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INTRODUCTION

We had the great honor of organizing the CBU International Conference 2017 (CBUIC 2017): Innovations in Science and Education in Prague, Czech Republic. It was truly a great pleasure for us to greet a lot of participants from many different countries attending CBUIC 2017! We firmly believe that the conference will become an important international event in the field of crossindustry discussion about innovations in Education and Science.

CBUIC 2017 was organized by Central Bohemia University and Unicorn College, Prague, Czech Republic. Proceedings were published by Central Bohemia University.

Two cooperating organizations supported the three-day conference. There were 222 papers accepted and another 22 abstracts for presentation at CBUIC 2017, contributed by 522 authors from 27 countries. We had four plenary speeches and several well-known scientists and experts, to give invited talks at different sessions.

The purpose of CBUIC 2017 was to provide a forum for the participants to report and review innovative ideas, with up-to-date progress and developments, and discuss the novel approaches to application in the field of their own research areas and discuss challenges of doing science and education.

We sincerely hope that the exchange of ideas on doing research, science and improving education will help the participants, and international cooperation sharing the common interest will be enhanced.

On behalf the Organization Committee of CBUIC 2017, we would like to heartily thank our cooperating organizations for all they have done for the conference. We would also like to thank the authors for their contribution to the proceedings; the participants and friends of CBUIC 2017, for their interest and efforts in helping us to make the conference possible; and the Editorial boards for their effective work and valuable advice, especially the CBUIC 2017 Secretariat and the CBU staff, for their tireless efforts and outstanding services in preparing the conference and publishing the Proceedings.

Petr Hájek, Central Bohemia University  
David Hartman, Unicorn College  
Conference chairs
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Sherzod Tashpulatov, Czech Technical University, Prague, Czech Republic
Mária Bohdalová, Comenius University in Bratislava, Slovakia
Petr Hájek, Central Bohemia University, Unicorn College, Prague, Czech Republic

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ECONOMICS AND BUSINESS
PROBLEMS OF IMPLEMENTING A BALANCED SCORECARD AS A MANAGEMENT TOOL IN UNIVERSITIES

Maria Arzamastseva,¹ Marina Khayrullina²

Abstract: With the globalization of the economy, close attention should be given to the strategic management of higher education institutions as representatives of one type of company. The main problem of university management lies in the gap between current results and ultimate goals of the university. Therefore, tools to link strategic plans to operational activities are needed for average employees. This article describes conditions and problems of implementing a balanced scorecard at different levels as a modern management tool both in foreign and Russian universities. The given study has practical value and can help to increase the efficiency of university activities.

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Keywords: BSC, tool, university, education, management, strategy.

Introduction

A balanced scorecard is an important tool for developing and implementing organizational strategies. It is a relatively new instrument for Russian universities and needs further development because of the need to shift to market principles of functioning with tightened performance requirements on the part of regulatory authorities and the business community. Thus, the improvement of this instrument and its adjustment to the educational environment are of academic and practical significance.

Theoretical Basis of the Study

In the most general sense, the balanced scorecard (BSC) is a concept for managing strategic development of an enterprise in regard to its performance. As Lawrie and Cobbold demonstrated (2002) the concept has undergone three successive stages of development.

Norton and Kaplan (1997) stressed a basic list of BSC mandatory characteristics on which modern researchers still base. BSC is always a combination of financial and non-financial scores. The number of scores being limited and varying within 15–20–25. The scores are grouped into four blocks called ‘Perspectives’: ‘Finance,’ ‘Customers,’ ‘Internal Processes,’ and ‘Innovation and Training.’ The latter two have been subsequently renamed as ‘Internal Business Processes’ and ‘Training and Development.’ The scores are selected according to an organization’s strategic objective. Typically, one or more types of scores are associated with one target. In selecting the scores, the expert evaluation given by the company’s top managers is taken into account. For the company management, forming BSC provides not only the opportunity to use information available to them only, but also ensures their approval and support through personal involvement. There are special causal relations among the four ‘Perspectives’ that were not clearly described in the early works of Kaplan and Norton (1997), though their existence is noted, as well as the interdependence between measures to improve productivity (lead) and indicators of the measures efficiency (lag).

The initial absence of a clear definition of BSC resulted in numerous attempts to change the original model. These changes mainly considered increasing or decreasing the number of scores and renaming of ‘Perspectives’ or blocks. In general, this revealed flaws in the earlier development of BSC and encouraged Norton and Kaplan (1997) to develop a second generation BSC. This next version differed to the original in regards to two features:

- Each score type related to a definite strategic objective. That is, the new design aimed to match the strategic objectives with one or more score types and group these into one of the four ‘Perspectives’; and
- Causal relations among the strategic objectives were visualized in a ‘strategic map.’

A distinct feature of this second BSC version was that it specified and visualized how the perspectives of ‘Training and Development,’ ‘Internal Business Processes,’ and ‘Customers’ connected to the final unit of ‘Finance.’ It was this change that gave rise to a new wave of disputes and BSC versions. The

¹ Faculty of Business, Novosibirsk State Technical University, Russia, mariaarzamastseva94@gmail.com
² Faculty of Business, Novosibirsk State Technical University, Russia, khayrullina@corp.nstu.ru
second-generation model did not suit many organizations. The four blocks (or Perspectives) either excluded important organizational blocks or contained ones that were irrelevant.

There were certain other drawbacks of the second model. Firstly, the second BSC model assumed that the company’s mission and strategic plan, on which the balanced scorecard was built, was clear to all members of the management team. Most often, this assumption failed to correspond to what ensued in practice. Secondly, the model did not consider the range of individuals responsible for choosing the above mentioned strategic objectives. Finally, the initial strategic objectives were selected prior to defining their interconnections. That is, the objectives were selected and then their links were depicted in the diagram.

The first-generation model was aimed at the selection of the scores, while the second-generation model focused on the links between the scores and the manner in which they are grouped.

Today the third BSC generation consists of two modules. The first is the Target Report (the Report), which is the reference point for defining strategic objectives. The Report includes several categories to allow those responsible to concentrate and chose specific objectives efficiently easily. For each category, experts forecast and assess the probability of achieving certain objectives by a specific date (typically three years ahead). The second module represents the first-generation mode (Kaplan, 2010). The BSC may seem rather multidimensional and difficult to perceive and build. However, considering the correctly compiled elements of the system and a well-balanced set of scores in unison can achieve a single strategy in any organization. The BSC is a flexible system in terms of opportunity to change its components, and any organization can tailor it for specific goals and objectives.

Relevance of BSC for Universities

For Russian universities, the introduction of BSC is governed by the following critical conditions of the current development stage:

- The opportunity to coordinate strategic objectives with operational activity aimed at implementing the strategy for international competitiveness;
- The relevance of non-financial scores, intangible assets and up-to-date information to ensure the university’s business reputation and image;
- Increase in the importance of stakeholder concept due to the significant role of higher education in developing an individual and the society as a whole; and
- A timely response to inconsistencies in business to achieve expected results.

The stages for introducing the BSC into the university management system can be identified as follows:

1. The choice (formulation) of the development strategy;
2. Design of the strategic map;
3. Identification of causal relations;
4. Selection of strategic scores;
5. Development of the motivation and staff encouragement system;
6. Assessment of the extent to which the objectives have been achieved; and
7. Monitoring and adjustment of the strategic plan.

For the leading Russian universities, the strategic objective is to ensure international competitiveness and a listing in world rankings to prove high-level educational quality and graduate demand. Therefore, for universities, the ‘Perspectives’ need to be linked to the main areas of activity that determine the international competition ranking.

The aim of this study is to ‘superimpose’ the first generation BSC model on the scorecard defining the position of the best known international rankings. The objective is to build a balanced scorecard for a university to ensure its place in global rankings and provide a solution for current activities.

**Data and Methodology**

The first stage involved an analysis of scores of four international rankings: the Quacquarelli Symonds (QS) World University Rankings, the Times Higher Educational World University Rankings (THE), the Academic Ranking of the World Universities (ARWU), and the Ranking Web of universities (Webometrics), as well as two Russian ratings: the National Ranking of Universities and the Ranking of Higher Education Institutes in Russia.
This analysis identified areas that could be developed to promote international competitiveness and global ratings. These included:

- Education;
- Research work and innovative activities;
- International activities; and
- Entrepreneurial environment.

In the second stage, a sample of leading Russian universities and Novosibirsk State Technical University were assessed for areas that directly or indirectly promoted international competitiveness and global ratings. The former involved 10 Federal and 29 National Research Institutes of Russia included in the Project for enhancing international competitiveness, known as ‘5/100’. The Novosibirsk State Technical University held the status of a regional support university.

In the third stage, the content of ‘Perspectives’ for a higher educational institution was analyzed using the traditional BSC model and the strategic objectives defined. Each ‘Perspective’ had at least one strategic objective in the context of areas defined at Stage 1.

In the fourth stage, the score system obtained in Stage 2 was superimposed on the ‘Perspectives’ (Stage 3) and areas (Stage 1).

**Results and Discussion**

A total of 30 scores was obtained (Table 1). A BSC was developed that met the strategic objectives of international competitiveness and ensured integrated development of current activity aimed at promoting local competitiveness, with the university regional specificity considered (Table 1).

<table>
<thead>
<tr>
<th>Perspectives</th>
<th>Strategic objective in the following directions</th>
<th>Scorecard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finance</td>
<td>E: Increase in the level of extra-budgetary funds received from educational services</td>
<td>1. Share of income received from extra-budgetary sources in the total income from educational activities (%)</td>
</tr>
<tr>
<td></td>
<td>R: Growth in research and development funding</td>
<td>2. Volume of research work per staff member</td>
</tr>
<tr>
<td></td>
<td>I: Increase in the number and amount of international grants</td>
<td>3. Volume of extra-budgetary funds received from international grants</td>
</tr>
<tr>
<td></td>
<td>B: Growth of funds received from engineering services, commercialization of the developed technologies</td>
<td>4. Share of revenues from commercialized technologies in the total income from all sources (%)</td>
</tr>
</tbody>
</table>
| Customers    | E: The demand in the university graduates; 100% employment of graduates | 5. Average Uniform State Exam score for university admission  
6. Number of textbooks and teaching aids developed  
7. Level of employer satisfaction with the graduate training quality (received via questionnaire; %)  
8. Employment rate (%) |
|              | R: Increase in research and development activities which are carried out for business and the region | 9. Percentage of Masters/Postgraduate students in total student population  
10. Percentage of students engaged in research and development activities on a paid basis  
11. Number of monographs published |
<table>
<thead>
<tr>
<th></th>
<th>Internal business processes</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>I:</td>
<td>Development of academic mobility through programs of two diplomas, internships, etc.</td>
<td>23. Level of public and expert activity of the university staff (%)</td>
</tr>
<tr>
<td>B:</td>
<td>Development of innovative entrepreneurship (startups)</td>
<td>24. Number of basic chairs</td>
</tr>
<tr>
<td>E:</td>
<td>Development of e-resources in management and education (e-workflow; distance learning technologies)</td>
<td>25. Number of trainees in supplementary vocational training programs from partner enterprises</td>
</tr>
<tr>
<td>R:</td>
<td>Creation of an effective ‘innovation lift’ to promote the results from research and development to the market</td>
<td>26. Number of publications in international citation databases (Web of Science, Scopus)</td>
</tr>
<tr>
<td>B:</td>
<td>Performance maximization of all departments and employees in terms of result achievement</td>
<td>27. Citation per one staff member in international citation databases (Web of Science, Scopus)</td>
</tr>
<tr>
<td>E:</td>
<td>Development of university human resource management system (recruiting; evaluation; training; promotion)</td>
<td>28. Number of unique external links to the university site pages</td>
</tr>
<tr>
<td>R:</td>
<td>Close integration of science, business, education</td>
<td>29. The ratio of the average monthly salary of a staff member to the average monthly salary in the region (%)</td>
</tr>
<tr>
<td>I:</td>
<td>Entry into international markets to attract applicants, teachers, and to promote the University</td>
<td>30. The share of funds from all sources aimed at the development of the property complex (%)</td>
</tr>
<tr>
<td>B:</td>
<td>Building of a business environment</td>
<td></td>
</tr>
</tbody>
</table>

It is noted that the perspective of ‘finance’ denoted the key focus of fundamental change in the Russian universities funding structure, i.e., an overriding proportion of extra-budgetary sources from educational, research, international, and innovative business.

The term ‘customers’ was applied to students and their parents (as the main customers of educational services) and to business as a consumer of human resources, educational services (additional
education), and research results. ‘Internal business processes’ reflected the efficiency of the university management as a whole. This was the weakest point for Russian universities, especially public universities with conservative views of change. ‘Capacity’ was primarily associated with staff and the environment in which they perform their professional tasks.

Problems of the BSC introduction in Russian universities

The process of Russian universities adapting to new management technologies is affected by attitudes, customs, approaches to the strategic management of public organizations, and other factors. These concerns are fully realized with the introduction of BSC.

The first and main problem is the non-applicability of the classic score set, especially with the perspective of ‘finance’ in the university environment. The main objective of the public university is to provide educational services and social development and subsequently, the BSC emphasizes scores related to academic activity in contrast to that emphasized for commercial organizations. Thus, the selection of key performance scores for universities is a new and individual process.

The second problem follows on from the first. The methodologies of evaluating any university activity, including national and international rankings, involves a high proportion of qualitative scores, which are less evident and tangible, and thus, difficult to quantify measure and analyze. These include the relevance of research areas carried out by the Chairs, the quality of the subject training, and student satisfaction. There is a problem of objective analysis and evaluation of a significant part of the university performance.

Other classic problems connected with introducing BSC into the management system typical of almost all Russian organizations include the lack of linking strategic objectives with operational activities and inadequate support from upper management.

Conclusion

The article presents concepts of the mechanisms for integrating the classic BSC model with strategic activities of Russian universities that deal with the challenge of being listed in international rankings. As a result, a balanced scorecard was developed to achieve strategic objectives and integrated growth of current activities.

The study also shows that there are certain problems with introducing BSC in Russian management system. Nevertheless, this tool can form the methodological basis for the management, building, and streamlining of all university processes, indicating a need for further methodological development and follow-up studies.

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A TURBULENT BUSINESS ENVIRONMENT AS A CRITERIA OF OPTIMAL STRATEGY TO ENTER INTERNATIONAL MARKETS

Ludmila Bahmane

Abstract. This work provides an analysis of marketing solutions and developments algorithm for Latvian enterprises entering into foreign markets based on an example of 185 studies made under the supervision of the author. The proposed algorithm is a part of the pedagogical activities in higher education institution of Latvia (RISEBA) over the last 10 years and it suggests the training of new marketing solutions development techniques in conditions of the turbulent business environment. The application of the proposed algorithm assumes the use of modern marketing technologies, including matrix methods, cluster, and screening analysis. The algorithm proposed is being analyzed on the example of Latvian enterprises. This work describes the use of the author’s proposed matrix of “consumer’s demand for creativity (novelty),” that is relevant in the development of creative marketing management solutions of such business spheres, where the novelty of products (services) is an important competitive advantage. The high versatility, simplicity and availability is proven for mastering and using the proposed algorithm.

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UDC Classification: 339.5

Keywords: marketing management, turbulent business environment, “consumer’s demand for creativity” matrix, cluster, matrix, screening analysis.

Introduction

Marketing management – for over 100 years, management has been forming the science of organization management, including business structures. Up to the middle of the fifties in the 20th century, marketing was considered to perform almost the same functions as sales. The sixties and the beginning of the seventies have become a golden era due to the new concept of marketing, which has become a basic philosophy of business at the time. Let’s try to focus on a few aspects of organization marketing factors (Kotler & Keller, 2012) that specify an external business environment. The external business environment can’t be constant, it is changing. As of such, it is possible to distinguish between the environment with slow changing parameters and the environment with fast and unpredictable changes. When some time has passed from that day, such an environment can be defined as the “calm” environment. Managers at that time were to organize their enterprises in such a way, that all opportunities of such an environment have been utilized completely. The situation of business structures becomes more complicated due to new conditions. With each year company management must consider not only increasing the number of environmental factors influencing the organization, but their global nature as well. Due to globalization with the increased number of management factors and their new features, there has been a new realization that management situations become unpredictable. There has been a new recognition of marketing managements in conditions of unpredictable, rapidly changing, and turbulent environments. New conditions require an understanding of an entirely new field of jurisprudence, marketing, and recognition of new cultural values. For the small and medium business of small states, such management requirements are especially difficult to realize. To achieve success, companies must compete in foreign markets and withstand competition with foreign companies at home as well. For Latvian entrepreneurs, an important and objective factor is the size and development level of the national market. Per the latest data, there are at most 1.97 million inhabitants in Latvia (2016).

Turbulent business environment as a new factor of marketing management

In modern marketing, several authors have been researching the factor of environmental changes as specific organization factor. Thus, Charles F. Sabel and Jane E. Prokop (1997) have stated in their work “Stabilization through reorganization” (Sabel & Prokop, 1997) and Michael Hammer and James Champy in their book “Reorganization of corporation” (2009), that up to about 1975, the environments of organizations have been stable with uncommon global cataclysms and the changes in such environments were insignificant. Rapidly changing environments can be characterized by increased instability, unpredictability, and the behavior of managers has become greatly complicated

1 RISEBA University, Riga, Latvia, ludmila.bahmane@inbox.lv
when compared to the behavior in conditions of the “calm” environment. In time, the quantity changes into a new quality, i.e. global changes arise, which lead themselves to the new concept of “global environment” (Lambin, 1994; Porter, 2008). Because of environments transitioning from “calm” state to rapidly changing, global changes of main economic environmental indicators have occurred.

As a consequence, the following characteristics may be noted: the rapid shortening of product’s life cycle; decreased products development time; maintaining warehouses becomes unprofitable; changes in requirements of technical subsystem of organization; increased complexity of products; changes in relationships between customers and manufacturers (confidence in competence); impracticality of maintaining own expert science intensive services; consumer dictates suppliers; increased toughness of competition; and pricing is not the most important factor in cooperation. As a result, the management attempts to find new methods and ways to manage businesses.

So, marketing management shows up. This means, that alongside to P. Kotler, new gurus of marketing appear such as Lambin J. J. (Lambin, 1994), and for instance, Sweden marketing school (Best, 2014). However, not always new management opportunities could reach small and medium business before old market economy problems are transformed. The crisis has become global. The fragmentation of markets continues to grow; the bounds of traditional markets become blurred due to substitutes and new technologies. Purely national markets transform into global and crisis management appears (Kotler & Keller, 2012). Specialists begin to mention that during the last 10 years, the business environment has changed entirely (Porter, 2008; Best, 2005). The concept of turbulence came from physics, which soon enough has been transformed into the concept of “turbulent business environment” (Lambin, 1994; Bahmane, 2010). There are not only forecasted changes of environmental factors, but the rules themselves alter as well, which describe how organizations should operate. And these rules change rapidly and unpredictably. The latest example of such changes are: withdrawal of Great Britain from the EU, new American policies of Trump, political factors (sanctions and counter-sanctions of the Russian Federation), which require to dismiss or to reprofile entire fields of the food industry of Latvia completely. What will happen to Latvian companies? Nobody knows that. How should management of these organizations operate for small and medium business?

It is considered, that in such turbulent environments the most important thing is the increased ability of organizations to adapt and survive (Hammer & Champy, 2009). A turbulent environment dictates specific requirements, which should be obeyed by enterprises. The conditions may be confused with requirements, because managers of a new company, irrelevant of its strong position, must “catch up” onto changes of the environment and make changes to their company in due time, otherwise, after some rather short time it will be too late to take such actions and former positions will be lost to more modern competitors. In short, these requirements are as follows: decreased the size of the organization; reorganization (reengineering); constant monitoring of the environmental situation; the immediate response to changes of the environment; the launch of “in time” production systems. In conditions of turbulent business environments, the enterprises must have clearly recognizable advantages, which should be developed for the organization to operate in advance by using a proactive marketing strategy instead of a reactive one. Such competitive advantages can be estimated by using a “Demand for novelty” matrix (Bahmane, 2005).

The ability to see new opportunities in the big global market becomes the most important conditions of survival for small and medium business, especially in small countries. The analysis in strategical marketing decision making and generation allows the author to state that: by using known (but little used) technologies to generate marketing solutions, it is possible to find an adequate solution for turbulent environments, including a strategical one (Bahmane, 2010).

**Algorithm of marketing decision making in a turbulent business environment**

For the criteria of optimality for marketing decisions generation in conditions of a turbulent environment, the following factors are considered:

1. decreasing risks;
2. direct search of maximum possible number of solution variants;
3. reliance upon developing competences.
It is important to formulate an algorithm as a sequence of logical activities to solve specific tasks and to teach modern analytical methods that provide a fast and direct search of possible marketing solutions, the choice of the effective one, and if there is none, to develop and offer one’s own solutions without fear. To achieve this, the manager should be able to consciously make:

- Decisions of the 1-st type – environment is developing predictably, thus solutions have a predetermined algorithm already known to manager.
- Decisions of the 2-nd type – from a set of multiple possible solutions, the manager must choose the most appropriate one. It is necessary to know the existing criteria to choose effective solutions.
- Decisions of the 3-rd type – solving untypical tasks. Manager can analyze unfamiliar situations and information, and generate new information.
- Decisions of the 4-th type – the ability to see new connections and opportunities, as well as the ability to generate completely new information based on this information in conditions of a turbulent business environment. For problems of this type the elements of creativity become absolutely required.

It is important, that in addition to these widely used and well-known matrices (Porter, Ansoff, Boston, McKinsey, SWOT) (Ansoff, 2007), the possibilities of the author’s matrix, “solutions novelty – demand for novelty by consumers”, application are investigated (Bahmane, 2005) (see. Figure 1).

![Figure 1: Matrix of “Solutions novelty – demand for novelty by consumers”](image)

<table>
<thead>
<tr>
<th>Level of management solutions novelty</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Strategy of quality increase (company image strategy, strategy of leadership in the field)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Benchmarking strategy (strategy of new products superquality, strategy of world leadership)</td>
<td></td>
</tr>
<tr>
<td>Minimum</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Strategy of proven quality (product brand strategy)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Strategy of new products (strategy of innovator image, strategy of niche leader)</td>
<td></td>
</tr>
</tbody>
</table>

Source: Bahmane (2005)

**Algorithm of securing strong position in foreign market**

The survival of small and medium businesses in the turbulent and rapidly changing conditions of the Latvian market depends entirely on the targeted search for new exporting opportunities by enterprises themselves. An example of a small Latvian company SIA ProBaltic has shown, that in conditions of market internationalization, the use of previously built databases, as well the application of screening analysis and matrix methods, allows finding and choosing the optimal marketing strategy to secure a niche in international markets by method of cabinet studies (Bahmane, 2010). The method of screening analysis, that has been mastered by example of studying 183 Latvian enterprises, indicates that there exists a specific searching algorithm to find the optimal solution with the choice of specific countries and markets, where products (or services) of a company will be able to secure a competitive niche. The main purpose of the company is to secure strong positions in foreign markets, by using the fastest direct search of possible marketing solutions.

Algorithm implementation stages.

1. Screening-analysis method (Cherenkov, 2006) allows for the solving of practically almost unsolvable task: to analyze market opportunities in the most comprehensive way with limited possibilities of the company (staff, time, resources). This can be used to define a list of high priority countries for further analysis.
2. If the environment is turbulent or rapidly changing, the screening analysis allows change of search criteria and to define multiple lists of high priority countries, which enable additional corrections to the international marketing strategy. So, when choosing some specific criteria and adapting them to specific conditions, the strategies of segmentation and positioning can be developed.

3. The environmental scanning method (Cherenkov, 2006) allows to separate specifics of the macro-environment and micro-environment, which can be used to determine a niche in potentially attractive countries, where the specific company can be competitive.

4. The Marketing-mix model use -7P(9P), which allows the company to ensure a full match in the needs of the target consumers in each of the chosen countries with the marketing capabilities of the company.

Screening analysis allows creating a list of high priority exporting countries by using a direct search among the 236 countries in the world in MS Excel software with conditional formatting tools. This method has been successfully used in RISEBA for 5 years in home tests of International marketing by students of the 3rd year for a wide variety of business structures – from small gambling business to banking. More difficult variants, which include the search for optimal selection criteria, comparative analysis of selected countries, and in-depth research of competitive niches, become bachelor’s or master’s degree thesis works.

The realization stages of optimal niche searching algorithm for a specific company in market globalization conditions can be summarized as follows below:

1. The object of the research is determined – a real company operating on the Latvian (European) market. The situation of the company is analyzed in conditions of the Latvian (or other national) market. The symptoms of problems, the base problem, and its research design are determined. A graph of the problem and solutions is designed.

2. The influence of micro-environmental factors on the operation of the company is determined with the PEST methods. The business environment type is determined: Stable? Changing? Turbulent? What is the company’s vision in these conditions?

3. The base market is conceptualized. The macro segmentation of the market is performed by using one of the well-known methods (Abel’s method, “fish,” “net,” 3D matrix).

4. Based on the matrix of “solutions novelty – demand for novelty by consumers” (Bahmane, 2005) an active marketing development strategy can be defined for the analyzed company based on the company’s competence and specific business development trends.

5. The base for further analysis is determined: the features of the company’s activities that make products (services) unique and competitive.

6. Based on the matrix of “local-global forces” the trends of advancement in international markets can be determined. The condition for search of new markets is defined – the strategy of the company is formed – standardization or adaptation, and the target of further research is determined: finding new markets, which are ready to accept the products of the company or finding the products, which are in high demand in markets known to the company. This decision is determined by the competitive (unique) features of the company’s products (services).

7. The screening analysis is performed to determine a list of high priority countries for further analysis. The screening analysis makes use of 4 filters which remove from a set of all countries those not matching the specific criteria.
   - 1-st filter. Potential is evaluated – macro-environment.
     - Review: socially-cultural norms, politically-legal norms, the economical state of countries, the geographical location.
     - Supposed selection criteria: customs tax, average income level per capita, the distance between exporting and importing countries, the population size of importing country, political disagreements between states (economic sanctions, embargoes).
   - 2-nd filter. Particularities of accepting specific products at the given location
     - Selection criteria evaluated: religious factors, informational provisions, historical premises, ethnicnal norms and traditions, market development stages.
3-rd filter. Specific factors influencing export.
  o Selection criteria evaluated: competition at the local market, similar substitutes of specific product, forecasts and real data on similar product sales at the market, acceptance rate by consumers, market entering expenses.

4-th filter. Target markets. Thus, a list of high priority countries is created for the search of a specific niche. From 236 available countries, only few are considered further, which is much easier.

8. Based on a list of selected countries (one, two and three) the environmental scanning analysis is performed by sections: economical, politically-legal, socially-cultural, technological.

9. Based on the McKinsey matrix (Kotler & Keller, 2012), the exporting strategy to the specific list countries is determined (from export to investments).

10. Competition analysis (per Porter) allows defining the most dangerous factors and risks for a company in conditions of the unstable environment. SWOT is constructed (TOWS).

11. Micro segmentation of the market is performed; the most attractive segment of the market is determined. VALS2, GLOBAL SKAN, (Kotler & Keller, 2012). By using a correlation or cluster analysis, the variants of product positioning are proposed in general and for the selected segment.

12. The distribution channels of the product are determined – how they match requirements of the target market segment in the selected country.

13. The price policy is determined and company tactics with an orientation to the selected market segment by maximally using a “price-quality matrix,” common competition matrix (Porter, 2008).

14. Communications strategy is developed considering specifics of the target consumer segment in the selected country.

Let us study one of the examples of the screening analysis application for exporting Latvian bakery “Lāči” products to potential (it is limited liability company founded in 1993) markets. The main activities: baking high quality bread per old-time Latvian traditions and making original confectionery. From a small bakery, “Lāči” has grown into a modern and stable enterprise with 200 employed persons and makes about 5 tons of bread daily. Net turnover is over 7.5 million EUR. Bakery “Lāči” creates and improves new products which are in high value not only in Latvia, but also abroad. The list of partnering countries of “Lāči” is: Russia, Ukraine, Estonia, Great Britain, Australia, Japan, the United States of America. The main market of “Lāči” products is ethnic. The niche for ethnical trading is open in markets when demand for exotic products from native populations allows immigrants to convert their contents and symbols of their ethnicity into products for profit. Selling exotic products and services is a rather profitable direction of business development, since immigrants offer products not readily available to get or be presented from anyone else. This is the advantage of “Lāči” products (especially of rye bread), which in the US and Great Britain markets is of high demand among immigrants from post-soviet states.

The product is standard for Latvia however, for exporting purposes a partial adaptation can be made; for example, the sugar amount in the product can be altered, depending on the customers’ preferences. The trademark is not about to be changed however, sometimes the products are sold under private trademarks of partners, which can be more recognizable by local customers. The package of products can be altered as well. The price is determined by considering expenses, logistics, and risks in Europe, while for non-European countries additionally customs taxes are included, and when necessary corrections by the market are made. Air transportation is used for making deliveries to far countries: Japan, USA and Australia. The bread is frozen; other products can have a storage life of up to one year. Delivery of products to the USA takes from one month to 6 weeks, and to Australia – about 2 months. Based on the matrix of “Local-global forces,” the company plans to work with standard Latvian products and adapt them only for the end consumers, instead of the target markets. In other words, it is more logical for the company to enter the transnational environment.

Based on the matrix of “Market attractiveness – development costs” (Cherenkov, 2006), the least expensive way to enter new markets has been determined – export sales via agents, importers and distributors. The company “Lāči” offers high quality products, which have multiple awards and quality certificates, so a standardization strategy should be chosen during a search for new
markets. It is necessary to find markets, which would be ready to accept the already existing products of the company. Presently the company has realized the “Strategy of proven quality” for products from the matrix “Novelty attractiveness.” In the future, it will be possible to develop a strategy of “Quality improvement, company image.”

The Screening analysis makes it possible to create a list of high priority exporting countries by choosing from the 236 world countries with a targeted search based on statistics from the World Bank.

- 1-st filter determines market potential and includes: GNI per capita with high income level (over 15265$), product import bans, the population of at least 3 million, distance (less than 3500 km).
  - The list of countries satisfying these conditions: Belgium, Denmark, Greece, Germany, Italy, the Czech Republic, France, Ireland, Slovakia, Spain, Sweden, Finland, Poland, Turkey, Belorussia, Croatia.
- 2-nd filter. Particularities of accepting a specific product at a given location. Selection criteria evaluated: insufficient information, import below average, customs taxes, the worst forecast of market development
  - The resulting list of countries: The Czech Republic, Denmark, Ireland, Slovakia, Croatia, Germany, and Sweden.
- 3-rd filter. Specific factors influencing export. Analysis of main competitors, business conduction problems, bad forecasts of market products.
  - The resulting list of perspective countries: Denmark, Ireland, Germany.
- 4-th filter. The target markets are determined, in which a company can find the strongest competitive niche, based on its competence.

Thus, only 2 countries remain: Denmark, and Ireland.

Conclusions of screening analysis

The method of screening analysis leads to the choosing of Denmark and Ireland as candidate countries for exporting. The base competition strategy for SIA “Lāči” in new markets is focused on niche differentiation. The comparison of “Lāči” with its main competitors in the target markets – “Lāči” is competitive in its pricing, despite the fact it is higher than prices of the local manufacturers. The company can position their product as a specially made product with ECO ingredients. From the International McKinsey matrix for estimation of exporting to foreign markets by SIA “Lāči” (determining an integral indicator of country attraction): the market of Denmark is highly attractive and competitive for “Lāči” while, the Irish market is highly attractive and medium competitive for “Lāči.” The main strategy here is exporting via company’s own representatives. In Ireland, the local population does not understand the concept of rye bread entirely however, in this country there are over 185 thousand immigrants from post-soviet countries that are familiar with this product, and they make the niche market for supplies of such a product. By using industry trends, ECO products should be introduced to target markets and benefit from low VAT rates (value added tax). When exporting products of “Lāči” to the markets of Denmark, the emphasis should be given to unique features of the product, such as high quality and handwork. When exporting products of “Lāči” to Irish markets, the high quality of the product should be emphasized, as well as the exporting country when advertising the product. In markets of Denmark the competition between trading networks and local manufacturers is high, and Germany is in close vicinity as well. On the other hand, the purchasing ability is high, and this market can be entered with niche food products. When competition increases, it should be stressed, that the product is exclusive and of Latvian origins.

Conclusions

In turbulent conditions– unpredictably and rapidly changing business environmental factors –active adaptation becomes a valid marketing technology, especially for small and medium businesses in Latvia.

The use of algorithms for standard marketing solutions allows for fast and adequate research of specific business environmental features and provides an active and adaptive marketing solution for the organization.
The higher the turbulence in a business environment is, the more actively small and medium businesses search for new niches by using specific selection criteria.

The authors proposed algorithm is rather simple for securing international markets by small and medium businesses’ marketing technologies, it shows its practicality in different businesses, times, and even the different abilities of managers.

The use of controllable solutions creativity – real opportunity to find variants for achieving goals of a business structure in conditions of a turbulent environment.

The use of a matrix of “Solutions novelty – demand for novelty by consumers” by specialists in the process of developing marketing solutions, allows them to find new aspects for development of adaptive marketing solutions.

In the presented work, the strategy development for an enterprise entering international markets has been described, the stages of decision making and choice of new target market have been analyzed. Based on an example of the enterprise “Lāči,” the search for the most attractive international market has been made for this specific Latvian company.

References
NIKE ON INSTAGRAM: THEMES OF BRANDED CONTENT AND THEIR ENGAGEMENT POWER

Carmen Balan¹

Abstract: Instagram is the fastest developing new media of high interest to marketers. As at December 21, 2016, the community included 600 million Instagrammers. This paper explores the problem of whether various themes of branded content differ significantly in their engagement power (ability to generate likes, views, and comments). The methodological approach consists of online monitoring of content in posts of a leading brand, Nike, for its 17 verified-badge Instagram accounts. The study focused on posts during the month of February 2017. The chi-square goodness of fit test (for one variable) was applied in the data analysis stage of the research. The initial hypothesis of significant differences between branded content themes as regards their engagement power was accepted. The practical implications of these findings for marketers include better selection of brand messages for Instagrammers and an increase in engagement levels.

JEL Classification Numbers: M30, M31 DOI: http://dx.doi.org/10.12955/cbup.v5.894

Keywords: Instagram, branded content, engagement, likes, views, comments, followers

Introduction

The dynamics of Instagram reveals one of the most rapid growth areas among social media. Instagram first launched on October 6, 2010. The interest in this new communication channel was overwhelming. The first day had 25,000 people signing for membership (Instagram, 2010, October 6). According to the 2016 press news of Instagram (2016, December 21), 100 million people had joined the community by the end of the second semester of 2016. The same source reported the number of Instagrammers had then surpassed 600 million members.

Nike is a highly recognizable consumer brand present on Instagram. It is a leading brand in the global sportswear market with a market share that was worth 17.2% in 2015 (Euromonitor International, 2016). The brand consistently held the leading position in every year of 2010–2015. According to the report published by Interbrand in 2016, this brand ranks eighteenth in the Top 100 best global brands and its market value reached USD 25034 mil. (Interbrand, 2016). As a comparison, one of its strongest competitors, Adidas, ranks sixtieth in the same top 100, with a brand value of USD 7 885 mil.

This paper presents the findings of research into the engagement power of branded content themes of Instagram posts. The Nike brand was chosen for this purpose because of its global ranking, as mentioned above. To the best of the author’s knowledge, this research has two unique features compared to studies with findings published in academic literature: 1) the present research is the first to address the topic of the engagement power of branded content themes on Instagram, and 2) it is the first to focus on Instagram posts of a leading brand such as Nike.

Literature Review

Since its launch in 2010, Instagram has not gained a high status as a priority field of study for academic researchers. A search of the Thomson Reuters database, Web of Science Core Collection, on March 19, 2017, using the keyword ‘Instagram’ as a research topic, revealed a total of 353 published studies, of which 165 were articles. A search of the same database using the same keyword, this time as a ‘title,’ revealed 90 results of which 44 were articles. These numbers indicated an opportunity for designing and implementing a future study relating to Instagram as a communication tool used by individuals and companies.

Many of the 90 title results were studies in categories that were related to computer science. The business, management, and economics categories of the academic literature had a lower contribution to the academic literature focused on Instagram topics. The vast majority of studies relating to Instagram focused mainly on the use of this tool by individuals and to a lesser extent by companies. Those relating to the content posted by brands on Instagram were uncommon. Consequently, the findings relative to the branded content posted on another online social media site, Facebook, were used to form the hypothesis for the current research paper relating to Instagram.

¹ The Bucharest University of Economic Studies, carmen.balan@mk.ase.ro
Lee et al. (2015) identified five primary social and psychological motives for using Instagram. Based on the findings of a survey of Instagram users, the main motives were the following: social interaction, archiving, self-expression, escapism, and peeking. Instagrammers seem to use the platform to escape from their everyday lives and connect with friends, family members, and other people via an online realm of existence.

Instagram has provided brands with a social media platform for visual communication with their target market. Various brands have experimented with the viral marketing of content in the form of videos. Examples include the brands of the fashion sector, especially the luxury brands (Wolny & Mueller, 2013). Brand-sponsored videos aim to attract the attention of visual influencers and to engage the target customers. Within the fashion sector, major brands such as Zara, Mango, and El Corte Ingles actively use social media as a communication channel (Gonzalez, 2015).

Many research studies of Facebook show that this type of brand content influences engagement on that particular site. Examples of such studies are those carried out by Taylor et al. (2011); De Vries et al. (2012); Chauhan and Pillai (2013); and Tafesse (2015).

Beukeboom et al. (2015) found that brand evaluations may improve with audience exposure to Facebook posts. However, their findings underlined that exposure to more of the same content does not generate a difference in terms of brand evaluations.

The study of Coelho et al. (2016), which related to 680 Facebook posts and 1169 posts on Instagram, measured the effect of post type (advertising, fan, events, information, and promotion) on audience likes and comments. The findings disclosed that post types focusing on events and promotion led to a higher involvement of followers, especially on Instagram.

According to the findings of Jahn and Kunz (2012), valuable content, either functional or hedonic, is an important driver that attracts users to fan-pages. Based on their research, the content must be interesting, entertaining, and innovative to be impactful.

Luarn et al. (2015) found that the type of post content (information, entertainment, remuneration, and social) of brand pages on Facebook significantly influenced the engagement of users. They found that the post content that focused on entertainment generated higher levels of commenting and sharing than other types.

The survey by Yuki (2015) showed that, on Facebook and other social media sites, the posts that were shared the most were those that conveyed the emotion of happiness. In addition, the content that involved usefulness increased the sharing likelihood among women and people over 55 years.

The various research findings relating to social media such as Facebook has led to the conclusion that branded content type influences engagement. These results lead to the hypothesis that Instagram content themes will differ in the engagement that they generate among followers.

**Data and Methodology**

The aim of this research was to determine whether various themes of branded content were significantly different in their engagement power (ability to generate likes, views, and comments). The initial hypothesis was as follows: there are significant differences between various themes of branded content in regards to their engagement power. The research focused on the Nike accounts existing on Instagram. The method of data collection involved observations of the online environment.

The scope of this research involved themes corresponding to the branded content posted by Nike, not by consumers and fans in their Instagram accounts. Thus, accounts were carefully selected to avoid systematic errors due to unclear ownership of the various ones that focused on Nike Sportswear on Instagram. The selection of each account was based on proof of ownership by Nike. This proof was the existence of a verified badge on the Instagram account associated with a Nike theme. A total of 20 verified-badge Instagram accounts resulted from the selection process.

Data of all photo and video posts by the Nike brand during the interval February 1–28, 2017 were collected by observing each verified-badge Instagram account. From the 20 verified-badge Instagram accounts of Nike, only 17 had content posted during February 2017. The three accounts that had no posts during this month were Nike Lab, Nike Toronto, and Nike Young Athletes.

In the case of each post, the following data were monitored: the theme of the branded content, the number of likes (for photo posts), the number of views (for video posts), and the number of comments
(associated with both photo and video posts). The themes were defined by qualitative analysis of the post content. Thus, the themes were not pre-defined before the design of the study, but they were developed during the research process, based on results of content monitoring of posts by the Nike brand. In the case of the video posts, the online monitoring included viewing the content for theme identification.

A total number of 121 posts in the study interval of February 2017 were recorded for the 17 verified-badge Instagram accounts of Nike. These were analyzed in terms of engagement power. In essence, the indicator 'engagement power of a post' was the sum of all reactions generated by that specific post among the Instagram followers. In the case of a photo post, the engagement power was reflected by the number of likes and comments, while in the case of a video post, the number of views and comments indicated the engagement power. Overall, the engagement power of a branded content theme was the sum of likes, views, and comments generated by the Nike brand followers.

A database was created to ensure a systematic approach to data collection from online monitoring. For each post, both qualitative and quantitative information were registered. Qualitative information consisted of the type of post (photo or video) and the theme of the post content. Quantitative information included entries relating to the number of likes, views, and comments generated by each post. Evidence of the posts was kept chronologically according to the date of the post.

Data were analyzed using the chi-square goodness of fit test (with one variable). This test determines whether certain models fit the observed data (Malhotra, 2010). The value of $X^2$ was calculated as follows:

$$X^2 = \sum \left[\left(EP_o - EP_e\right)^2/EP_e\right]$$

where:

- $EP_o =$ engagement power resulted from observation,
- $EP_e =$ expected engagement power.

**Results and Discussion**

The metrics for content posted on 17 verified-badge Instagram accounts of the brand Nike are listed in Table 1.

<table>
<thead>
<tr>
<th>Instagram accounts of Nike</th>
<th>Total posts as at March 19, 2017</th>
<th>Total followers as at March 19, 2017 (in thousands)</th>
<th>Total posts for February 2017</th>
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<td>nikesb</td>
<td>2 177</td>
<td>4 400</td>
<td>20</td>
</tr>
<tr>
<td>nikesbath</td>
<td>1 040</td>
<td>57</td>
<td>26</td>
</tr>
<tr>
<td>nikesportswear</td>
<td>1 193</td>
<td>5 000</td>
<td>4</td>
</tr>
<tr>
<td>nikebasketball</td>
<td>273</td>
<td>1 100</td>
<td>3</td>
</tr>
<tr>
<td>nikewomen</td>
<td>730</td>
<td>6 300</td>
<td>1</td>
</tr>
<tr>
<td>usnikefootball</td>
<td>638</td>
<td>2 300</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>12 118</td>
<td>227 575</td>
<td>121</td>
</tr>
</tbody>
</table>

On March 19, 2017, the studied accounts reached a total of 12,118 posts by Nike (since the date of the setting-up of each account). The total of followers of these accounts was 227.57 million.

Some accounts were more active than others, from the perspective of the total number of posts. Five of the 17 accounts received 56.5% of the total posts. These accounts were nikesb, nikefootball, nikesportswear, nikesbau, and nikerunning.

In February 2017, the 121 photo and video posts to the 17 verified-badge Instagram accounts generated an engagement level consisting of 9,247,138 likes, views, and comments (Table 2). The average engagement power per post was 76,423 likes, views, and comments. This statistic varied among the content themes presented by the photo and video posts on the verified-badge Instagram accounts. The strongest posts in terms of engagement power were related to those of user experience (194,350 likes, views, and comments), while the weakest were those relating to sport and style or fashion (3365 likes, views, and comments).

<table>
<thead>
<tr>
<th>Brand content theme</th>
<th>Number of posts</th>
<th>Total engagement power of the theme</th>
<th>Average engagement power per post</th>
</tr>
</thead>
<tbody>
<tr>
<td>Art and sport</td>
<td>4</td>
<td>297,457</td>
<td>74,364</td>
</tr>
<tr>
<td>Aspirational values</td>
<td>30</td>
<td>3,890,330</td>
<td>129,678</td>
</tr>
<tr>
<td>Branded product</td>
<td>23</td>
<td>1,219,324</td>
<td>53,014</td>
</tr>
<tr>
<td>Sports and style/ fashion</td>
<td>3</td>
<td>10,096</td>
<td>3,365</td>
</tr>
<tr>
<td>Sports competitions</td>
<td>11</td>
<td>1,013,265</td>
<td>92,115</td>
</tr>
<tr>
<td>Sports people in action</td>
<td>42</td>
<td>1,261,870</td>
<td>30,045</td>
</tr>
<tr>
<td>User experience</td>
<td>8</td>
<td>1,554,796</td>
<td>194,350</td>
</tr>
<tr>
<td>Total</td>
<td>121</td>
<td>9,247,138</td>
<td>76,423</td>
</tr>
</tbody>
</table>

Source: Author

In the month of February 2017, the aspiration values, itemized in Table 3, pertained primarily to ‘equality’ as communicated by Nike. The result of chi-square goodness of fit test on the engagement power expected and observed are presented in Table 3.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Art and sport</td>
<td>297.46</td>
<td>1,321.02</td>
<td>793.08</td>
</tr>
<tr>
<td>Aspirational values</td>
<td>3,890.33</td>
<td>1,321.02</td>
<td>4,997.16</td>
</tr>
<tr>
<td>Branded product</td>
<td>1,219.32</td>
<td>1,321.02</td>
<td>7.83</td>
</tr>
<tr>
<td>Sports and style/ fashion</td>
<td>10.10</td>
<td>1,321.02</td>
<td>1,300.90</td>
</tr>
<tr>
<td>Sports competitions</td>
<td>1,013.26</td>
<td>1,321.02</td>
<td>71.70</td>
</tr>
<tr>
<td>Sports people in action</td>
<td>1,261.87</td>
<td>1,321.02</td>
<td>2.65</td>
</tr>
<tr>
<td>User experience</td>
<td>1,554.80</td>
<td>1,321.02</td>
<td>41.37</td>
</tr>
<tr>
<td>Total</td>
<td>9,247.14</td>
<td>9,247.14</td>
<td>7,214.69</td>
</tr>
</tbody>
</table>

Degrees of freedom: 6
The critical (theoretical) value of Χ²: 12.59 (p = 0.05)

Source: Author

The comparison between the critical (theoretical) and calculated value of the chi-square statistic showed that the calculated overpassed the critical value. Thus, the null hypothesis that the observed and the expected were the same was rejected. Therefore, the results indicate the differences between content themes regarding their engagement power shown were statistically significant.
The research results present a twofold perspective for discussion. The first pertains to previous research findings for Instagram; and the second about the existing research into Facebook as a major social media with high popularity. Relating to Instagram, the results of this study align with the findings of Coelho et al. (2016), according to the types of posts differing in the level of engagement they generate. Relating to Facebook, the findings of the research presented in this paper are similar to those of Luarn et al. (2015) and Yuki (2015) in regards to the different impact of post types. At the same time, there are similarities with the findings of Taylor et al. (2011); De Vries et al. (2012); Chauhan and Pillai (2013); and Tafesse (2015), from the viewpoint of brand content type influencing engagement, as in the case of Facebook.

Conclusion

The findings of this study revealed statistically significant differences between the content themes of Instagram posts by the brand, Nike. In addition, content that focused on user experience and aspirational values appeared to have more engagement power than other themes approached by Nike. The implications of these findings for the research domain is that they lead to more detailed studies of the engagement power of themes of branded content. The present study focused only on the posts of the brand, Nike. Further research could consider the engagement power of themes corresponding to posts of competing brands or by brands from other markets. In this respect, several new research questions arise. Examples include: Do the posts focused on user experience always have more engagement power compared to all other branded content themes? What aspirational values have the highest engagement power? Does the engagement power of a specific theme differ among the brands existing in the same sector? Is the engagement power dependent on the share held by the theme in the total number of posts made by the brand on various themes? Is the engagement power of a theme influenced by the type of product or market? How does the execution of each photo or video post influence significantly the engagement power? For practitioners, this study shows that impactful Instagram strategies that generate high levels of engagement require careful selection of branded content themes. Based on the present findings, practitioners are recommended to favor posts referring to user experience, aspirational value, and sports competitions, rather than posts focused on branded product. The brands present in the Instagram community need to be creative and differentiate their content not only from competitors but also between accounts. The number of Instagrammers is increasing rapidly. Undoubtedly, their expectations will evolve and continue to challenge the creativity of brands in more engaging and memorable experiences.

References


Social initiatives are often disconnected and fragmented. Many SMEs have a job and salaries payment can already promote different perks, such as medical insurance, present a marketing tool of promoting the business as socially responsible. Besides paying salaries, implementing long-term socially responsible programs can gain a strong reputation of a company’s image, especially in the service sector, which directly deals with its clientele. Though, both marketers and managers are aware that sustainable activities will not immediately increase sales and further innovation. Corporate social initiatives are often disconnected and fragmented, which causes constraints to analyze their prospects to cut expenses and increase revenues. The statistical data of a period of over four years show the continual growth in Russian service sector which can provide resources for “world-positive” business initiatives. Though authorities traditionally and usually force the ways of engaging business in financing social programs, the image of a socially responsible and environmentally friendly business provides opportunities for a sustainable upturn in Russian service sector.

**JEL Classification Numbers:** M00, M14; **DOI:** http://dx.doi.org/10.12955/cbup.v5.895

**Keywords:** Corporate Social Responsibility (CSR), service sector, sustainable business, upturn.

**Abstract:** Though evidence of socially responsible behavior of companies appeared to be indisputable, the most problematic for any company is to align it with the employed marketing strategy and enhance the opportunities it can provide for creating competitive advantage and further innovation. The development of socially responsible marketing (SRM) appeared in opposition to the strategy focused on excessive consumerism and as an intrinsic response to business operations that caused environmental damages. The concept SRM itself is sometimes viewed as a constituent of Corporate Social Responsibility (CSR), its ambient extension. SRM constitutes abandonment of even legally accepted deceptive marketing practices in defining a marketing mix for any product or service.

The universal general trend mentioned by Skorobogatyh (2014) is dominating in social marketing over liberal methods in corporate social responsibility. The concept SRM itself is sometimes viewed as a constituent of Corporate Social Responsibility (CSR), its ambient extension. SRM constitutes abandonment of even legally accepted deceptive marketing practices in defining a marketing mix for any product or service.

The philosophy behind the concept is in balancing the aspiration of maximizing profit and ethical aspects of business activities and moral standards of society. Therefore, SRM can be defined as “an obligation of an organization's marketing management towards the welfare and interests of the society in which it operates.” (Businessdictionary, 2017)

**Evaluating CSR impact**

Companies usually prefer to invest in short-term projects with high publicity as was illustrated by Taylor (2015). Long-term programs to ensure the social and economic development of a region do not have the same media coverage and seem to be less attractive. Following Ferrell and Hartline (2011), we can admit that sponsorship of some big event creates an immediate response and may result in remarkable improvement of a company’s image.

Socially-oriented investments can be defined as forms of financial support allocated by business for implementing long-term programs, usually organized in the mode of cooperative partnership, objected at easing social tension in the area of a company operation and raising living standards for all groups of the population.

Primarily, companies develop strategies of investing in their personnel what is also supposed to present a marketing tool of promoting the business as socially responsible. Besides paying salaries, different perks, such as medical insurance, fitness, and training facilities are financed. Many SME (small and medium size enterprises) and large holdings representatives consider that an opportunity to have a job and salaries payment can already promote a socially responsible image. (Financial Times, 2016)

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1 Plekhanov Russian University of Economics, barsov2@mail.ru
Having provided their staff with merited living standard, a company may ponder over investments in a local society, which can provide resources for further development and expansion and is very important for their successful operations in the area (Fig. 1). Undoubtedly, a business’ degree of involvement in socially responsible projects depends on the affordability of required resources. Every company’s marketing strategy should optimize the balance of investments in social programs and the company’s profitability.

![Figure 1: Types of Socially-Oriented Investments](source: Author)

To expand studies made by Bonini et al. (2009) for marketers to improve scaling of sustainable business practices the following guidelines can be offered:

- the demand of consumers to be aware of the positive environmental and social impact (in this case they are ready to pay more for the goods and services);
- people working in companies pursuing socially responsible strategies are more committed and demonstrate better effectiveness;
- being engaged in socially and environmentally responsible activities helps businesses to enhance partnerships to retain market share and enter or develop new markets with stronger support;
- a company staff engaged in different CSR programs are reported to develop communication, collaboration, innovation and leadership skills;
- the reputation of a socially responsible business can improve access to capital as “Impact Investing” is increasingly supported by all types of financial institutions.

Besides all aspects mentioned above, there is also a moral imperative which seems to have no benefit for the bottom line. Although a going concern business may offer not only resources but expertise, leadership, and management to design the contingency strategy, that may lead to further development of company operations. A well-run business can easily mobilize the necessary resources and instantly channel the information or deliver assistance to the specific recipients or areas.

**CSR development in Russia**

In contrast to methodologically defined tendencies of corporate social responsibility (CSR) evolution in countries with developed economies, especially the USA by Armstrong and Kotler (2008), CSR in Russia is a relatively new marketing concept. The process of developing new approaches to interaction with society through being in trend with international tendencies, analyzed by Saginova et al. (2014), has peculiarities in establishing under the considerable government supervision as was emphasized by Karpova (2014). While business through CSR activity realizes its corporate interests, the state tends to integrate the socially responsible projects of companies in government social policy through stimulation and active involvement of companies both locally and nationally.

In Russia business is historically seen by government officials as a dependent and temporary source of raising capital for co-financing sustainable projects, as was stated by Novatorov (2015). Despite the very complicated current economic situation in Russia, investments in socially responsible projects,
especially regionally, may at this stage – as never before – contribute to further capitalization and promote the image of a socially responsible company – a long-term strategic partner of social development policy.

The lack of institutional norms for CSR in the Russian Federation has logically been derived from pre-revolutionary forms of philanthropy and charity and the system of social support in the Soviet period when all programs were initiated and totally controlled by the state, as was stated by Novatorov (2015). Following the period of privatization and prompt accrual of funds by some entrepreneurs resulted in firm distrust of citizens towards the level of justice in government-vs-business relationships. Moreover, social inequality and fierce stratification of the society has not contributed to generating loyal citizenry in our country. Till now the rate of our country’s integration in the world informational systems and, especially with the economic sanctions from the European Union and the USA, in the world economy through unstable interaction channels and necessity to employ flexible tactics is very low. Besides, the absence of traditional corporate governance is intensified by the poor state of infrastructure.

Regarding legislation improvements to formalize integration of the Russian Federation in the international CSR programs the following highlights might be mentioned:

- the foundation of the Russian Union of Industrialists and Entrepreneurs (RSPP) – 1991
- RSPP initiated a set of programs in socially responsible field, among which was establishment of the Charter of Corporate and Business Ethics (2002)
- the Social Charter of Russian Business adoption by the Congress in 2004 with amendments of 2008
- the Anti-Corruption Charter of Russian Business was promulgated by RSPP in September 2012 at the summit with the country’s prime minister
- following the appointment of Entrepreneurs’ Rights Ombudsman (June 2012) the president of the Russian Federation, introduced an ombudsman’s office for Russian national business in (December 2012)
- RSPP headed the process of B20 at the term of Russia chairing G20

Since 2014 introduction of new sanctions and strengthening complications, in spite of remaining influence of Russian governance and economic development in the world economy, most of the integration was transferred to the East. As for further participation in international associations in CSR activities, RSPP, for example, continues cooperation as an observer.

Markit Economics survey reveals extensive growth in Russia’s service sector by July 2014. The Purchasing Managers’ Index (PMI) for the upturn in the sector reached 55 points, the highest results for the previous 40 months. Analysts stated considerable increase of employment in the service sector, especially noted in hotel, restaurant and retail industries as a reimbursement of it in manufacturing and finance sectors. In May 2016 a survey of 300 firms indicated sustainable expansion in employment, sales and a range of other factors of service providers in Russia: Markit’s index was 54.2 in April reflecting the improvement in demand. (HIS, 2016). By December 2016 Russia Composite Output Index rose to the highest level of 56.6 within 50 months, alongside with the stabilization of the workforce figures and marginal growth in selling prices of service providers (RT, 2016).

Analyzing the dynamics of overall reported data, all areas of business activity demonstrate steady growth. In particular, Russian retail, railway, professional services and airline sectors have strong positions in comparison with other world countries, according to Organisation for Economic Co-operation and Development (OECD) reports. (OECD.org., 2016)

Some other peculiarities of socially responsible behavior rooting historically in the “soul impulse” transformed into voluntary aid, organized as a spontaneous response to natural or social catastrophes. This type can be qualified as collective social help without any particular company, fund or state guidance, and governance. Or these initiatives can be regarded as CSR uniting people of some universities, institutions or enterprises if organized under the patronage of companies or legal authorities. Spontaneous donations of goods and money for people in Syria or Donbass may be a good example. These volunteer initiatives, especially in contingency situations, emerge a sense of social responsibility, uniting people’s reaction to tragedy: “who else would help?”
Political scientists believed that Russian model of social responsibility was based on “informal and often not transparent interaction between large corporations and government authorities.” However, it should be admitted that nowadays the process of transition from bargaining practices to formalizing business liaising with government officials, the switch to the mutually beneficial partnership, though mostly regionally, is strongly developing. At federal level, sustainable business efforts are evaluated by the state authorities and supported by necessary legislation reforms. Regionally local power clearly aims at involving enterprises in solving social problems in the area to expand opportunities for implementing programs in social and economic spheres not only at the expense of companies’ resources but in co-financed programs with federal and local budgets.

Conclusion

Even before the economic downturn, not many companies in service industry have considered investments in long-term socially-oriented programs as a marketing strategy leading to a substantial increase in an enterprise’s compatibility and capitalization (intangible assets). In current conditions of service-oriented economy alongside with the economic sanctions towards the Russian Federation from Western countries, a persistent upturn in service sector’s indicators can be stated. Although there is a tendency of curtailment of some socially-oriented programs by businesses in connection with focusing mainly on cost effectiveness and profitability, it can be noted that they become better targeted in crisis periods, especially at local levels.

References

HIS Markit press release (2016). Retrieved from https://www.markiteconomics.com/Survey/PressRelease.mvc?b1c7c0b4e444c6f89b0b1a6a7aae4b6
Abstract: A dam, in most cases is a large, impressive concrete structure. A commanding number of large dams exist with over 45000 estimated in the world. It is important to understand such a concrete structure not only from a technical perspective, but also from the view of local community in the region of the dam. Also, it is important to know the international impact of a dam on a river basin and the measures necessary for implementing a dam, as well as the positive and negative effects of dam construction itself. Preliminary measures aim to characterize a river regarding natural, geological, geographical patterns, human geographical distribution, and food production. Prospective trends, such as the need for augmented water volumes for a water-fed agriculture, industrialization, energy, and river transportation, can influence decisions connected to dam building. Recently, climate change, a phenomenon considered as human-induced, at least partially, and the prospect of a water-stressed world, are another elements that affect decisions about build dams, especially regarding water security and green energy and a renewable resource under threat. This paper presents the main administrative requirements for a team involved in dam construction, including their specific tasks and interactions. The main aim of this paper is to establish political meaning of dams, and their capacity to influence economics, society, and the environment in an interconnected world.

JEL Classification Numbers: L94, O13, Q25; DOI: http://dx.doi.org/10.12955/cbup.v5.896

Keywords: dam, energy, environment, water

Introduction

A dam affects two vital and interrelated resources: water and food, with the latter depending on water availability. Water and human civilization are inseparable, especially in the light of the direct relationships between the evolution of human civilization and rivers. A dam is an engineering feat that helps humans control and influence nature but often interferes with the river’s normal course, and at times creates adverse effects. Whereas in the past dams were built to prevent floods or were conceived as a component of an irrigation plan for providing water in drought-prone regions, the last century has witnessed dam construction for multiple purposes, from flood mitigation and water storage to energy generation, transport facilitation, recreational activities, and tourism. The hidden part of this story is that dams have been used as instruments to demonstrate national rise and power and as a means of political control upon minorities located in the region of the dam or in other states adjoining the river, known as ‘riparian’ countries, as defined by the Danube Commission. In these specific cases, dams have become instruments of foreign policy.

It is well known that water availability is a barrier to broader economic development. As mentioned by Chellaney (2013), water availability of less than 2000 m³ per person per annum results in little expansion for sustainable economic development and environmental protection. Rising powers that are geographically located to control the flow of the rivers onto other countries with riparian rights, regard dams as necessary instruments for political control. Their thinking is that where they can control water flowing onto other countries, the can influence their political and strategic decisions. Turkey and China are such states. For example, Syria and Iraq are potentially affected by Turkey’s decision regarding the dam development program in south-western Anatolia. As well, China has domination over Tibet, which is named The Third Pole, because of the water that flows from its glaciers. In this respect, China can use dams and other schemes to control the flow of this water onto another 13 riparian countries, and thus influence these countries’ behavior (Chellaney, 2013).

Nevertheless, before a dam is built, there are necessary specific steps to be taken, from the decision adopted at highest political level to creating administrative constituencies, and technical and administrative structures that operate the dam.

Data and Methodology

This study considered both positive and negative aspects, concentrating on features that define a dam, and the main steps involved in building one. The main sources are materialized in books covering subjects connected to water, agriculture, energy, sustainable development, diplomacy and geopolitics.
and climate changes, while the part of the paper regarding the actual construction of a dam results from direct researching the way some dams were built. Iron Gate System built on Danube River fits perfectly this category. The method used for writing this paper is both descriptive and the comparative, with comparative method being used especially when there are analyzed positive and negative aspects of dams’ construction.

The Multiple Features of Dams

The obstruction of river flow and creation of artificial lakes through dam building provide a means to manage water resources. There are numerous existing dams in use. Some are small, while others are large and impressive.

A dam has multiple benefits, most of them which relate to water use in agriculture, energy, transportation. In brief, a dam can provide these functions:

- Regulation of water flow to prevent floods;
- Supply of water during drought. The water of the dam’s reservoir, which accumulates during rain periods, is extracted or released for industry, households, and agriculture;
- Provision of clean and renewable energy by transferring water (hydro) power into electricity;
- Recreation or commercial use. The water reservoir created by dam’s construction could be used for fisheries (sport or food source), and tourism (providing money for the service sector);
- Waterway transport. The raised level of the water from dam construction can improve conditions for navigation, and thus the dam could provide for a safer and a more efficient mode of transport; and
- The role of a bridge. The reinforced part of the dam can serve as infrastructure in future roadways.

A particular ‘benefit’ of dam building is one involving its use as a political weapon. For example, a country in the upper river basin could build a dam close to an adjoining country with riparian rights and choose to manipulate the river flow by either limiting flow during drought or by greatly enhancing flow to a level that would damage the lower riparian area during particularly important times, such as harvesting. These actions are possible scenarios that are likely to cause long-term friction between countries. Furthermore, large dams constructed to divert water from the natural drainage of rivers, can negatively influence biodiversity and change the distribution patterns of water in the basin, especially where inter-basin transfers are involved. As Shiva (2016) mentioned, this interference can generate conflict that easily escalates into disputes between states, especially where water stress becomes the everyday norm in the future.

There is considerable debate regarding a dam’s usefulness. Much discussion hinges on the disadvantages relating to dam building. For example, locating dams on rivers that flow through more than one state’s territory can create animosities between riparian states about water allocations. Maximum impact of this scenario arises where a state in the upper river reaches decides to build a dam and thus, gain power over other riparian states by way of controlling their water supply. One such case involves the region crossed by Tigris and Euphrates rivers where the Turkish state intends building more than 20 dams under the Turkish program known as ‘GAP’. This action will undoubtedly affect Syrian and Iraq whose political survival depends heavily on water flow from these rivers. For Turkey, the dams in the south-eastern part of the country represent a means for political control over the Kurdish population, as well as Syria and Iraq. As emphasized by de Villiers (2000), dams mean power. However, such dam building will further complicate an already complex situation in this region of tension in the world.

Dam emigrants are another negative aspect caused by a dam’s construction. Large dams not only disrupt natural ecosystems but also adversely affect human populations and thus have a social cost. Since 1949, China has relocated a total of at least 23 million people because of Chinese water projects.

In summary, for more than sixty years in China each day some 1035 people have been forcibly moved for reasons of water projects’ construction (Chellaney, 2013). A dam’s construction demands concentrated effort from its inception to the last ‘brick’ installed, while rising water levels will flood large areas previously used for agriculture, transport, and industry. Forced mass migration is an ever-present element in these cases, especially where, on the upper side of the dam, populations existed prior to dam construction. Nonetheless, topography influences this aspect greatly, with low river banks
providing a large land surface area for water coverage, while mountainous areas result in less land surface area being inundated, and (generally) fewer water emigrants.

In addition, Lei (2011) identifies the threat caused by the race to build dams. Lei maintains that while the race to build dams can amplify the already strained relationships among riparian states, over-damming can create direct damage: where several large dams located in a region trigger dam-induced earthquakes.

The costs and time needed for completing dams are high. They align with the dam’s size. Even though the source of energy is inexpensive and renewable, being generated from flowing water, the costs for all materials and technical elements that transform water power into electricity (especially turbines and electric equipment), and their assembling, are enormous. It is important to note the contribution to cost involved with the expected time needed to complete a dam’s construction and the daily high probability that a large dam’s construction will run over budget and require a greater span of time than first calculated. However, when compared with large projects, the World Commission on Dams Report (2000) reveals that projects for dams with a height less than 30 m and a reservoir area less than 10 km² tend to meet predicted targets and demonstrate less variability for major area development, such as irrigated areas and intense cropping.

The next point is dam’s efficiency. Where it produces high energy with low investments and maintenance costs, the dam fits the category of an efficient project. This category is mostly influenced by the dam’s emplacement and the area where it is located. Where the river has a natural pronounced declivity on the upper side of the dam, its capacity to generate power is greater than in the case where the declivity is small, and investment costs in both cases are possibly similar. This situation is especially observed with run-of-river hydroelectric systems.

Since rivers in mountains are relatively narrow in most cases, dams can be built in these areas to create artificial lakes, where water is captured and transported through tunnels to a hydropower plant at the base of the mountain. However, this use will likely threaten areas previously untouched by a human civilization and its potentially destructive effects. On the list of few advantages, in this case, is the possibility of a short electrical network that could connect (over short distances) hydropower with the needs of the military. Strategic energy and industry are best protected by nature, and mountains offer the ultimate shelter for these types of activities.

The Momentum of a dam
First, long before a dam is under construction, a political decision occurs at the highest level of the state overseeing the dam construction with full deliberation. That individual dam, where it comprises turbines, would become a hub in the national energy infrastructure, a part of that state’s national energy capacity. That national energy capacity is decided upon at the highest political level and depends on many variables, some of them which are natural features while others are created. Natural variables are connected to the river’s characteristics or potential to create artificial lakes, e.g. topography, geology, geography (physical, human, and economic), and other available energy resources at the national level, as well as existing resources in other countries and the prospective access to them.

In addition, a large part of the political decision is driven by fears as well as expected benefits over the long term. International context is an important factor that has a significant influence over this process. Present and expected global and regional contexts are both critical, but most crucial are the evolving relations among riparian states. Dam building in one country, similar to an arms race, can trigger a race to build dams in another within the same river basin. Expecting fossil fuel prices to rise (especially for natural gas), or worst, their fluctuation, and the likelihood of political dependence can greatly influence such decisions. Political dependence is especially the case where an upper riparian state manipulates river flow through dam building to affect the water allocation of downstream riparian countries and thus, their food production. Climate change is a current issue that needs greater consideration when a state analyzes its available solutions for future energy production, with water-stress adding complexity to its decisions.

As one can observe, for certain natural attributes (variables) there are superimposed human actions that are influenced by fear, constraints, and opportunities. At the same time, technological
developments and new discoveries provide a rising the number of opportunities (e.g. offshore drilling or shale fossil fuels).

When a nation chooses a strategy to build dams and that state’s national territory and rights allow this path, it means that this state has become aware of its natural potential, wants to use it for its well-being, has the will, determination, and access to the resources from the financial, technical, and human perspectives. However, the state also needs to be aware of its influence on the natural river flow, and the possible adverse effects that the state’s actions could trigger for other riparian states as well as biodiversity. It could heighten tensions among riparian states. Nevertheless, where the decision to build a dam involves two or more countries from the same river basin, the dam could become a project to unite those interested states. Therefore, it could represent a starting point for open political relations in the future. For this to happen, there must be a political will from the part of the states that are likely to be involved in such a project. They would need to understand that unilateral measures could only be a short-sighted solution, with long running deficiencies, while a long-term perspective with benefits for all riparian states would contribute to solving tension, and greatly improve international relations with dams, in this case, being the technical elements that sustain a broader process of fostering peace.

The political decision regarding a dam’s construction involves three important elements:

1. Technical capability required to complete the project;
2. Managing resources for successful project end (human, financial, and logistical), and
3. Sustainable integration of the dam in a national (or regional) electricity grid and managing effects on the overall river basin, especially effects on downstream riparian states.

Technical capability can be considered from two angles: 1) original engineering techniques and methods, and 2) new chemical compounds that generate fresh opportunities for novel materials in dam construction. These apply to historical dams built to create water reservoirs and prevent disastrous effects of floods, as well as those of the last century that focus on energy production. Dams, energy, urbanization, and industrialization have become highly interconnected.

Mobilizing human resources needed for dam building is a highly complex activity. First, after the decision to build a dam, specialist teams need to be united under a collective umbrella. These specialized teams are organized into different types of activities. One team will focus on economic-financial issues regarding the financial resources involved, compensation in case of expropriation, damping and efficiency of the dam, and its financial rate of return. Another team would exist for terrain, topography, environment, and geological issues to analyze the best place for the future dam, how to least disturb the environment through the dam construction, and to understand precipitation and the water flow regime during and after the dam construction. Another would cover technical issues, focusing on the best technologies and materials to be used, the best location for the dam, considering the type and shape of the dam, and ultimate features such as height, the number of turbines, and connection to the national or regional electricity grid. Another team would cover legal issues around the application of pre-existing laws and conventions during the dam construction and its exploitation, compensations paid to those affected by the dam construction, or legislation to be applied after dam completion.

The legal arm is of utmost importance where a dam is built on an international river (which could be an international waterway) and where two or more countries participate in the dam project. It will be the main team, which will work on details regarding the construction of the ‘legal’ bridge involving international accords and conventions that precede the technical construction of the dam. Furthermore, apportioning the future electricity production, adjustments to borders in the case of dams being located on a river that acts as a border, amendments because of water level rises, participant costs and burdens and their apportionment, solutions for unforeseen events, as well as other legal matters, are the focus of domestic and international law specialists.

Where two countries unite to build a dam, representatives from both countries are grouped into different national teams (specializing in economic-financial, technical, technical terrain documentation, and legal issues). These groups form the pillars of the one unique mixed international team (or international commission) that unites specialists under individual aspects of the one umbrella.
International context is critical in the context of there being a commonality in building a dam by two or more countries. In this case, negotiations precede the conventions, agreement signature, and ratification, as legal basis for the constructing of the dam as a joint endeavor. In the future, the international context may be influenced by climate change and water shortage considerations. With this in mind, all riparian states would need to be involved in decisions. However, such actions and decisions may be affected by water nationalism. The first situation could bring long-term benefits for riparian states, whereas the second, only deep distrust and conflict.

In the first case, negotiations with the objective of innovation are needed. As Ikle (1964) mentioned, the main subject of innovative negotiations pertains to creating new institutions. Since two countries decide to unite to build a dam, the creation of a mixed specialist team or teams is a natural prerequisite. This progression points to the need for innovative negotiations where two countries unite with the common aim of constructing a dam. At the same time, these negotiations are intended, as Malita (2007) mentioned, to exploit common interests. Countries determined to build the dam together will gain net benefits in the field of energy independence, low pollution, and greater water allocation for agriculture, tourism, and fishing, as well as possible improved navigational conditions. Where the river being dammed crosses more than two countries, all riparian states could benefit. All would have lower navigational costs and trade could be stimulated using the river, meaning lower congestion and transportation risks for land transport, coupled with lower emissions, lower pollution, and greater mobility and integration at the river basin level.

However, to achieve this outcome, an international system for the transnational river is required beforehand. This system would need to be under a special umbrella and cover all bi- and multilateral negotiations including those for dam building and involving all riparian countries. For such a regime to operate smoothly, a lengthy span of time would be required.

The best example of a transnational case involves the Danube River, which flows through ten countries, making it one of the most international rivers in the world. The Iron Gate System of dams involves a gorge located on the Danube on the ex-Yugoslavian-Romanian border. It is noteworthy that negotiations for this dam building had a very technical character, meaning a high degree of complexity and requiring the participation of several specialists over a long period. As well, the diversity of issues to be solved demanded a series of parallel negotiations.

Moreover, this is an ever-present peculiarity of dam construction. However, the building of a large dam by a nation on its own is a sign of that nation’s emergence and desire to affirm itself on the international stage. It could be proof of its technical, financial, engineering, management, and human competencies, and its determination to modernize. However, it could also denote a sign of its desire to manipulate the environment. Added to this list is energy independence, as well as climate change and water shortage motivations, and intelligent water management, which will mark the agenda of the state that modernizes its existing or future dams.

Needless to say, a dam can be constructed as a political weapon, aiming at extracting unusual behaviors from other riparian states. Through the creation of reservoirs in their territory, an upstream riparian state can reduce the river flow reaching countries in the lower river basin that greatly depend (especially for agriculture and urbanization) on that river flow. The two greatest examples of this occur with Turkey and China. These countries view water on their territory as a natural right to use as they deem fit, without much concern for other riparian countries along the same river. This creates concern and increasing distrust between the countries involved. Not only are they unaware of the environmental impact of such projects and the social costs of relocating people, but they also contribute to future instability in transnational river basins. Hence, water could become a trigger for conflict, and not an integrative natural resource for all countries and people to share in their water.

**Conclusion**

Life is impossible without water. For this reason, water and civilization are inseparable. If in the preindustrial era people had been unaware of the sustainable economy concept, using nature without harming such, then the Industrial revolution has changed this. Humans have started to view nature and natural resources as fully and readily exploitable elements, without much concern about possible future evolution. However, the recent decades have proved this path to be inappropriate. As a natural resource, water has been used inappropriately also; and the damming of rivers has occurred without
much concern for the effect on the environment, or on populations being displaced. Dams were viewed as technical faculties that proved a state’s political clout and became known as instruments of social modernization.

New developments and recent evolution have changed this view; water has become a natural resource under threat, marked by a lower quality and quantity partially attributed to environmental change and partly to pressure due to a more populous, industrialized, and urbanized world. Water crisis and associated food emergencies are future problems that will plague humans. Water is becoming a scarce resource and water stress will crucially influence future developments.

In this context, dams could be connected to water nationalism, becoming instruments of political control over other countries and societies and rising instability in international river basins. Alternatively, they could become technical instruments built by two or more riparian states in unison and facilitating cooperation among riparian states. This latter scenario would contribute to a deeper regional integration of societies and economies. The first setting would complicate further an already conflicted world; the second would contribute to greater international stability and multilateral gains. Humans are at historical crossroad and their future will be partially influenced by decisions about water use, and the integration of dams into this context.

References
DANUBE AND THE FACILITATION OF NAVIGATION ON DANUBE

Ciprian – Beniamin Benea,1 Adina Secară Onița2

Abstract: With 2857 km in length, the quiet Danube quietly tells Europe’s history. We only must be aware of its story. Since ancient times it was connected with empires, expansion, and navigation. The Romans fully understood its role, and proceeded accordingly. They made it their border, but used it for transporting goods and military, too. After the Dark Ages, all European affairs have been in one way or another connected and influenced by the Danube. Romania’s modern history was influenced by the evolution of international problems connected to this river. The Moldavia and Wallachia 1859’s unification in a single state – Romania – had lot to do with the Danube and it was involved in London’s interests in the Oriental Question. The paper presents shortly the way the legal framework regarding the Danube was developed, and what was Romania’s role in facilitating navigation on the Danube. The main data which inspired this work – regarding both the political-legal aspects, and the technical solutions used to facilitate navigation on Danube – are based on earlier writings and studies of Romanian thinkers such as Antipa, Baicoianu, Dascovici and Gogoanu. The evolution of these aspects has a direct or an indirect connection with the evolution of political events and the economic development in all European states, but their importance is crucial especially for those countries which are located in the Danube’s basin. The main text regarding the political aspects related to the Danube is the Belgrade Convention, which has been the general framework under which riparian countries come together to collaborate and to solve the technical impediments for navigation, such as those imposed by the building of the Iron Gate System. At the same time, this paper signals the role of education in understanding the Danube’s role for riparian countries, and for their possible evolution in connection with this river.

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Introduction

Danube is a river which flows from Western Europe to its Eastern part, creating a natural corridor through its middle; in fact it is the only natural route passing through the center of the European continent to its Easter region. Exactly due to its location and geographical position, it has constituted as a “battle-field” among main powers in different historical periods. They have recognized its key-position for controlling the Danube’s riparian states, and for promoting their narrow interests. But after the Enlightenment, and especially after the Crimean War in 1856, different countries started to look at the Danube in a manner which was quite different from the situation peculiar before.

This is exactly the period when Romania started to “appear” on Europe’s map, with its great geopolitical potential. In fact, Romania’s geopolitical position and her economic and national advances depend in a crucial manner on the free navigation on the Danube. Even her appearance on the map as a modern state was directly connected with this river. Furthermore, between 1856 and 1948 there was a period when different European states manifested their special interests regarding the Danube, especially its strategic Delta. Of course, there were general interests from their part, which went hand in hand with those of the riparian states located on the lower Danube, regarding navigation conditions.

This results in the creation of legal and technical instruments and means for this aim. But the main decision regarding technical facilitation was taken in Belgrade in 1948, when the Danube Convention was concluded by the riparian states. With this occasion, it was the first time that non-riparian states were excluded from participating in the affairs regarding the Danube. After this situation was created, the “obligation,“ was mentioned, for the riparian states, which had to remove all obstacles which could hinder or affect navigation of the Danube river. Synthetically, there are three different means of improving the navigation on the Danube river: one is legal, the second is technical, and the third – which I consider of utmost importance – is that one which is correlated with the consciousness of the people from the riparian states, regarding the importance of the Danube for their country. Using this river’s potential is connected not only to international conventions regarding navigation and transport, or technical improvements focusing on dams, locks, and ships, but to the people from the riparian states and their deep understanding of the Danube’s importance for their country; and this has to do with their education.

1 University of Oradea, Faculty of Economics; c_benea@yahoo.com
2 University of Oradea, Faculty of Economics; ooadina@yahoo.com
What the Danube means

There is no doubt of European interest related to the Danube; and this is not new at all. Since ancient times different emperors and kings aimed at controlling this river. The great Romanian romantic writer – Mihai Eminescu – recalled in one of his best known poems, “The Third Letter,” the interest on Danube for Darius, son of Histaspes. While establishing the Danube as the political border of the Roman Empire by the Roman Emperor Augustus recalls the military, cultural and political separation between the parts of Europe situated north, and respectively south, of this great waterway. In the late part of the Middle Ages the Ottoman Turks used this waterway to penetrate into Central Europe, after Moldavia lost its fortresses (Chilia and Cetatea Alba, in 1484); the great battles between the Turks and the various European powers followed the great line described by the Danube: Sabac, Belgrade, Mohacs, Budapest, and Vienna (twice) are the best witnesses in this regard. The geographical turning point in European history, when Sobieski played a key-role, was connected with Danube: the second siege of Vienna marked the beginning of the decay of Turkish power, and the ascension of Europe’s power. The line marked by the Danube again became the confronting interests of those involved in this great policy.

Even the evolution of Romanian states is directly influenced by their freedom of using the Danube; with the Treaty of Adrianopole (1829) the Turkish possessions on the left bank of Danube were attached to Wallachia’s territory. All these were in connection with the English interests, in this period London guarding carefully to provide for a free navigation on Danube, which until then were hindered by the Turks. In 1856, after the Crimean War, France and England being aware of Russia’s interests in the Danube Delta connected to Eastern Europe approved the attachment of Bessarabia to Moldavia. Furthermore, the union between Moldavia and Wallachia was considered necessary. In order to control the Danube, there was needed for a bigger country close to its delta, ruled by a unique hand, indebted to London, and especially to Paris.

Between the two world wars a brilliant Romanian diplomat with a great vision – Nicolae Titulescu – focused on the conception of interwar Romania’s foreign policy connected to the Danube and the Black Sea straits.

As we can see, the importance of this river is connected to geography: it is the only big river which flows from West to East, cutting Europe through its middle. As in other situations, geography determines and compels people to adapt to it, to compete, or to collaborate in a predetermined geographical environment, which hasn’t been changed. Nowadays with its 2850 kilometers, the Danube is the river which crosses the biggest number of countries in the world from its spring to its Delta, ten countries, respectively; in comparison the Nile crosses the territory of nine countries.

What is important in the present paper’s context is to recall the Danube’s role to promote cooperation among its riparian states.

There is a European interest connected to the freedom of navigation on the Danube. All its riparian states would benefit from its flowing waters only when navigation is free, while hindering navigation or seizing it by hidden or niggardly interests is a serious obstacle for different riparian nations’ normal and legitimate aspirations. As always, history becomes the best witness in this regard; but in order to avoid unjust developments it needs to become the teacher of the Danube’s riparian states’ people. In this context, education and the facilitation of understanding of Danube’s role for the riparian states’ evolution plays, and will always play a crucial role in their destiny.

As humanity surpassed the Middle Ages there were changes, both in diplomacy and in the technical field. Humankind’s history is directly connected to sciences’ development, and in its evolution, humankind has always made its first leap in sciences. A discovery in this field generates deep changes in technical, social, legal, and political fields. Galileo’s thesis marked this turning point in human history. It prepared the way for a new diplomacy and a new legal system.

As mentioned by Nicolson (1955), between Rome’s falling (476 a.d.) and 1575 a.d., diplomacy was totally disorganized but, between 1573 and 1914 diplomacy was under the newer umbrella of “European states’ system”, while the third period in diplomacy’s evolution has to do with “democratic diplomacy”, one of its expressions being multilateral and conference diplomacy (Malița, 1975).

The situation regarding the Danube followed the same path: before the end of the 15-th century, the relations among the different entities related to the Danube were accidental; after that, there was
diplomacy which facilitated the permanent maintenance of contacts among different powers involved in one way or another in the Danube’s affairs.

The invention of steam engine’s invention and as a consequence – the expansion of railways and steam navigation – had facilitated the appearance and consolidation of nation states, and also that of multilateral diplomacy.

The Danube, as a geographical element, started to be more and more regarded through these new angles, due to the evolution registered in both, diplomatic/legal and technical areas. The Danube was regarded as a geographical element which could facilitate the creation of a brotherhood among different nations.

The Treaty of Paris (ending the Crimean War-1856) was of outmost importance from Romania’s point of view, and from the European angle too. It was this treaty which consecrated the freedom of navigation on the Danube, and as an appendix, the Black Sea’s neutralization. The Danube’s regime was guaranteed and put under the surveillance of Europe’s interest. With this treaty, Danube’s navigation entered under the European system of public law (Bâicoianu, 1915). This new regime was a great opera of progress and civilization, and it was of outmost political importance and foreseeing: it provided free navigation on Danube for vessels registered under any nation’s flag – a visible proclamation of promoting nations’ brotherhood on international rivers.

From Romania’s national point of view, it is noteworthy to mention the remark made by Carol the 1-st related to the Danube: being counseled to refuse the crown of a country without any future, he looked to Europe’s map and to that of the Danube, and said that because Romania is crossed by this river, which is “the most direct line between Europe and the Indies, this country has a great role to play in the world trade” (Antipa, 1921).

The institutional mean for promoting freedom of navigation was Danube’s European Commission. It promoted and provided surveillance for free navigation and the identification of all technical obstacles hindering navigation, especially between Isaccea and Black Sea.

For the Romanian nation, the Danube guarantees its future and its development in the great competition among different nations, and as a consequence, the Danube dictates Romania’s special interests and its policy. The manner Romania understands how to play its role in the Danube Delta and Iron Gate System areas crucially influences the Romanians’ destiny among other nations in the world.

Romania has the greatest interest in free and unhindered navigation on the Danube, and this interest is the same with that of all other Danube riparian states. Dașcovici said (1936) that Romania depends in such a measure on Danube’s navigation that Romania’s “future, as well as her past”, is influenced in such a way that this old Danube has been “the force of protection, renaissance, and then of Romanian nation’s consolidation, as well as European interests related to free navigation on it, which coincided with” Romania’s “best understood interests”.

Anyway, it was only after 1948 when Romania started to play a decisive role in the Danube’s affairs. Even if it had been “allocated” to the communist block after the WW II, it would have been only then that all powers with no territory connected directly to Danube were excluded from the “administration” of this river. There were only left the riparian states with the right to collaborate in order to provide smoother navigation (from a technical point of view) and free navigation (from a legal point of view). For promoting this aim, the Danube’s Commission was created (its first headquarter was in Galatzi, then it was changed to Budapest, where it is still today).

It was at Belgrade in August 1948 that a Convention was concluded with a huge political impact upon the Danube’s riparian states, as Gogeanu mentioned (1970); this convention facilitated cooperation among Danube’s riparian states, facilitating the removal of obstacles for navigation, but eliminated non-riparian states from these processes. The Danube riparian states’ sovereignty was consolidated in connection with the general interests connected to free navigation, while the special administrations of peculiar areas were to be provided under a special status, by the riparian states with direct access to those areas. There were created the Special River Administration for the Lower Danube (having at its base the bilateral agreement between USSR/Ukraine and Romania) and the Special Administration of the Iron Gates (having at its base the bilateral agreement between Romania and Yugoslavia/Serbia), both of them being in relation with Danube’s Commission in Budapest.
These were the legal and administrative means for promoting cooperation among Danube’s riparian states aiming at the facilitation of navigation, bringing benefits to them all. Where the Danube marks the border between two states, the rules of navigation were to be established by those peculiar states, and not by the Commission of Danube, giving a new meaning and significance to national sovereignty, and to the general interests connected to free navigation on the Danube. The Commission of Danube has had a very high utility for riparian states, for it created the institutional forum which facilitated the continuous coordination of activities which have promoted the expanded collaboration among Danube riparian states’ economies and societies (Gogeanu, 1970).

From a technical point of view, there were identified two areas of outmost importance: the Danube Delta, and the Iron Gate sector. There were established legal means for countries neighboring these two areas, and their obligation to remove all obstacles for navigation on this international waterway (art. 20, Convention of Belgrade, 1948).

One special area where permanent dragging is needed concerns Sulina’s arm of the Danube. The special bilateral institution aims at managing this part of the Danube in a sustainable and continuous manner this aspect. Furthermore, between kilometer 1821-1791 (between Gabcikovo and Gonyu) there is a permanent changing of river bed and water depth.

The greatest obstacles for navigation were to be found in the Iron Gate sector, where the shallow water coupled with a high water speed, created the most dangerous conditions for navigation on the whole Danube. These obstacles were technical hindrances between the lower part of the Danube and the countries situated on its middle and superior course. Even starting in 1838 some Germans, Austrians, and Hungarians tried to resolve these impediments, but missing technical means, coupled with some narrow interests, their solutions were not effective. In 1895 Hungary received the right to work in this sector in order to remove the obstacles for navigation, but, even after four years of steady work, the aim was far from being definitively achieved. Cutting a canal of 2840 meters, while refusing to adopt the technical solution with locks, as mentioned by Băicoianu (1915), rose the water’s speed to 3-5 m/s, and with all these efforts, the difficulties for navigation were still complex. The navigation in the Iron Gate sector had remained dangerous, and more expensive than in the past.

The technical solution which proved to be the best was the locks system. What is important to mention here is that the Iron Gate System was created under the stimulus and umbrella of the Convention of Belgrade, but it was the direct result of Romanian and Yugoslavian effort. In fact, the technical solution of the Iron Gate System has two interconnected principles and parts: facilitating cooperation among riparian states through improving the navigation conditions, and using the water’s potential to generate electricity by two neighbouring and friend countries. This solution was the best, it combined the general interests of navigation with the special interests of Romania and Yugoslavia related to energy production (and independence in this strategic field).

**What should the Danube mean for Romanians**

Tacking account of these historical, political and technical realities, we must never forget that free navigation on Danube represents a key-stone of Romania’s domestic and foreign policy.

Now, to utilize the Danube’s potential, something must be done more than just connecting things to international law and the general interests of all riparian states; the technical and human means for navigation must be created. Ships, personal, technical facilities in ports, and shipping companies are of outmost importance in this context. Under this view point, shipping companies (even if they are private) are geopolitical instruments used for promoting national interests. Even if a riparian country had excelled in international cooperation facilitating the navigation on the Danube, missing its national flag on this river’s waters, and beyond it, is not only a sign of technical incapacity, but of political weakness, and administrative impotence. States rise as their transport means evolve, while the decay of the states is first encountered in the transportation area.

That for, Romanians must be aware of the role Danube plays in Romania’s destiny; history is a very good teacher in this regard. Becoming familiar with the Danube’s influence upon Europe, the role Romania could play in this river basin could be well improved. Educating Romanian pupils having this in mind will bring benefits in the future for all the Danube’s riparian states. Without understanding this, Romanians could very carefully guard other states’ interests on the Danube, but they still miss the capacity to benefit from this river great potential fully.

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As we can synthetically note, for Romania, there are already legal means which sustain transport on the Danube, technical means which removed the impediments in the most dangerous areas of the river, the Iron Gate, but the cultural, educational, and technical elements which could make Danube the most important corridor for transporting Romania’s goods are missing.

Put in another way, Romania is very open when it comes to international collaboration and the rule of law, but when it is about Romania’s destiny and guarding its national interests, it is a national disappointment.

The Danube remains a river with an ideal potential, far away from daily realities.

**Conclusion**

As was stated above, it is important to note the peculiar role Danube has played in the history of Europe. This should be the focus of present generation, and through education, of future generations too. This river is the quiet witness of how geographical elements and peculiarities have been used by different powers of the moment, to promote their narrow interests to the detriment of others. While the changing context after the 2nd World War, with promoting regional integration, totally reoriented the way Europeans see the Danube. The European integration process cannot be imagined without the Danube as its main artery of trade. The Danube becomes the natural pathway for political integration and cooperation among all its riparian countries and among them and other countries which this river indirectly connects, from the Middle East and Central Asia to the Rhine’s riparian countries. In Romania’s particular case, it is necessary for all Romanians to understand the Danube’s role in their history, in order to transform the Danube’s potential into real life benefits.

**References**


THE ASSESSMENT OF CORPORATE TRAINING AND THE EVALUATION OF SELECTED WORK ATTRIBUTES

Zuzana Birknerová,1 Miroslav Frankovský,2 Eva Benková3

Abstract: The contemporary economic environment including the context of work is characterized by unusual turbulence and an unflagging stream of changes. The effective operation of organizations in these conditions is more and more conditioned by the quality of human resources. Corporate training represents one of the significant factors of increasing this quality. In this paper, we present the results of our research which specifies connections between the assessment of corporate training and the evaluation of selected work attributes. Based on the data which were obtained by the original SBES methodology, it is obvious that there are significant connections between the perception of corporate training factors and the evaluation of work attributes. The most evident were the connections between the assessment of the corporate training factor ‘Significance for performing a profession’ and the attributes of ‘Interesting work, Delight from work and Possibility of being promoted at work.’

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Introduction

Nowadays, the educational level of employees belongs to the basic aims and priorities of each organization. At the same time, it is a requirement and a necessity so that an individual can be successful in the contemporary labor market, and be able to perform the working duties and vice versa, so that the organization could their growth, continuous improvement, and development of their educational level. Fitzgerald (1992) defines corporate training as a tool which helps an individual to support the organization and to succeed at their current position as well as the acquisition of knowledge and skills which are related to the existing tasks.

The essence of corporate training is the effort to improve knowledge, attitudes, and skills of employees. Corporate training can also increase the employees’ trust, their motivation and subjective satisfaction with their job (Fill and Mullins, 1990). Milkovich and Boudreau (1991) define this training as a systematic process of the change of employees’ behavior, knowledge, and motivation with the aim to increase the level of agreement between the employee’s features and the requirements put on them.

Modern and contemporary organizations relate their success and competitiveness to the preparation and creation of employees’ working potential so that they could reach a high level of talent, skills, knowledge, and motivation. They are searching for capable, professionally, and psychologically prepared job applicants or they ensure a professional preparation for their employees. Corporate training is a significant technique leading to the productivity increase (Goldstein and Goldstein, 1990).

An employee’s corporate training is carried out as a direct result of the requirement of their superior. We can find out educational needs by the means of the so-called “analysis of educational needs.” According to Milkovich and Boudreau (1991), the given analysis is carried out at several levels. According to Srivastava (2002), training follows continuous innovation by creating the connection between the external and internal organization world which helps the organization to keep its competitiveness.

The organization survival depends on its ability to equip its employees with the right skills and competences completed with the right attitudes. In this way, they serve the aims of the organization, especially by the means of increasing the adaptability and ability to react to the changes in the economic and business environment.

Gould et al. (2004) state that the analysis of educational needs is a first step in the strategy of organizational training and it is crucial to satisfy the needs of the employee’s permanent professional development. The analysis of educational needs must be therefore carefully planned, managed, and

1 The Faculty of Management, Slovakia, zuzana.birknerova@unipo.sk
2 The Faculty of Management, Slovakia, miroslav.frankovsky@unipo.sk
3 The Faculty of Management, Slovakia, eva.benkova@unipo.sk
directed towards clear results so that the educational actions are ensured to be applied effectively and they could lead to meaningful changes, e.g. in the quality of services provided by the organization.

An inevitable part of the concept of corporate training is an evaluating analysis which is carried out continuously. Hamblin (1974) understands the evaluation of corporate training in the context of information (feedback) about the effects of a training programme and the evaluation of the training in the light of this information. Evaluation should give a comprehensive reply to a question whether training fulfilled its purpose from the point of view of acquiring new skills and knowledge but also from the point of view of subjective perception of work attributes. The position of corporate training is determined by the fact that training is a tool not a goal. To be effective, corporate training has to respect the organization requirements as well as the employees’ possibility (Sadler-Smith, 2006). The mentioned attributes of corporate training are reflected in the concepts of this issue of several authors (Spector, 1997; Russ-Eft, 2008; Fitzgerald, 1992 a i.).

Research

The research sample was created by the employees of a private and public sphere operating in the sector of production, administration, and a school system. We addressed 152 respondents, from which 87 were men (57,20%) and 65 women (42,80%), in the age from 21 to 62 years (the average age was 40,84 years, standard deviation was 10,510). The employees had an average length of practice of 17,36 years (standard deviation was 10,806 years). The minimum length of practice was 1 year and maximum length 44 years. From the total number of employees, 92 operate in a private sphere (60,50%) and 60 in a public sphere (39,50%). We addressed 51 employees working in the sector of economic production (33,60%), 36 in administration (23,70%) and 21 in a school system (13,80%).

The data in a presented research were acquired by the means of SBES methodology (Frankovský et al., 2015; Birknerová et al., 2016a, 2016b). The methodology contains 22 items, based on which the respondents were assessing different aspects of corporate training. The individual items were evaluated on a 5-point scale, where 1 = certainly no, 2 = rather no, 3 = neither no, nor yes, 4 = rather yes, 5 = certainly yes. Corporate training was assessed by the means of factors which explain 65,6% variances.

The Principal Component Analysis with Varimix Rotation was used to extract 4 factors the content of which may be described as follows:

- **F1: Significance for the profession.** Respondents scoring high in this factor attach greater importance to education for the profession; they perceive a greater personal significance of education and see a higher degree of relation to the work performance (Cronbachova alpha – 0,899).
- **F2: Benefits for the employees.** Respondents with higher scores in this factor attach greater importance to education for career development, positive evaluation, improvement of relationships on the workplace, and for motivation increase (Cronbachova alpha – 0,844).
- **F3: Expectations of the employees.** Respondents scoring high in this factor provide positive evaluation of the education program, utilized methods and forms of education and the training course, and have also higher expectations (Cronbachova alpha – 0,860).
- **F4: Satisfaction of the employees.** Respondents with higher scores in this factor evaluate education as more comprehensible, acceptable, and adequate time-wise (Cronbachova alpha – 0,771).

Selected work attributes were evaluated from the point of view whether they contribute or not to the achievement of good results at work. The respondents had a possibility to assess the following work attributes: interesting job, delight from the results at work, thrilling situations, free working time, wage, the possibility to be promoted, competition among co-workers, social usefulness of the work, appreciation from co-workers, and appreciation from a superior. Individual attributes were assessed at a nominal bipolar range yes – no.

The differences in assessing corporate training from the point of view of evaluating selected work attributes were analysed by the means of a mathematic-statistical method of t-test for two independent selections in the statistical program SPSS 20. The results of the analysis are presented in Tables 1 – 4. The tables show only those attributes by which statistically significant differences were found out.
The results of the mathematical-statistical analysis proved the existence of significant differences in assessing the corporate training factor of the Significance for performing a profession between the respondents who agreed that work attributes Interesting work, Delight from work and the Possibility to be promoted at work contribute to reach good results at work and the respondents who did not agree that Interesting work, Delight from work and the Possibility to be promoted at work contribute to reach good results at work. It proves the fact that the respondents who assessed the mentioned corporate training factor more positively also agreed that interesting work, delight from work and the possibility to be promoted significantly influence the achievement of good results at work (Table 1).

The acquired results from the analysis in assessing the corporate training factors of the Advantages for employees and the Expectations of employees proved similar findings. But the significant differences between the respondents who agreed or did not agree with the influence of work attribute on work results only proved from the point of view of the attributes of Delight from work and the Possibility to be promoted at work (table 2 and table 3). Also in this case, the respondents who assessed the mentioned corporate training factors more positively agreed that the delight from work and the possibility to be promoted at work influence the achievement of good results at work.

Table 1: Assessment of the corporate training factor of the Significance for performing the profession from the point of view of selected work attributes

<table>
<thead>
<tr>
<th></th>
<th>F1 – Significance for performing the profession</th>
<th>F2 – Benefits for the employees</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Interesting work</strong></td>
<td>Average - yes</td>
<td>Standard deviation</td>
</tr>
<tr>
<td></td>
<td>Average - no</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.80</td>
<td>1.03</td>
</tr>
<tr>
<td></td>
<td>2.90</td>
<td>0.93</td>
</tr>
<tr>
<td><strong>Delight from work</strong></td>
<td>Average - yes</td>
<td>Standard deviation</td>
</tr>
<tr>
<td></td>
<td>Average - no</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.01</td>
<td>0.90</td>
</tr>
<tr>
<td></td>
<td>2.99</td>
<td>0.99</td>
</tr>
<tr>
<td><strong>Possibility of being promoted at work</strong></td>
<td>Average - yes</td>
<td>Standard deviation</td>
</tr>
<tr>
<td></td>
<td>Average - no</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.14</td>
<td>0.86</td>
</tr>
<tr>
<td></td>
<td>3.22</td>
<td>1.05</td>
</tr>
</tbody>
</table>

Source: Authors

Table 2: Assessment of the corporate training factor of Advantages for employees from the point of view of selected work attributes

<table>
<thead>
<tr>
<th></th>
<th>F2 - Benefits for the employees</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Delight from work</strong></td>
<td>Average - yes</td>
</tr>
<tr>
<td></td>
<td>Average - no</td>
</tr>
<tr>
<td></td>
<td>3.24</td>
</tr>
<tr>
<td></td>
<td>2.82</td>
</tr>
<tr>
<td><strong>Possibility of being promoted at work</strong></td>
<td>Average - yes</td>
</tr>
<tr>
<td></td>
<td>Average - no</td>
</tr>
<tr>
<td></td>
<td>3.45</td>
</tr>
<tr>
<td></td>
<td>2.90</td>
</tr>
</tbody>
</table>

Source: Authors
The development of employees put attention is focused on not only face changes but also to suggest to create a change (Fitzgerald, 1992). In connection to understanding the economic environment as turbulent with a never-ending flow of changes (Drucker, 1999), the attention paid to the development of human capital is inevitable.

The analysis of the differences in assessing the corporate training factor of Employees’ Satisfaction proved the significant differences between the respondents in the examined context from the point of view of work attributes of Interesting work and Delight from work. As already mentioned, the respondents who assessed the corporate training factor of Employees’ satisfaction agreed that the delight from work and interested work influence the achievement of good results at work (table 4).

### Table 3: Assessment of the corporate training factor of Expectations of employees from the point of view of selected work attributes

| F3 – Expectations of the employees | Delight from work |  |  |  |
|-----------------------------------|-------------------|-------------------|-------------------|
| Average - yes                     | Standard deviation| T -test           | Significance      |
| Average - no                      | Standard deviation| - yes             |                   |
| Average - no                      | Standard deviation| - no              |                   |
| 3.21                              | 1.18              | 2.929             | 0.004             |
| 2.73                              | 0.81              |                   |                   |

| F3 – Expectations of the employees | Possibility of being promoted at work |  |  |  |
|-----------------------------------|----------------------------------------|-------------------|-------------------|
| Average - yes                     | Standard deviation| T -test           | Significance      |
| Average - no                      | Standard deviation| - yes             |                   |
| Average - no                      | Standard deviation| - no              |                   |
| 3.42                              | 0.91                      | 2.499             | 0.014             |
| 2.81                              | 1.25                      |                   |                   |

Source: Authors

### Table 4: Assessment of the corporate training factor of Employees’ satisfaction from the point of view of selected work attributes

| F4 – Satisfaction of the employees | Interesting work |  |  |  |
|-----------------------------------|-------------------|-------------------|-------------------|
| Average - yes                     | Standard deviation| T -test           | Significance      |
| Average - no                      | Standard deviation| - yes             |                   |
| Average - no                      | Standard deviation| - no              |                   |
| 3.29                              | 0.92              | -2.026            | 0.045             |
| 2.99                              | 0.89              |                   |                   |

| F4 – Satisfaction of the employees | Delight from work |  |  |  |
|-----------------------------------|-------------------|-------------------|-------------------|
| Average - yes                     | Standard deviation| T -test           | Significance      |
| Average - no                      | Standard deviation| - yes             |                   |
| Average - no                      | Standard deviation| - no              |                   |
| 3.41                              | 0.90              | -2.718            | 0.007             |
| 2.99                              | 0.89              |                   |                   |

Source: Authors

**Discussion and conclusion**

If an organization wants to make a progress, it is inevitable to pay attention to the corporate training of employees; the character, the level and the intensity of which can be different according to the needs of the organization (Sadler-Smith, 2006) and the employees’ possibilities. One of the important aspects of the corporate training effectiveness is the perception and evaluation of this training by the employees (Lelková and Lorincová, 2017; Várová et al. 2012) and thus also a question of getting a feedback (Rajnoha et al. 2016) and other work aspects (Štefko and Gallo, 2015). A crucial factor of the development of any organization are its employees, a human capital. The performance and the competitiveness of an organization is from the point of view of its employees conditioned by the development of their competences and self-management (Russ-Eft. 2008). In this context, the attention is focused not only on the evaluation and remuneration, but also on a development and training. The development of employees puts an organization into a position when they can directly not only face changes, react to changes but also to suggest, to create a change (Fitzgerald, 1992). In connection to understanding the economic environment as turbulent with a never-ending flow of changes (Drucker, 1999), the attention paid to the development of human capital is inevitable.
The presented results prove the meaningfulness of thinking about the significance of corporate training also from the point of view of assessing the work by employees. The identified and specified connections between assessing the corporate training attributes (significance, advantages, expectations and satisfaction) and perception of the work (delight from work, interesting work, the possibility to be promoted) prove the mentioned thinking. (Fill and Mullins. 1990). The employees who assessed the individual corporate training attributes more positively agreed also with the mentioned work attributes as significant prerequisites for good results at work. In the context of corporate training, these findings focus the attention not only on the aspects of the development of findings, knowledge, and skills, but also on a possible influence of this training on a psychic aspect, experiencing one’s own work. Such an approach enables a more complex view on the position of corporate training also from the point of view of motivation, loyalty and other work attributes which are connected to a subjective work picture. The research results proved the findings which are connected to specifying the external and internal motivation factors of education. These findings correspond with the findings which are presented by Buckley and Caple (2007). From a methodological point of view, the presented results prove the legitimacy of a structural approach (significance, advantages, expectations and satisfaction) to discovering a feedback assessment of corporate training. At the same time, it is possible to consider the results of this study as a contribution to verifying the use of the SBES methodology (Frankovský et al. 2015; Birknerová et al. 2016a. 2016b).

Acknowledgement
The contribution is the result of KEGA Project 003PU-4/2017.

References
MANAGEMENT OF RESEARCH PROJECTS – LESSONS LEARNED

Jan Betta,¹ Joanna Jastrzebska²

Abstract: Project management assists many areas of human activities and recently has been considered as a way to ensure the success of scientific research projects. A primary problem is the need to identify the project’s success factors, which include phenomena, actions, events, and parameters that contribute to the success. The purpose of this study is to identify the management issues and oversights that pose a negative effect on scientific research projects. The study involves a questionnaire, distributed to several managers of research projects conducted within Polish universities. This paper presents the results of assessing responses to two questions of this survey. These questions about project management deal with goals achieved by marginal projects and an analysis ex post. The responses to each question are grouped into five types, on which a frequency analysis is performed. For each group, several conclusions and recommendations are proposed. The results are a first attempt to construct a set of suitable practices for the management of scientific research projects.

JEL Classification Numbers: Y2; DOI: http://dx.doi.org/10.12955/cbup.v5.s899

Keywords: research project, research project management, factors of success, good practices

Introduction

There has been growing interest in project management of scientific research. The issue has remained neglected for many years, leaving the management of scientific research projects lagging behind that of other areas such as information and technology. Awareness is needed on the history of project management and the specifics of research projects since those requiring a high level of innovation and creativity may not fit within the rigid framework of algorithms and quantitative tools.

The work conducted in this paper is empirical, based on the experiences of many scientists who implement and manage scientific projects, and results from the scientist’s perceived need to change. The intention is to find the starting point for future development of project management research, or at least to identify a set of ‘good practices’ in this field. The aim of the work is to show the areas considered unfavorable for research projects where appropriate improvements could lead to eliminate the most common mistakes for better project management in the future. The target audience includes individuals managing scientific research projects, as well as other stakeholders.

Literature Review

Success and Failure in Research Project Management

There exists broad divergence of opinions on the subject of what constitutes ‘research project success.’ Success, considered primarily as project success in general and not only in reference to research projects, refers traditionally to three basic criteria for successful projects in an ‘iron triangle’ or ‘golden triangle’: cost, time, and quality (Atkinson, 1999; Baccarini, 1999; Cheng, Tsai, & Sudjono, 2012). In general, the understanding of a successful project appears obvious and yet, project management literature reveals inconsistencies of an omnifarious nature. As Cameron (2016, p. 1) writes, relatively little systematic attention has been given in the literature to the meaning of “success and failure of research/innovation projects.” For formulating assessments of success and failure, there is a need to define the nature of the notions in more detail. Considering the impact of particular research project, Cameron (2016, p. 6) argue that “research projects must be judged on their longer term programmed effect, perhaps on a stream of products which take time to manifest their full impact” and analogously “take a longer term of the results of a new innovation” instead of restricting assessment to a single product. Success and failure are always relative concepts in the sense that a project can generate significant revenue even if its status is ‘failed’, as demonstrated in Cameron’s work with the case study of Betamax versus Video Home System (Video Home System; Buisseret, Cameron, & Georghiou, 1995; Cameron, 2016). Gryzık and Knapińska (2012) in their broad study of research projects claim that there is no universal way to manage a research project to guarantee success. The nature of the project, its environment, competencies, and predispositions of the team, and team skills of the manager need to be taken into account. According to Gryzık and Knapińska (2012),

¹ Wroclaw University of Technology, Poland, jan.betta@pwr.edu.pl
² Wroclaw University of Technology, Poland, joanna.jastrzebska@pwr.edu.pl
delays, overruns, lowering the quality of the work, and the inability to continue project arise from the following:

- Incorrect or no specification of the roles and responsibilities of the project team;
- Lack of rules and channels of communication within the team; and
- Inefficient planning (creating overly generalized plans prevents the functioning of management, and exceedingly detailed plans are unrealistic to execute within the given time).

Research project management literature offers some important guidelines as success criteria for research projects. Kamińska (2014) argues that evaluation of the project should be based on the following criteria:

- Relevance (the process of project implementation is correct, according to identified problems);
- Efficiency (the extent to which its objectives are realized or steps and actions are taken to fulfill the objectives and implementation indicators contained in the logical framework);
- Effectiveness (the measures taken are effective and lead to the growth of innovative research and development projects or create a new business start-up or spin-off; what has been achieved, was also planned);
- Perception (the project meets the expectations of stakeholders; academic, business and public community perceive these activities as helpful and contributing to the development of their regions); and
- Durability (the extent to which the beneficiaries of the target have a wider overall impact on other regions in terms of innovation and entrepreneurship.)

Interesting conclusions are formulated by Lazzarotti and Manzini (2011), who raise a formal model for assessing success and failure of research and development (R&D) projects. The model is based upon a balanced and synthesized evaluation of quantitative indicators from five different perspectives of performance: financial, customer, innovation and learning, internal business, alliances, and networks (Lazzarotti, Manzini, & Mari, 2011). A similar formal model for measuring R&D performance was proposed by Cameron (2016) who writes about dimensions for creating a typology of criteria for assessing success and failure of research projects. According to this author, based on four dimensions, 11 different types of criteria should be defined, among which 38 criteria should be differentiated. Then, a subjective opinion is formed on the importance of each type of criterion from three perspectives: commercial, customer, and social and environmental. In this model, Cameron (2016) formulated these criteria: accounting and financial measures, market-based, counterfactuals, technical or market innovativeness, time, technological performance, standards, environmental, competence, skills, research results, productive capacity, and social impact.

**Data and Methodology**

The research was conducted by a project team at the Department of Computer Science and Management, Wrocław University of Science and Technology. The project team’s objective was to apply success factors to Polish scientific research projects. Forty-two research project managers were involved. A questionnaire of 58 open and closed questions was developed and addressed to these managers, who supervised research projects at Polish scientific institutions. This paper focuses on the following two questions asked of the managers:

A. Did you find any side-effects of the project (both favorable and unfavorable)?

B. If you had the opportunity, what would you change in project realization (e.g., organizational structure, schedule, budget)? Why?

**Results and Discussion**

Question A was answered by 15 respondents (33%), who listed 13 side-effects. Statements, quoted literally, are grouped into 5 types of side-effects:

1. Scientific research side-effects (6 posts; 40% of all answers)
   - new projects
   - new doctorates
   - development of a new technology
   - other side-effects in terms of scientific research
   - the unexpected discovery of interesting properties of protein
noticed a pattern which we would like to examine later on

2. Context side-effects – relationship with the external environment (3 posts; 20% of all answers)
   - established beneficial contacts and co-operation for use in future projects
   - beneficial cooperation, further projects
   - cooperation with INCO company

3. Personal development side-effects (2 posts; 13% of all answers)
   - new ideas
   - increase creativity

4. Behavioral side-effects – internal relationships in the project team (1 comment; 7% of all answers)
   - the team, although skilled, cannot work together due to character differences

5. Other – negative (3 posts; 20% of all answers)
   - only 50% of the project objectives achieved
   - renouncement from further research
   - the problem with the use of materials

Figure 1 shows the proportional distribution of these responses according to the five groups.

<table>
<thead>
<tr>
<th>Figure 1: Distribution of answers to question A about side-effects given by 42 research project managers</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Pie chart showing distribution of answers]</td>
</tr>
<tr>
<td>Group 1: Scientific research side-effects</td>
</tr>
<tr>
<td>Group 2: Context side-effects</td>
</tr>
<tr>
<td>Group 3: Personal development side-effects</td>
</tr>
<tr>
<td>Group 4: Behavioral side-effects</td>
</tr>
<tr>
<td>Group 5: Other – negative</td>
</tr>
<tr>
<td>Source: Authors</td>
</tr>
</tbody>
</table>

Question B was answered by 38 respondents (90%) proposing 42 amendments. Statements are quoted literally and classified into five proposal types:

1. Change of administrative procedures (18 comments; 42% of all answers)
   - formalization level of the application process was too high
   - any change to the project required submission of the application, long time waiting for a response (2–3 months)
   - cooperation with the administration (contact with only one person was flawless)
   - difficult to prepare the correct application in accordance with the requirements, a lot of applications rejected, complicated procedures
   - I would expect (Polish National Science Centre (NCN) gives the opportunity of expression to the project team
   - there was a possibility to submit an official letter, but there is no opportunity to comment on the criteria for evaluation
   - I would like to make some comments to NCN if they see that some people have similar demands, then maybe they could see it is worth looking at it
   - the most important factor is administrative support
• amateur activities related to the selection of adequate reviewer
• too formalized procedures
• incompetent reviewers
• too much bureaucracy and too little interest in scientific values of the project
• in new projects, no one can be paid for their work, this possibility disappeared
• bureaucracy in NCN projects
• better placement of project in the direction of financing and supporting institutions; implementation of the project in the institution, which supports the administrative project manager
• support of other units of the University
• administrative support
• NCN should consolidate the scientific community, and not support unhealthy competition

2. Project management (8 comments; 19% of all answers)
• I would re-define project goals
• independence in search of contractors, translations
• organizational changes
• the project should be realized as a consortium
• disclosure of research results should not take place
• the amount of research topics should be limited. Otherwise, funds are dispersed
• management should be more professional

3. People in the project (7 comments; 17% of all)
• more contractors, tighter control of results
• the way of managing people should be better
• manager predispositions
• the most important factor is an efficient team
• larger team
• improve the recruitment of team members
• personal relationships with managers of academic units

4. Other resources (5 comments; 12% of all answers)
• bigger budget
• budget changes
• financial support
• greater importance should be attributed to budget planning, which will be implemented in the next project
• the budget was ‘not enough’

5. The duration of the project and scheduling (4 comments; 10% of all answers)
• more time needed
• schedule
• longer duration of the project
• better allocation of tasks to consortium members

Figure 2 shows the proportional distribution of responses according to the five groups. Only every third respondent claimed to experience side-effects. The classifying of responses distinguished five groups relating to side-effects. The result was dominated by research side-effects (40%). This outcome confirmed a general opinion among the Polish scientists that an essential attribute of a research project is its high unpredictability in outcomes. Thus, possibly an agile approach would benefit research project management. At this stage, the question remains open as to whether it is better to use a well-known agile methodology, develop a new, universal agile approach or use a specific agile type as may be required in a variety of research projects. Context side-effects or otherwise external relationships (20%) rated as the next highest response group for Question A, alongside negative side-effects (20%). Project managers stated side-effects involved establishing new
valuable contacts and cooperating with other research centers and enterprises. Negative side-effects related to the partial failure of projects. Possibly, managers need to focus more on risk management of research projects. The remaining responses to Question A related to personal development (13%) and behavioral goals (7%).

Figure 2: Distribution of answers to the question B on proposed changes as given by 42 research project managers

<table>
<thead>
<tr>
<th>Group</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>42%</td>
</tr>
<tr>
<td>Group 2</td>
<td>19%</td>
</tr>
<tr>
<td>Group 3</td>
<td>17%</td>
</tr>
<tr>
<td>Group 4</td>
<td>12%</td>
</tr>
<tr>
<td>Group 5</td>
<td>10%</td>
</tr>
</tbody>
</table>

Group 1: Change of administrative procedures
Group 2: Project management
Group 3: People in the project
Group 4: Other resources
Group 5: The duration of the project and scheduling

Source: Authors.

The manager’s responses regarding suggested changes for managing future projects (Question B) were mostly about administrative procedures (42%). This outcome reflects the general opinion within the scientific environment that scientists perceive excessive formalization and complicated administrative procedures as a major obstacle inhibiting proper realization of research projects. Among the eighteen statements in this group, most pertained to NCN, though there were also comments about the internal administration. The second most popular response group for Question B referred to the management of the project (19% of opinions). This area covers various aspects of management. The result reveals that management problems occur and are recognized. The third group referred to people in the project (17%), including aspects of leadership abilities of the project manager, selection of team members, and the team members’ work in the project. A relatively high awareness of the effect of personnel (‘soft’ resources) in the outcome of the project was evident. This was followed by other resources (e.g., budget; 12%) and then the time and scheduling group (10%), which is considered ‘hard (hard means measurable, like time, quality, money, risk)’ resources. This shows that the ‘hard’ resources are necessary, though not of primary importance.

Conclusion

The study serves an empirical point as it examines the experience of 42 managers of research projects, in the area of achieving the objectives of projects, unexpected side-effects, and ex-post analysis of the project in terms of “what would I change in management of the already ended project?” The research component presented in this paper is relatively small, being part of a larger NCN project that is ongoing. More research results are expected as the project progresses. Nevertheless, already a predominant direction of the desired changes in managing research projects is visible, though further research is necessary to substantiate these findings.

Acknowledgement

Research was carried out in the framework of a project funded by the National Science Centre ["Czynniki sukcesu i porażki projektów badawczych. Studium przypadków Polski ("nowa" Unia) i Francji ("stara" Unia)", nr 2014/13/B/HS4/01660].

References


COMPETITIVENESS OF THE FISH PROCESSING SECTOR IN LATVIA

Inese Biukšāne 1

Abstract: In the development of Latvia’s economy, the fish processing sector has played an important role, historically and traditionally, because of its ability to produce competitive products for the world market. The aim of this research is to evaluate the competitiveness of the fish processing sector in Latvia. Methodology involving the Model of Factors Influencing Competitiveness of the Fisheries Sector Cluster and the Index of Fish Processing Sector Competitiveness are developed as part of the research. The study also identifies the spheres influencing competitiveness, as well as the possibilities of further development. The methodology created in the study can be used to evaluate competitiveness of the fish processing sector in any country. It may also assist institutions involved in developing Fisheries’ policy to work more successfully and improve the common policy in the Fisheries sector.

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UDC Classification: 338.2

Keywords: competitiveness, index, fish processing, model.

Introduction

Latvia has a border length of 1836 km and a coastline of 494 km, which is 0.7% of the total EU coastline of 66 000 km (European Commission, 2014). The territorial waters of the Baltic Sea, up to 12 nautical miles from the coast, as well as the economic area, and the continental shelf of 28 000 km² fall under state jurisdiction (Agriculture Ministry, 2014). The internal waters comprise 2.543 km² or about 4.1 % of the country’s land mass (Agriculture Ministry, 2013). These waters include 12 500 rivers with a total length of 37 400 km. As well, there are 2 256 lakes with a total area of approximately 0.1 M ha and 800 artificial water bodies (Agriculture Ministry, 2014). Environmental pollution and inimical spawning conditions, as well as intensive fishing and other factors, have been detrimental to fish stocks. As a result, catch quotas and fish numbers in the Baltic Sea have diminished, and this has adversely affected the operation of fishery and fish processing companies in Latvia, but at the same time, increased the role of the aquaculture sector in the acquisition of alternative fish resources (Finance Ministry, 2003). The future of the fish processing sector in Latvia depends on the development of the fisheries and aquaculture sector.

In 2015, the Latvian fish processing sector involved 112 economically active companies with 4190 employees. These companies specialized in producing sterilized and unsterilized canned fish, smoked and salted fish, refrigerated and frozen fish, as well as mixed fish products. Raw materials in the production of canned fish and other fish products comprise fish caught mostly in the Latvian territorial waters of the Baltic Sea and the Gulf of Riga. These fish are primarily sprat and Baltic pilchard. Processing companies also use oceanic fish: herring, mackerel, sardine, sardinella, and tuna-fish to diversify their product assortment. In recent years, to produce canned fish, these processing companies have started to use freshwater species, such as pike, catfish, carp, and salmon bred locally in aquaculture, as well as salmon imported from foreign countries. The volume of canned fish and other fish products sold in 2014 reached 83.43 thousand tons, with a total market value of EUR 155.71 million. From 2005 to 2014 the volume of sold products reduced by −30.52% and to a great extent was related to a worsening market and an embargo introduced by Russia. The most popular product in the fish processing sector is the canned fish ‘Riga sprats’, which due to their specific taste peculiarities, ensured by a traditional smoking method using alder wood, has been a beloved consumer dainty for more than 100 years. Fish processing companies produce canned fish and other high-quality fish products and follow market tendencies and consumer demand. In general, in 2015, fish products and canned fish were exported to more than 60 countries (the main markets being Lithuania, Morocco, Russia, Belarus, and Ukraine). A portion of the exports went to the markets of the Commonwealth of Independent States (CIS), thus subjecting the fish processing companies to additional administrative risks, which had not existed in the common European market.

1 Riga Technical University, inese.biukshaene@inbox.lv
The Common Fisheries Policy of the European Union (EU) strives to ensure ecologically sustainable fisheries over a long-term and fisheries management that corresponds to the objective of ensuring benefits in economic, social, and employment spheres, to facilitate the availability of food (European Parliament and Council, 2013). The Common Fisheries Policy should foster increased productivity, a fair standard of living for the people employed in the fisheries sector and stable markets, and it should ensure the availability of resources and that product reach consumers at reasonable prices (European Parliament and Council, 2014). Using the support opportunities provided by the EU funding instruments and participating in the formation of the Common Fisheries Policy of the EU have enabled broad opportunities of enhancing competitiveness to promote the Latvian fish processing sector. Facilitation of competitiveness has become a major objective of the development strategy of companies, branches, and countries (Skapars & Sumilo, 2006). Evaluation of competitiveness provides an opportunity to judge impartially and allows a better understanding of the need for structural reforms and choice of priorities. This research aims to evaluate the competitiveness of the fish processing sector in Latvia. To achieve this aim, the study focused on the following objectives: 1) develop the methodology for the competitiveness of the fish processing sector; 2) evaluate the competitiveness of the fish processing sector in Latvia, identifying the spheres ensuring competitiveness. The novelty of the research is that it develops a methodology for evaluating competitiveness in the fish processing sector and thus potentially aids institutions involved in developing the fisheries policy to work more successfully and improve the common policy in the fisheries sector.

**Data and Methodology**

The qualitative and quantitative research methods used in the study included general scientific, statistical, mathematical, and sociological research methods. Microsoft Excel (2017) was used in the processing and analysis of the study results.

**Figure 1: Model of the Factors Influencing Competitiveness of the Fisheries Sector Cluster**

<table>
<thead>
<tr>
<th>Socio-economic Environment</th>
<th>Policy Environment</th>
<th>Nature and Culture Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>- demographic situation;</td>
<td>- fiscal policy;</td>
<td>- nature and culture resources</td>
</tr>
<tr>
<td>- social environment;</td>
<td>- monetary policy;</td>
<td>availability and protection;</td>
</tr>
<tr>
<td>- educational system;</td>
<td>- credit policy;</td>
<td>- global warming;</td>
</tr>
<tr>
<td>- science and research;</td>
<td>- innovation policy;</td>
<td>- water quality;</td>
</tr>
<tr>
<td>- infrastructure;</td>
<td>- investment policy;</td>
<td>- traditions and eating habits,</td>
</tr>
<tr>
<td>- investment environment,</td>
<td>- environmental policy,</td>
<td>etc.</td>
</tr>
<tr>
<td>etc.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Author

Figure 1 shows the Model of the Factors Influencing Competitiveness of the Fisheries Sector Cluster was developed to identify various influencing factors. These were internal and external social, economic, political, natural, and cultural environmental factors (including random events) and the
ability to adapt or modify these. As well, the model showed the mutual interaction and collaboration between factors and the involvement of affiliated companies and supporting infrastructure institutions.

A Fish Processing Sector Competitiveness Index was developed to evaluate the competitiveness of the Latvian fish processing sector at the level of microeconomics. The development of the Index was based on the Model of the Factors Influencing Competitiveness of the Fisheries Sector Cluster (Figure 1). The calculation of this index involved six sub-indexes in functions of their relative proportions (Equation 1) and with normalized values of indicators of the factors influencing the competitiveness (Equation 2).

\[
I_{FP} = SI_{AQPF} + SI_{PRC} + SI_{PC} + SI_{MME} + SI_{FS} + SI_{C} \tag{1}
\]

where:

\[
SI_{AQPF} = \text{Sub-Index of Availability and Quality of Production Factors}
\]

\[
SI_{PRC} = \text{Sub-Index of Production Competitiveness}
\]

\[
SI_{PC} = \text{Sub-Index of Product Competitiveness}
\]

\[
SI_{MME} = \text{Sub-Index of Marketing and Management Efficiency}
\]

\[
SI_{FS} = \text{Sub-Index of Financial Stability}
\]

\[
SI_{C} = \text{Sub-Index of Cooperation}
\]

\[
SI = \alpha(I_{1}^{nv} + I_{2}^{nv} + I_{3}^{nv} + ... + I_{n}^{nv}) \tag{2}
\]

where:

\[
SI = \text{Sub-Indexes}
\]

\[
\alpha = \text{relative scales}
\]

\[
I_{1}^{nv}...I_{n}^{nv} = \text{indicators with the normalized values}
\]

Overall, the study involved 22 indicators to evaluate competitiveness. These were selected from literature (Biuksane, 2016a) and involved more than 35 sub-indicators. As well, several were chosen using the main conditions for indicator selection (Biuksane & Judrupa, 2016). The indicators were normalized using minimum-maximum algorithm values of −5 to 5.

The Index of the Fish Processing Sector Competitiveness was used to assess the fish processing competitiveness, to identify the facilitating and promising spheres as well as the procrastinatory and stagnating ones influencing competitiveness. The Index was used as a basis for developing specific strategies (Table 1) for implementing an appropriate investment policy.

<table>
<thead>
<tr>
<th>Competitiveness</th>
<th>Penetration strategy</th>
<th>Enlargement strategy</th>
<th>Development strategy</th>
<th>Improvement strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>( C_{L(-0), \cdot} \cdot G_{P(\leq0)} )</td>
<td>✓</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>( C_{L(-0), \cdot} \cdot G_{P(-0)} )</td>
<td>-</td>
<td>✓</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>( C_{L(-0), \cdot} \cdot G_{P(\leq0)} )</td>
<td>-</td>
<td>-</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>( C_{L(-0), \cdot} \cdot G_{P(-0)} )</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>✓</td>
</tr>
</tbody>
</table>

\( C_{L} = \text{competitiveness level} \)

\( G_{P} = \text{growth pace} \)

Source: Author
Table 1 shows the four promotional strategies: 1) the penetration strategy, mostly for implementing measures to strengthen the spheres involved in procrastinating competitiveness, where cooperation plays a significant role; 2) the enlargement strategy for mostly implementing measures to strengthen the spheres that stagnate competitiveness; 3) the development strategy for implementing measures to strengthen spheres that promise competitiveness; and 4) improvement strategy for implementing measures to strengthen spheres that facilitate competitiveness.

Results and Discussions

The results indicated that the competitiveness of the Latvian fish processing sector from 2005–2014 was medium-high (0.46), apart from 2010, which was after the socio-economic crisis in Latvia when the competitiveness of Latvian fish processing sector was the lowest (−0.15). Over this period, the competitiveness of the fish processing sector in Latvia decreased by −45%, from −1.36 in 2005 to 0.74 in 2014 (Figure 2).

For competitiveness in the fish processing sector, the facilitating spheres comprised the availability and quality of production factors (AQPF) and the production competitiveness (PRC). The promising spheres involved the marketing and management efficiency (MME) and the financial stability (FS), while the procrastinatory spheres encompassed product competitiveness (PC) (Figure 2). In the fish processing sector don't have cooperation (producer organizations), depicted in Model (Figure 1).

The companies that operated in the fish processing sector in Latvia and the representatives of the institutions involved in the fishing sector and in developing and implementing fisheries policy believe that the growth of the sector competitiveness can be promoted by applying certain interrelated and subordinated measures (Figure 3).
The competitiveness of the Latvian fish processing sector may be facilitated by applying innovative technologies in production and producing qualitative and innovative products with high added value as well as carrying out regular cost optimization. According to the opinion of the companies and the representatives of the institutions involved in developing and implementing policy of the fisheries sector, the competitiveness of the fish processing sector in Latvia can also be promoted by other measures.

The measures proposed by the fish processing companies and those involved in policy development to promote competitiveness of the fish processing sector in Latvia are useful. However, the author believes that the promotional measures need to be structured and implemented according to the chosen development strategy and investment policy. There are several types of strategies. However, the author believes that to facilitate the competitiveness of the fish processing sector in Latvia a strategy of corresponding approaches should be developed. The Latvian fish processing sector has a medium-high competitiveness, but has a tendency to disimprove. Consequently, to facilitate competitiveness of the sector, a development strategy is highly recommended. In the framework of the development strategy, one should primarily implement measures that strengthen the spheres of promising competitiveness in the fish processing sector, and only then strengthen the other spheres.

**Conclusion**

The fish processing sector has always played a significant role in the economic development of Latvia. In Latvia, the fish processing has not only a long-standing history and tradition but also the ability to produce competitive products in the world market. Using supporting opportunities provided by the EU financial instruments and participating in developing the EU Common Fisheries Policy, Latvia’s fish processing sector gains a broad range of possibilities for its growth and increase in competitiveness. Competitiveness of the Latvian fish processing sector is currently evaluated as medium-high, which is ensured by the availability and quality of production, product competitiveness, marketing and management efficiency, and financial stability factors. To facilitate the competitiveness of the fish processing sector in Latvia, the author recommends implementing a development strategy. The evaluation methodology of the fish processing sector competitiveness developed in this study can be used to evaluate the competitiveness of the fish processing sector of any country. Furthermore, the methodology developed for evaluating competitiveness may assist the institutions involved in the Fisheries’ policy formation to work more successfully and improve the common policy in the Fisheries sector.

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CORPORATE SOCIAL RESPONSIBILITY AND CONSUMERS’ WASTE SORTING HABITS

Solveiga Blumberga,1 Ance Saulīte2

Abstract: The transition to circular economy shifts attention to re-use, repair, restoration and recycling of materials and products. What was previously considered to be waste can be turned into resources. The transition to a circular economy where the value of products, materials and resources is maintained for as long as possible and where as little waste is generated as possible is a significant contribution to the common effort in the European Union to create a sustainable low-carbon economy in which resources are used efficiently. Such an approach allows to transform the EU economy and generate new advantages for it (European Commission, 2015). Our individual action and provided support may help peers notice an opportunity and a solution for the future. The aims of the study are: To investigate the evaluation of the significance of the consumers’ corporate social responsibility and waste-sorting habits and to provide recommendations for improved access to the separate waste collection service. The research questions for achieving the objectives of the study were the following: How do consumers evaluate corporate social responsibility of companies in general? What are the waste-sorting habits of consumers? Are there statistically significant differences in the waste-sorting habits between various consumer generations? The authors prepared a unique consumer survey in which economically active inhabitants of the capital of Latvia, aged 15 to 71 years, participated. The results of our survey showed that the respondents rated the corporate social responsibility of companies as essential and emphasized that it was important for the large-size enterprises to operate ethically. The waste-sorting process itself creates disbelief among the respondents and also suspicion that all sorted waste is lumped together and removed to disposal sites.

UDC Classification: 159.9; DOI: http://dx.doi.org/10.12955/cbup.v5.901

Keywords: CSR, waste sorting, habits, generations, circular economy

Introduction

Up until now waste-sorting and citizen’s habits of waste-sorting have been a little-studied topic. Single individual’s view on the importance of corporate social responsibility is unusual subject for research in comparison with the popular corporate-level approach. Just a small part of Latvians is sorting their waste on a daily basis. Latvia faces a huge challenge to be able to meet requirements placed by the European Union of implementing principles of circular economy. Latvians need to change their habits of purchasing commodities and waste-sorting. The research of corporate social responsibility and habits of waste-sorting is valuable for both – waste management sector and to any socially responsible company. It finds significant correlations between habits of various generations and evaluation of the importance of corporate social responsibility within the economically active population. The research will primarily be used by “Latvijas Zaiļais Punkts” to develop various public awareness campaigns.

Literature review

S. Rahmann (Rahmann, 2011) describes corporate social responsibility (henceforth referred to as CSR) as a duty in front of the society, inclusion of the parties involved, improvement of the quality of life, economic development, ethical business practices, compliance with the law, voluntarism, human rights, environment protection, transparency and responsibility. Nowadays, social responsibility, responsibility for the environment and economic responsibility are the fundament of CSR (Crane, Matten & Spence, 2014). A new way of thinking in the management of the company, creation of shared values and social responsibility in it is being integrated into the overall strategy of a company (Rahmann, 2011; Wang, Tong. Takeuchi & George, 2016).

A habit is one or multiple activities performed regularly, automatically and frequently without our intentional involvement (Duhi gg, 2012). Making a decision, we start repeating the chosen activity daily until our behavior and action becomes habitual. Society members feel the responsibility for the direct impacts of their activities on them, others and the environment differently (Barrett, 2004). The age of the individuals influences their lifestyle and values, habits and consumption (Olson & Brescher, 2011).

For the Baby Boomers (born between 1945 and 1962), it is essential to maintain the traditional cultural values. Having concentrated the power (the experience, money and power accumulated through

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1 University, Riga, Latvia, solveiga.blumberga@gmail.com
2 RISEBA University, Riga, Latvia, saulite.ance@inbox.lv
hardship) in their hands, representatives of this generation are not able to give away their legitimately leading positions and values to the young that easily (Mullins, 2005). It is a generation which had experienced considerable changes, is very hard-working, careful and forbearing. For the Generation X (born between 1962 and 1980) is the motivation for work self-esteem, recognition and status. Since they are slightly cynical towards work, they search for opportunities to develop themselves and their skills and knowledge. Independent (no need for feedback), adaptive, efficient and profit-oriented people (Parker, 2007). The Y Generation (born between 1980 and 2000) is the socially fully integrated generation which is considerably different from the generation of their parents and grandparents. This generation is particularly considered to be the generation of outstanding managers. Very confident about their professional advantages which include knowledge of several languages, command of technologies, and a social capital which is well built on the social networks (Tolbize, 2008). Then comes the Z Generation whose description and tendencies have not been scientifically studied much so far.

Methods

The strategy of a quantitative study was chosen for the conduct of the study. Two surveys were used for the acquisition of the primary data: a survey regarding the rating of the significance of corporate social responsibility, supplemented with the perspectives of environmental sustainability, and a survey regarding the waste sorting habits of consumers in the context of awareness and motivation to sort waste, which materializes in concrete action. The research questions were the following: How do consumers evaluate corporate social responsibility of companies in general? What are the waste-sorting habits of consumers? Are there statistically significant differences in the waste-sorting habits between various consumer generations? Are there statistically significant correlations between the ratings of corporate social responsibility and waste-sorting habits? The overall sample for the study formed economically active inhabitants of the capital of Latvia, aged 15 to 71 years. By making calculations to verify the sufficiency of the sample, it has been determined that the study sample N=171 has been sufficient. Assuming a possible error of 6.3 %, the credibility of the results is 90%.

The age structure of the respondents by generations has been determined as follows: 51 respondents were between 15 and 36 years of age, 120 respondents were between 37 and 71 years of age, with higher education and higher vocational education.

Results

Along with the economic aspects, the social and ecological matters have become more topical. A vast majority (91%) of the respondents responded affirmatively regarding their awareness of the necessity to preserve the natural resources for the future generations. As the authors interpret it, this statement does not answer the question regarding the readiness of the respondents to act actively to conserve the natural resources. However, the authors theoretically assume that a marketing message which is based on future values might be efficient and powerful. One of the aspects of a sustainable environment is awareness of the limited quantities of the resources and the loads on the ecological systems caused by human activities. The level of responsibility of the respondents and the ratings provided by them for the importance of sustainability are evaluated based on the statement regarding the duty of the respondents toward the environment. Most (89%) of the respondents agree affirmatively that care for the environment around them is one of their own obligations. In the statement regarding the involvement of the society to educational events, this corporate social dimension is noted as significant by a majority (77%) of the interviewees. A small part (22%) of the respondents partly agree with the statement that it is a significant step towards a better future, which may be defined as an approving evaluation for the education of the society as such. Saving of various resources is a matter of corporate social responsibility and sustainability of a contemporary organization, resources may be saved by economizing them, not using them, or by replacing them with other, more environmentally-friendly resources, and a majority (77%) of the respondents claim that they pay attention to such action.

The Latvian waste management companies do their business in conditions of fierce competition, create new vacancies, invest money into the infrastructure, the latest technologies and science. Only one third (31%) of the respondents agree with the statement that waste management companies provide their contribution to the general economy. Almost one-half (47%) of the interviewees partly accept this statement; this means that they have a certain degree of doubt regarding this, and this means that there is little information and understanding relating to the significance of the service itself in the context of
the circular economy. According to a statement in the survey regarding ethical business practices, almost one third (26%) of the respondents agree that waste management companies have ethical business practices, yet a larger part (46%) of the interviewees agree with this statement only partly, and this suggests that the respondents have some level of doubts regarding the ethicalness of the business practices of the enterprises in this sector. When explaining the difference between the ratings provided by the generations for the dimensions of CSR, the authors used the Mann-Whitney U criterion and found out that there are statistically significant differences on the scale “Motivation” (r = .028, sig <0.01) between the respondents in the generation groups X & Y and the respondents in the generation groups Baby Boomers & X, and this suggests that older people have more motivation to sort waste (Table 1).

<table>
<thead>
<tr>
<th>Sample groups</th>
<th>Awareness</th>
<th>Motivation</th>
<th>Sustainability</th>
<th>CSR dimension society</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mann-Whitney U</td>
<td>2689.000</td>
<td><strong>2413.000</strong></td>
<td>2925.000</td>
<td>2755.500</td>
</tr>
<tr>
<td>Asymp. Sig. (2-tailed)</td>
<td>.207</td>
<td><strong>.028</strong></td>
<td>.642</td>
<td>.296</td>
</tr>
<tr>
<td>Motivation- Y &amp; Z generation</td>
<td>10.333</td>
<td><strong>11.118</strong></td>
<td>9.471</td>
<td>7.039</td>
</tr>
</tbody>
</table>

Source: Authors

Table 1: Mann-Whitney U criterion for both age-groups

To determine the scales with the most significant impacts on the closeness and significance of the correlations between the CSR dimension “Society” and the CSR dimension “Business” the Pearson Correlation Coefficient was calculated for the Y&Z generation group of respondents. The Y&Z generation groups of respondents have several statistically significant correlations of the scales CSR Society and CSR Business with the scales Awareness, Emotions, Action, Habits and Sustainability (see Table 2). There is a statistically significant correlation between the CSR Business dimensions with Emotions (r = .037, sig < 0.01). Even though the correlation is weak, the evaluation provided by respondents for the significance with regard to enterprises is sufficiently emotional. This means that every time there is positive or negative information regarding the corporate social responsibility of an enterprise in the media space, the consumer evaluates it sufficiently emotionally and associates with opting for a service or product offered by this company. There are statistically significant, but weak correlations between the CSR Business dimensions and Habits (r = .135, sig < .01), and this means that corporate social responsibility measures have significant impacts on consumer habits, the stronger the consumer habits, the higher the rating for the significance of CSR. Weak, but statistically significant correlations can be seen between the CSR Business dimensions and Action (r = .011, sig < .01) and Sustainability (r = .001, sig < 0.01), which means that the respondents of the Younger generation do not yet find Sustainability as significant as the Older generation. Statistically significant, very weak correlations can be seen between the CSR dimensions Society and Sustainability (r = .005, sig < .01), and this means that there is a possibility that particularly the consumers with the higher ratings for the significance of sustainability have higher ratings for the CSR Society dimensions (Table 2).

<table>
<thead>
<tr>
<th>Scales</th>
<th>Awareness</th>
<th>Emotions</th>
<th>Action</th>
<th>Habits</th>
<th>Sustainability</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSR dimension society</td>
<td>Pearson Correlation</td>
<td>.300*</td>
<td>.036</td>
<td>.036</td>
<td>.194</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.032</td>
<td>.800</td>
<td>.800</td>
<td>.173</td>
<td>.005</td>
</tr>
<tr>
<td>CSR dimension business</td>
<td>Pearson Correlation</td>
<td>.135</td>
<td>.293*</td>
<td>.355*</td>
<td>.303*</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.345</td>
<td>.037</td>
<td>.011</td>
<td>.031</td>
<td>.000</td>
</tr>
</tbody>
</table>

Source: Authors
To determine the closeness and significance of the correlations between the CSR dimensions Society and the CSR dimensions Business, the Spearman’s Correlation Coefficient was calculated. The obtained results show that the Y&Z generation group of respondents has a positive, statistically significant correlation between the scales CSR Society (r = .033, sig < 0.01) and CSR Business (r = .001, sig < 0.01) and the scale Motivation, and this means that the higher the significance rating provided by the respondent for the CSR dimensions, the higher their motivation to sort waste. Also, highly motivated respondents have higher significance ratings for the CSR dimensions. The CSR Business dimensions have a stronger correlation with Motivation to sort waste, rather than with the CSR Society dimensions.

To determine the closeness and significance of the correlations of the CSR dimensions Society, the Pearson’s Correlation Coefficient was calculated for the Baby Boomers & X generation group of respondents (see Table 3). There is a statistically significant correlation between the CSR dimension Society and the scales: Emotions (r = .023, sig <0.01), Motivation (r = .001, sig < 0.01), Habits (r = .001, sig < 0.01) and Sustainability (r = .001, sig < 0.01). The authors identified that in the Baby Boomers & X generation group, the corporate social responsibility dimension focused on the society increases the consumer’s significance ratings for sustainability, similar to what appears in the Y&Z generation group of respondents.

Table 3: Calculation of Pearson’s Correlation Coefficient for the Baby Boomers & X generation group of respondents

<table>
<thead>
<tr>
<th>CSR Dimension society</th>
<th>Awareness</th>
<th>Emotions</th>
<th>Motivation</th>
<th>Action</th>
<th>Habits</th>
<th>Sustainability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson’s Correlation Coefficient</td>
<td>.141</td>
<td><strong>.207</strong></td>
<td><strong>.305</strong></td>
<td>.171</td>
<td><strong>.382</strong></td>
<td><strong>.389</strong></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.125</td>
<td>.023</td>
<td>.001</td>
<td>.062</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>N</td>
<td>120</td>
<td>120</td>
<td>120</td>
<td>120</td>
<td>120</td>
<td>120</td>
</tr>
</tbody>
</table>

Source: Authors

To determine the closeness and significance of the correlations of the CSR dimensions Society, the Pearson’s Correlation Coefficient was calculated for the Baby Boomers & X generation group of respondents (see Table 4). The results obtained for the Baby Boomers & X generation group show a statistically significant correlation between the scale CSR Society and the scales Emotions (r = .001, sig < 0.01), Action (r = .001, sig < 0.01) and Habits (r = .001, sig < 0.01). This means that the corporate social responsibility dimensions focused on the society have statistically significant impacts on the emotions of consumers regarding sorting of waste, facilitate action and strengthen waste-sorting habits.

Table 4: Calculation of Pearson’s Correlation Coefficient for the Baby Boomers&X generation group of respondents

<table>
<thead>
<tr>
<th>Scale</th>
<th>Emotions</th>
<th>Action</th>
<th>Habits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSR Society</td>
<td>Pearson’s Correlation</td>
<td><strong>.526</strong></td>
<td><strong>.497</strong></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>N</td>
<td>120</td>
<td>120</td>
<td>120</td>
</tr>
</tbody>
</table>

Source: Authors

By calculating the T criterion for both age-groups on the scales Emotions, Action, Habits, CSR dimension Business, statistically significant differences can be seen on the scale CSR Business. The T criterion for the Y&Z generation is 19.039, whereas for the Baby Boomers & X generation it is 22.117. This shows that the significance ratings for corporate social responsibility are higher particularly among the respondents of the Baby Boomers generation. It is possible that individuals of this generation have more time to go deep into the flow of information and pass the information on to
their children and grandchildren. The Mann-Whitney U criterion for both age-groups on the scales Awareness, Motivation, Sustainability, CSR dimension Society shows statistically significant differences in the scale Motivation. The U criterion coefficient for the Y&Z generation is 11.118, whereas for the Baby Boomers & X generation it is 12.567. The authors consider that the Baby Boomers generation has more motivation than the Y&Z generation, which might be associated with the habits of the generations as such as well as the habitual tendency of the Y&Z generation to do what would be rewarded emotionally, financially, or socially (Duhigg, 2012).

With regard to the corporate social responsibility dimensions focused on business, statistically significant correlations can be seen on the scales Emotions (r = .037, sig < 0.01), Action (r = .011, sig < 0.01), Habits (r = .031, sig < 0.01) and Sustainability (r = .001, sig < 0.01). These data show that the corporate social responsibility measures focused on the alignment of the business environment have more significant impacts on the respondents’ significance ratings and have positive impacts in the scales which imply concrete action and waste-sorting habits themselves.

Conclusions and Recommendations

Most of the interviewees note that educating the society is a significant step towards a better future. The interviewees also find it necessary that companies in Latvia pay attention to the saving of resources. The respondents pay special attention to the enterprises that save resources. The corporate social responsibility of the large-size companies is rated as significant for the society in general, in assuring employment and new vacancies. Only one-third of the respondents claim that sorting of waste is a habit in their daily routine in the household, the family and the place of work and that they sort waste by using the publicly available containers for the disposal of sorted waste and separating glass containers from paper packaging. The Baby Boomers generation has more motivation to sort waste than the Y&Z generation. The significance ratings of the Baby Boomers generation for corporate social responsibility are higher than those of the Y&Z generation of consumers. There are statistically significant correlations between the waste-sorting habits of consumers and the significance ratings for corporate social responsibility. The results of the study show that consumers of the Y&Z generation have statistically significant correlations on the dimensions of corporate social responsibility which are focused on the society, awareness and the significance rating for sustainability, whereas specifically the business dimensions of corporate social responsibility appear to be stimuli for action and the formation of waste-sorting habits in the consumers of the Y&Z generation. The results of the study obtained for the Y&Z group of consumers show a positive, statistically significant correlation between the significance ratings for corporate social responsibility and Motivation, and this suggests that the society- and business-focused dimensions of the corporate social responsibility of companies have significant impacts on the motivation of consumers to sort waste. In the Baby Boomers group, there are statistically significant correlations between the society-focused dimensions of corporate social responsibility and the consumer’s significance ratings for sustainability, similar to what can be seen in the Y&Z group. Differently, from the Y&Z group of consumers, the CSR dimensions Society have statistically significant impacts on the motivation of individuals in the Baby Boomers group of consumers to sort waste and on their waste-sorting habits.

A particular offer should be made. The cooperation with retailer chains and offices should be strengthened to offer clients contemporary and convenient sorting of waste in their offices, including not only paper and waste paper, but also PET bottles, tetra-packs, tins. Waste management companies should develop an offer and a model for cooperation with the organizers of the large-scale sports events regarding PET bottle flattening facilities. Communication specialists should review the corporate communication strategies. Until now, communication has been informative and responsive. The strategy of communication (particularly in social networks) should be focused on the communication of the CSR values, such as purchase of a new, environmentally friendly system or discovery of a new unauthorized construction waste disposal site. Marketing specialists should do research and create business plans for the establishment of a new media platform to build common value on the national scale, including measuring the ecological footprint of the consumer, summarization of the habits, and recommendations for the reduction of the ecological footprint.

References


IMPACT OF UNCERTAINTY ON EUROPEAN MARKET INDICES
QUANTILE REGRESSION APPROACH

Mária Bohdalová,1 Michal Greguš2

Abstract: Contemporary Europe needs to make important collective economic and foreign-policy decisions. Many authors argue that uncertainty has influence on the markets’ behavior. Therefore, we have decided to analyze the impact of the uncertainty on the returns and the volatility of two major European market indices Germany (DAX) and the U.K. (FTSE 100) across selected quantiles. We present results for the time-period from January 3, 2000 to December 30, 2016. As influential factors, we consider the Economic policy uncertainty (EPU) indices for Europe, the United Kingdom, Brexit and low prices of the crude oil. In our paper, we have found an asymmetric dependence of the analyzed market indices on the selected factors. EPU Brexit had no or weak impact on the analyzed data. Our conclusion shows to investors how sensitive German and English markets are to the uncertainty in Europe.

JEL Classification Numbers: C21, C40, G11; DOI: http://dx.doi.org/10.12955/cbup.v5.902

Keywords: quantile regression, uncertainty, Brexit.

Introduction
Policy uncertainty in Europe has intensified because of the Global Financial Crisis, serial crises in the Eurozone, Brexit, etc. Following the recession in 2007-2009, the uncertainty of economic policy has increased as a result of uncertainty among businesses and households about future tax, regulatory, spending, health and monetary policies. However, dominant entrepreneurs and households decreased their spending on investment, consumption and rent following the recession, which resulted in slowing down the increase in policy uncertainty. Baker et al. (2015) investigated the role of policy uncertainty, and they have developed an index of economic uncertainty (EPU) for the United States. Bloomberg gives us an opportunity to analyze economic policy uncertainty for Europe, the United Kingdom and for Brexit in indices EPUCCEUM, EPUCUK, and EPUCBREX. The construction of these indices is based on newspaper articles regarding policy uncertainty concerning economy, uncertainty and information on spending, deficit, regulation, budget, tax, policy, or the Bank of England, or the ECB. We have taken EPU indices as risk factors for analyzing two major European markets – the DAX, Germany market and the FTSE 100, UK market. In addition to these indices, we have considered the volatility of oil prices and the volatility of the EUSTOXX European market.

In this paper, we have used a quantile regression method (Engle and Manganelli, 2004; Alexander, 2008; Birău and Antonescu, 2014; Naifar, 2016; Aymen and Mongi, 2016) to analyze the impact of uncertainty on major European market indices. Precisely, we propose a new model based on quantitative regression approach to explore how the individual mentioned risk factors affect the returns and volatility of the market index DAX and the FTSE 100. Our quantile regression model enables us to analyze the dynamics of the co-movement of the returns and volatilities through selected quantiles. Our findings give insight into the reaction of European equity markets to uncertainty and ultimately, they can help policy-makers, investors, and risk managers.

The paper is organized as follows. The next section shortly describes quantile regression and introduces our model. The section on data analysis presents analyzed data and results. The last section concludes our findings.

Methodology
The correlation coefficient measures the linear symmetric dependency between the analyzed variables. However, it cannot measure dependence between large and small movements of the analyzed financial time series. Therefore, we have used a quantile regression approach to analyze this complex dependence. Quantile regression gives us information not only about the average dependence in comparison to ordinary least square regression method (OLS) but we can learn also about lower and upper tail dependence (Koenker and Bassett, 1978; Alexander, 2008; McMillen, 2013; Mensi et al., 2014; Aymen and Mongi, 2016). The quantile regression model gives a set of regression curves that
differ across selected quantiles $q$ of the conditional distribution of the endogenous variable. QR is a distribution-free technique to estimate the effect of an endogenous variable on the quantiles of the response distribution. Its main advantage comparing to OLS regression is the flexibility in data modeling with different conditional distributions. The $q$-th conditional quantile function of the dependent variable $Y$ on independent variable $X$ (when variables $X$ and $Y$ are linearly dependent) is given as (Mensi et al., 2014)

$$Q_y(q|X) = \inf \left\{b \big| F_Y(b|X) \geq q \right\} = \sum \beta_i(q)X_i = X^T \beta(q)$$  \hspace{1cm} (1)

where $F_Y(b|X)$ is the conditional distribution function of $Y$ for given $X$. $\beta(q)$ is a vector of the quantile regression coefficients that determines the relationship between variable $X$ and the $q$-th conditional quantile of $Y$, $0 < q < 1$.

$$\hat{\beta}(q) = \arg \min \sum_{i=1}^T \left( q - 1 \cdot 1_{Y_i \leq X_i^T \beta(q)} \right) |Y_i - X_i^T \beta(q)|.$$  \hspace{1cm} (2)

where

$$1_{Y_i \leq X_i^T \beta(q)} = \begin{cases} 1 & \text{if } Y_i \leq X_i^T \beta(q) \\ 0 & \text{otherwise} \end{cases}.$$  \hspace{1cm} (3)

The dependence structure of $Y$ is determined by the values of $\beta(q)$. This structure is either constant when the values of $\beta(q)$ are the same for each quantile $q$ or monotonically decreasing/increasing, when the values of $\beta(q)$ decrease/increase for the increasing quantile $q$ or asymmetric/symmetric when the values of $\beta(q)$ are dissimilar/similar for lower and upper tail of the distribution of $X$ (Mensi et al., 2014).

To determine the impact of the uncertainty on the selected stock markets log returns (log returns are given by formula: $r = \ln P_t/\ln P_{t-1}$, $t = 1, \ldots, T$, excluding account dividends) or volatilities based on EWMA model (Alexander, 2008), we consider the following multivariable QR model.

$$Q_y(q|X) = X^T \beta(q),$$  \hspace{1cm} (4)

where

$\beta(q) = (\alpha(q), \beta_1(q), \ldots, \beta_b(q))$.

$Y$ are either log returns or volatility of the DAX stock index and

$X^T = (UKVolatility, COVolatility, SSXEVolatility, EPUCBREX, EPUCCEUM, EPUUK)$

or $Y$ are either log returns or volatility of the FTSE 100 stock index and

$X^T = (DAXVolatility, COVolatility, SSXEVolatility, EPUCBREX, EPUCCEUM, EPUUK)$

when EWMA model volatility is used for the DAX, the FTSE100, the SSXE stock index and Crude oil close prices.

**Data analysis**

Our empirical analysis examines impact uncertainty on major European markets represented by the DAX and the FTSE 100 stock market index. The DAX index includes 30 major issues traded on the German stock exchange in Frankfurt. The United Kingdom index FTSE 100 takes into account the value growth of the 100 largest market capitalization shares. The weighting of individual companies is determined by the “free float value” (market value of the freely traded number of shares) for both indices. Risk factors include the volatility of the European stock market represented by the EUSTOXX 50 stock (SSXE), volatilities of the DAX, the FTSE 100 and crude oil closing prices (CO). Then we have used the European economic uncertainty index EPUCCEUM, the U.K. economic uncertainty index EPUCUK and the economic uncertainty index due to Brexit EPUCBREX. The data were collected from a Bloomberg data provider, monthly from January 2000 to December 2016. The currency used is Euro. The analyzed time series are shown in Figure 1. As we can see, the evolution of the DAX and the FTSE 100 is similar during the analysed period (Fig 1, left). The gauge of economic
policy uncertainty in the United Kingdom has quadrupled in 2016. The uncertainty gauge for Europe also reached a record high (Figure 1, right).

We present results obtained using IBM SPSS software. We have decided to estimate the quantile regression coefficients across nine quantiles \( q = \{0.01, 0.05, 0.1, 0.25, 0.5, 0.75, 0.90, 0.95, 0.99\} \).

Table 1 provides the results for the log returns of the Germany market index DAX. Table 2 gives results for the EWMA volatility of the German market index DAX. Similarly, Table 3 gives results for the log returns of the U.K. market FTSE 100. Table 4 shows the results for the EWMA volatility of the U.K. market index FTSE 100. Tables 1 and 3 present the estimation of the quantile regression coefficients for model (4). Tables 2 and 4 give the estimation of the quantile regression coefficient for the market index volatility, see model (4). We have denoted by one asterisk ‘*’ the statistical significance of the QR coefficients at the 5% level and by two asterisks ‘**’ the statistical significance at the 10% level. We have found a significant negative effect of the FTSE 100 volatility on the index DAX log returns only for quantiles 0.01, 0.1 and 0.25. Slightly lower dependence is given by the 25% quantile, then the 1% quantile follows, and the strongest dependence is shown by the 10% quantile. The impact of crude oil volatility is positive and significant only for the 10% quantile. The volatility of the EUSTOXX 50 has a significant negative influence on the DAX log returns for quantiles from 0.01 to 0.25. However, for quantiles from 0.75 to 0.99, the volatility of the EUSTOXX 50 has a significant positive influence. Brexit influences positively only lower quantiles from 0.01 to 0.1. The Economic policy uncertainty index for Europe has significant negative influence from 1% to 50% quantiles and slightly positive influence from 90% to 99% quantiles. Only the high quantile is without influence of the EPUBLIC. Economic policy uncertainty index for the U.K. shows positive influence on the lower quantile and the median and negative influence for 95% quantile. The other quantiles do not show significant dependence (see Table 1).

![Figure 1: Close prices of the analyzed time series](image)

Source: Authors

We present results obtained using IBM SPSS software. We have decided to estimate the quantile regression coefficients across nine quantiles \( q = \{0.01, 0.05, 0.1, 0.25, 0.5, 0.75, 0.90, 0.95, 0.99\} \).

Table 1 provides the results for the log returns of the Germany market index DAX. Table 2 gives results for the EWMA volatility of the German market index DAX. Similarly, Table 3 gives results for the log returns of the U.K. market FTSE 100. Table 4 shows the results for the EWMA volatility of the U.K. market index FTSE 100. Tables 1 and 3 present the estimation of the quantile regression coefficients for model (4). Tables 2 and 4 give the estimation of the quantile regression coefficient for the market index volatility, see model (4). We have denoted by one asterisk ‘*’ the statistical significance of the QR coefficients at the 5% level and by two asterisks ‘**’ the statistical significance at the 10% level. We have found a significant negative effect of the FTSE 100 volatility on the index DAX log returns only for quantiles 0.01, 0.1 and 0.25. Slightly lower dependence is given by the 25% quantile, then the 1% quantile follows, and the strongest dependence is shown by the 10% quantile. The impact of crude oil volatility is positive and significant only for the 10% quantile. The volatility of the EUSTOXX 50 has a significant negative influence on the DAX log returns for quantiles from 0.01 to 0.25. However, for quantiles from 0.75 to 0.99, the volatility of the EUSTOXX 50 has a significant positive influence. Brexit influences positively only lower quantiles from 0.01 to 0.1. The Economic policy uncertainty index for Europe has significant negative influence from 1% to 50% quantiles and slightly positive influence from 90% to 99% quantiles. Only the high quantile is without influence of the EPUBLIC. Economic policy uncertainty index for the U.K. shows positive influence on the lower quantile and the median and negative influence for 95% quantile. The other quantiles do not show significant dependence (see Table 1).

| Table 1: The estimation of the quantile regression coefficients for the DAX returns |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|                | 0.01            | 0.05            | 0.10            | 0.25            | 0.50            | 0.75            | 0.90            | 0.95            | 0.99            |
| Intercept      | -0.007          | 0.001           | 0.000           | 0.002           | 0.001           | 0.000           | -0.001          | 0.000           | -0.003          |
| Prx[t]         | 0.003*          | 0.649           | 0.944           | 0.001*          | 0.145           | 0.860           | 0.248           | 0.945           | 0.115           |
| UKXVol         | -0.058          | -0.022          | -0.040          | -0.015          | -0.004          | -0.006          | -0.015          | 0.013           | -0.021          |
| Prx[t]         | 0.061**         | 0.235           | 0.004*          | 0.083**         | 0.445           | 0.449           | 0.177           | 0.479           | 0.392           |
| COVol          | 0.013           | -0.003          | 0.008           | -0.002          | 0.000           | 0.001           | 0.003           | -0.002          | 0.006           |
| Prx[t]         | 0.148           | 0.577           | 0.056**         | 0.503           | 0.862           | 0.652           | 0.261           | 0.735           | 0.356           |
| SXXEVol        | -0.112          | -0.096          | -0.059          | -0.032          | 0.004           | 0.044           | 0.094           | 0.101           | 0.200           |
| Prx[t]         | 0.000*          | 0.000*          | 0.000*          | 0.000*          | 0.393           | 0.000*          | 0.000*          | 0.000*          | 0.000*          |
| EPUBLIC        | 0.002           | 0.001           | 0.001           | 0.000           | 0.000           | 0.000           | 0.000           | 0.000           | 0.000           |
| Prx[t]         | 0.000*          | 0.000*          | 0.000*          | 0.885           | 0.451           | 0.243           | 0.216           | 0.344           | 0.352           |
| EPUBLIC        | -0.003          | -0.002          | -0.002          | -0.001          | -0.001          | 0.000           | 0.001           | 0.001           | 0.001           |
| Prx[t]         | 0.000*          | 0.000*          | 0.000*          | 0.000*          | 0.110           | 0.014*          | 0.002*          | 0.052**         | 0.000           |
| EPUBLIC        | 0.000           | 0.000           | 0.000           | 0.000           | 0.000           | 0.000           | 0.000           | -0.0005         | 0.000           |
| Prx[t]         | 0.570           | 0.421           | 0.119           | 0.020*          | 0.012*          | 0.258           | 0.195           | 0.010*          | 0.100           |

Source: Authors
The impact of crude oil prices volatility on the DAX volatility is systematic with positive influence on the upper quartile and then it varies to negative influence. Volatility of the FTSE 100 does not impact the DAX volatility only for the 5% quantile. Otherwise, it has weak negative fluctuating impact on the median. Starting with the upper quartile, the positive impact grows. The impact of the volatility of the EUROSTOXX 50 is significant positive with the strongest impact on the median. EPUCBREX shows lower negative influence only for the 95% and 99% quantile. EPUCCEUM has a very small positive significant effect only for the lower quartile and the 99% quantile. EPUUK has no impact from the lower to the upper quartile. The dependence for the other quantiles is lower and significant (see Tab.2).

**Table 2: The estimation of the quantile regression coefficients for the DAX volatility**

<table>
<thead>
<tr>
<th></th>
<th>0.01</th>
<th>0.05</th>
<th>0.1</th>
<th>0.25</th>
<th>0.5</th>
<th>0.75</th>
<th>0.9</th>
<th>0.95</th>
<th>0.99</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>0.012</td>
<td>0.004</td>
<td>-0.004</td>
<td>-0.010</td>
<td>-0.005</td>
<td>0.003</td>
<td>0.005</td>
<td>0.006</td>
<td>-0.015</td>
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<tr>
<td>Pr&gt;</td>
<td>t</td>
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<td>0.000</td>
<td>0.000</td>
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<td>0.000</td>
<td>0.000</td>
<td>0.004</td>
<td>0.000</td>
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<tr>
<td>COVol</td>
<td>0.084</td>
<td>0.101</td>
<td>0.109</td>
<td>0.098</td>
<td>0.068</td>
<td>0.029</td>
<td>-0.029</td>
<td>-0.051</td>
<td>0.082</td>
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<tr>
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<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>UKXVol</td>
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<td>-0.062</td>
<td>-0.140</td>
<td>-0.087</td>
<td>0.205</td>
<td>0.474</td>
<td>0.653</td>
<td>0.328</td>
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<td></td>
<td>0.000</td>
<td>0.914</td>
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<td>0.000</td>
<td>0.000</td>
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<td>0.000</td>
</tr>
<tr>
<td>SXXEVol</td>
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<td>0.715</td>
<td>0.847</td>
<td>1.045</td>
<td>1.081</td>
<td>0.910</td>
<td>0.856</td>
<td>0.758</td>
<td>1.079</td>
</tr>
<tr>
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<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>EPUCBREX</td>
<td>0.798</td>
<td>0.900</td>
<td>0.386</td>
<td>0.776</td>
<td>0.937</td>
<td>0.353</td>
<td>0.144</td>
<td>0.035</td>
<td>0.000</td>
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<tr>
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<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>EPUCCEUM</td>
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<td>-0.001</td>
<td>0.000</td>
<td>0.001</td>
<td>-0.001</td>
<td>0.001</td>
<td>0.000</td>
<td>0.000</td>
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</tr>
<tr>
<td>Pr&gt;</td>
<td>t</td>
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<td>0.000</td>
<td>0.315</td>
<td>0.002</td>
<td>0.003</td>
<td>0.005</td>
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</tr>
<tr>
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<td>0.001</td>
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<td>0.000</td>
<td>-0.002</td>
<td>-0.001</td>
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</tr>
<tr>
<td>Pr&gt;</td>
<td>t</td>
<td></td>
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<td>0.000</td>
<td>0.038</td>
<td>0.184</td>
<td>0.581</td>
<td>0.150</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Source: Authors

**Table 3: The estimation of the quantile regression coefficients for the FTSE 100 returns**

<table>
<thead>
<tr>
<th></th>
<th>0.01</th>
<th>0.05</th>
<th>0.1</th>
<th>0.25</th>
<th>0.5</th>
<th>0.75</th>
<th>0.9</th>
<th>0.95</th>
<th>0.99</th>
</tr>
</thead>
<tbody>
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<td>Intercept</td>
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<td>0.001</td>
<td>0.002</td>
<td>0.001</td>
<td>0.000</td>
<td>-0.001</td>
<td>0.000</td>
<td>-0.002</td>
<td>-0.002</td>
</tr>
<tr>
<td>Pr&gt;</td>
<td>t</td>
<td></td>
<td>0.228</td>
<td>0.181</td>
<td>0.005</td>
<td>0.092</td>
<td>0.134</td>
<td>0.048</td>
<td>0.532</td>
</tr>
<tr>
<td>DAXVol</td>
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<td>0.056</td>
<td>0.019</td>
<td>-0.011</td>
<td>-0.005</td>
<td>-0.002</td>
<td>0.002</td>
<td>-0.002</td>
<td>-0.011</td>
</tr>
<tr>
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<td></td>
<td>0.031</td>
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<td>0.045</td>
<td>0.220</td>
<td>0.713</td>
<td>0.820</td>
</tr>
<tr>
<td>COVol</td>
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<td>-0.009</td>
<td>-0.009</td>
<td>-0.001</td>
<td>-0.001</td>
<td>0.005</td>
<td>0.003</td>
<td>0.004</td>
<td>0.006</td>
</tr>
<tr>
<td>Pr&gt;</td>
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<td>0.048</td>
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<tr>
<td>SXXEVol</td>
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<td>-0.086</td>
<td>-0.022</td>
<td>0.006</td>
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<td>0.064</td>
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<tr>
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<tr>
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<tr>
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<td>0.000</td>
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</tr>
<tr>
<td>Pr&gt;</td>
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<td>0.662</td>
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<td>0.803</td>
<td>0.385</td>
<td>0.176</td>
<td>0.820</td>
<td>0.060</td>
</tr>
</tbody>
</table>

Source: Authors

The FTSE 100 log returns are significantly positively influenced by the DAX volatility only for the lower quantiles until the lower quartile with a decreasing impact. The effect of crude oil volatility is negative and the same for the 5% and 10% quantile, and it has a positive impact for the upper quartile. The volatility of the EUROSTOXX 50 has significant negative decreasing influence on the FTSE 100 log returns for the quantiles from 0.01 to 0.25. However, for quantiles from 0.75 to 0.99, the volatility of the EUROSTOXX 50 has significant increasing positive influence. Brexit influences positively only the lower quantiles from 0.01 to 0.1. The economic policy uncertainty index for Europe has significant negative decreasing influence from 1% to 25% quantiles and a slightly positive increasing influence from 50% to 99% quantiles. The Economic policy uncertainty index for the U.K. shows a lower positive influence only for the 90% and 95% quantile at a significance level of 90% (see Table 3). The volatility of the FTSE 100 is under systematic influence of the DAX volatility. This dependence is positive and smoothly decreasing across the analyzed quantiles to the upper quartile, and then it varies to negative decreasing influence. The impact of the volatility of crude oil prices on the FTSE 100 volatility is systematic positive to 95%. The impact of the volatility of the EUROSTOXX 50 is...
significant positive influence across all quantiles with the strongest impact at 99%. EPUCEUM shows a lower positive influence only from the 1% quantile to the 25% quantile. EPUCEUM has a very small positive significant effect only for the 1% and 5% quantile and the 75% and 99% quantile. EPUCEUM has a weak impact from the lower to upper quantiles (see Table 4).

Table 4: The estimation of the quantile regression coefficients for the FTSE 100 volatility

<table>
<thead>
<tr>
<th></th>
<th>0.01</th>
<th>0.05</th>
<th>0.1</th>
<th>0.25</th>
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<th>0.75</th>
<th>0.9</th>
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<td>-0.014</td>
<td>-0.018</td>
<td>-0.023</td>
<td>-0.019</td>
<td>-0.004</td>
<td>0.006</td>
<td>0.014</td>
</tr>
<tr>
<td>Pr&gt;</td>
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<td>0.000 *</td>
<td>0.000 *</td>
<td>0.000 *</td>
<td>0.000 *</td>
<td>0.000 *</td>
<td>0.000 *</td>
<td>0.000 *</td>
</tr>
<tr>
<td>DAXVol</td>
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<td>0.333</td>
<td>0.178</td>
<td>0.051</td>
<td>-0.134</td>
<td>-0.197</td>
<td>-0.273</td>
<td>-0.384</td>
</tr>
<tr>
<td>Pr&gt;</td>
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<td>0.000 *</td>
<td>0.000 *</td>
<td>0.000 *</td>
<td>0.000 *</td>
<td>0.000 *</td>
<td>0.000 *</td>
</tr>
<tr>
<td>COVol</td>
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</tr>
<tr>
<td>Pr&gt;</td>
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<td></td>
<td>0.000 *</td>
<td>0.000 *</td>
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Source: Authors

Conclusion

Our paper has analyzed the impact of economic uncertainty and selected volatilities on the German and U.K. stock markets across selected quantiles of the return distributions. Empirical results presented in this paper indicate an asymmetric dependence between the EU stock markets and all considered influential factors for the period from January 2000 to December 2016. We have found that the volatility of oil prices shows an asymmetric dependence with the U.K. and German markets returns in bullish and bearish markets conditions. The U.K. market volatility is independent from the oil price during the bear market conditions. The EUROSTOXX volatility co-move positively with the DAX and FTSE 100 volatilities, and it has a negative decreasing impact when the market is bearish. Finally, the economic policy uncertainty Brexit index had a weak influence on the U.K. and German stock markets mainly for the quantiles of the lower quartile. Otherwise, it did not have any influence. Our findings can be helpful to international investors because it shows them how sensitive the German and English markets are to the uncertainty in Europe.

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APPROACH TO SOCIAL ENTREPRENEURSHIP IN SLOVENIA

Barbara Bradač Hojnik

Abstract: In this paper, social entrepreneurship as a developing type of entrepreneurship is analyzed. On the level of the European Union (EU), social entrepreneurship is widely supported by different initiatives which aim to develop a suitable legal, administrative, and financial environment for social enterprises, but also allowing member states to regulate them individually. This paper focuses on the social entrepreneurship in Slovenia, where it is strictly shaped by the legislation. Consequently, social enterprises need to meet the legislation’s requirements which hinder their quantity and development. Additionally, the scope of social enterprises is narrowed to those companies that received the formal status of social enterprise. In the paper provided will be the data on social enterprises in Slovenia with some recommendation for further development of the framework for social entrepreneurship in the country.

JEL Classification Numbers: L31, L26; DOI: http://dx.doi.org/10.12955/cbup.v5.903

Keywords: social entrepreneurship, social enterprises, Slovenia

Introduction

Social entrepreneurship is an innovative type of entrepreneurship, with a high level of responsibility to the society. It is characterized by the motives of resolving social, economic, environmental and other problems of society. The primary purposes of social enterprises are adding value to the society, improving conditions of the social environment, creating jobs for vulnerable groups, performing socially useful activities…etc. Similarly to profit oriented enterprises, social enterprises also operate on the market, but with the main difference that profits are returned to the enterprise to achieve social goals. Although social enterprises are diverse, they mainly operate in personal social services (medical and elderly care, health services, childcare services), work integration (integration of the unemployed and people with disabilities), in the development of disadvantaged locations (rural areas, problematic areas in urban locations), and in some other services (environmental services, culture, sports) (EC, 2017). As social enterprises depend on institutional and cultural contexts in which they operate, the barriers that they face are specific to those contexts. But, there also exist some common challenges, among which are legal frameworks, access to markets and to financial resources, business support and sustainability issues, and development structures.

As the social entrepreneurship is broadly defined, we will follow the definition by Mair and Marti’s article (2006, p. 37), that the social entrepreneurship is a process, where the value is created by combining resources in new ways, principally to exploit opportunities to generate social value by meeting social needs or stimulating social change. The Organisation for Economic Co-operation and Development (OECD) and European Commission each have their own definition for social enterprises. The OECD (1999) defined social enterprises as “any private activity conducted in the public interest, organized with an entrepreneurial strategy, but whose main purpose is not the maximisation of profit but the attainment of certain economic and social goals, and which has the capacity for bringing innovative solutions to the problems of social exclusion and unemployment”, while the European Commission (European Commission, 2011) defined a social enterprise as “an actor in the social economy whose main objective is to have a social impact rather than make a profit for their owners or shareholders. It operates by providing goods and services for the market in an entrepreneurial and innovative fashion and uses its profits primarily to achieve social objectives. It is managed in an open and responsible manner and, in particular, involves employees, consumers and stakeholders affected by its commercial activities”.

The European Commission (EC) considers several different types of businesses as social enterprises: (1) enterprises with social or societal objectives, (2) enterprises which reinvest their profits to achieve social objectives, and (3) enterprises with democratic or participatory principles of operating or focusing on social justice (European Commission, 2017). Defourny and Nyssens (2010) pointed out that there exist three key dimensions of social enterprises. The first one is the entrepreneurial dimension, which is expressed through the engagement in economic activity of social enterprises. The second one is the social dimension, which is seen as a primary and explicit social purpose of social enterprises.

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2 University of Maribor,barbara.brada@um.si
enterprises. And the third one is the governance dimension which is expressed through the mechanism that encompasses social goals of organizational aspects of the enterprises.

However, legal forms of social enterprises are different across countries. Their forms include a range of different forms, such as solidarity enterprises, cooperatives or limited liability social cooperatives, collective interest cooperatives, social purpose or collective interest companies, community interest companies and similar. A review of the legal structures and legislation in European countries reveals that several countries have adopted national laws regulating social enterprises. Additionally, these laws focus on common issues among which are the definition of social enterprise, asset allocation, stakeholder and governance systems, and accountability and responsibility towards internal and external stakeholders (OECD/European Union, 2013). In general, three main models of organizational forms of social enterprises are present (Cafaggi and Iamiceli, 2009), namely the cooperative model, the company model and the open type model (without specific legal form). For the creation and development of social enterprises the appropriate legal framework is needed at a national level. It will represent the foundation for establishing social enterprises, their operation and development. A clear set of rules is useful for several reasons, such as to open up opportunities for fiscal relief, to govern access to public procurement, and to define the beneficiaries of other forms of public support to social enterprises, according to their organizational form, target group and activity (European Union, 2015).

**Approach to social entrepreneurship in the European Union and in Slovenia**

In the European Union, the importance of social entrepreneurship is growing in recent years. For several years, the European Commission aims to create an encouraging financial, administrative and legal environment for social enterprises so that they can be on an equal position with other types of enterprises in the same sector. At the EU level, the social economy represents enterprises and organizations that are economic and social actors and are present in all sectors of economy and society. They are marked by their goals and unique design. The social economy includes organizations such as cooperatives (cooperative) associations, mutual societies and foundations. These social enterprises are particularly active in areas such as social protection, social services, health care, banking, insurance, production activities, a variety of consumer services, brokerage, various crafts, housing services, supplying services to the local environment, education and training in the field of culture, sport and leisure activities” (Campos and Ávila, 2012). The European Parliament adopted the Resolution on Social Economy in 2009 which states that the social economy combines profit with solidarity, aim at creating high-quality jobs, strengthening social, economic and regional cohesion, generating social capital, promoting active citizenship, solidarity and economics, in which people are set on the first place. Additionally, to foster social economy and support social enterprises, the European Commission launched the Social Business Initiative in 2011 to identify actions to make a real difference and improve the situation on the ground for social enterprises (European Commission, 2017).

In Slovenia, the social entrepreneurship domain is regulated by the national legislation. In year 2011 the Act on Social Entrepreneurship (Official Gazette, 2011) was adopted, which regulates the activity of social enterprises. It also stipulates a series of measures aimed at fostering the development of social enterprises, including the requirement to set up the Council for social entrepreneurship and to adopt a national strategy for the development of social entrepreneurship together with the program of measures to implement the strategy every four years. The implementation of the legislation is the responsibility of the Ministry of economic development and technology.

The Act on Social Entrepreneurship is designed to enable an open model of social entrepreneurship. It allows the creation of a social enterprise regardless of the legal form of the company. The Slovenian Act on Social Entrepreneurship predicts for two forms of social enterprise, so called type A and type B. The type A of social enterprise is meant for companies with intention to achieve positive social, environmental and economic impacts. The Act, therefore, provides a list of suitable activities for this type of social enterprise, including activities such as social and family protection, protection of physical, sensory, mental or otherwise disabled people, science, education and childcare, care and health promotion, ensuring social inclusion, promoting employment and vocational training of people who are unemployed or threatened by unemployment. On the other side, the type B of social enterprise applies to employees and not to the activity provided for the recruitment of persons who for various reasons are excluded from the traditional labor market. So, a social enterprise of this type may be
established to employ disadvantaged people and has to employ at least one third of these employees. The concept of social entrepreneurship in Slovenia and its objectives are also defined by the Act on Social Entrepreneurship. Its definition is as follows (Official Gazette, 20/2011): “Social entrepreneurship constitutes a permanent activity of social entrepreneurship or permanently performs other activities under the specific conditions of employment in the manufacturing and selling of products or services on the market, while making a profit is neither the sole nor the principal objective of the activity. Social entrepreneurship strengthens social solidarity and cohesion, encourages people's involvement and volunteer work, enhances the innovative ability of the company to address the social, economic, environmental and other problems, provides an additional range of products and services in the public interest, developing new employment opportunities, providing additional jobs and social integration and professional reintegration of the most vulnerable groups in the labour market (the objectives of social entrepreneurship)”.

In Slovenia, the primary goal of social entrepreneurship is to create jobs for groups of people who are vulnerable and have fewer employment opportunities (older workers, first-time job seekers, former drug users, ex-convicts, persons with disabilities, physically disabled persons, etc.). In addition to creating jobs the feature of social enterprises is performing socially useful activities (e.g., social tourism, eco-food production, youth work, fair trade, and promotion of healthy lifestyle).

**Empirical evidence on social enterprises in Slovenia**

The share of formally registered social enterprises in Slovenia is very low, especially when compared with other developed countries. As there are approximately 130,000 active companies in Slovenia and only 251 of them have the status of social enterprise, then the latter represent only 0.2% of the population, which is a negligible share (Ministry of economic development and technology, 2017). The reason lies mainly in the restrictive legislative framework, which clearly defined the terms for obtaining the status of a social enterprise. Currently, in Slovenia there are registered 251 companies with status of social enterprises. Their distribution by the type of organization is represented in Figure 1. There are almost one third of institutions, followed by cooperatives, associations and limited liability companies. All other types represent minor parts.

<table>
<thead>
<tr>
<th>Figure 1: Share of social enterprises in Slovenia by type of organization</th>
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<tbody>
<tr>
<td>institution</td>
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<tr>
<td>cooperative</td>
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<td>association</td>
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<tr>
<td>limited liability company</td>
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<td>institute</td>
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<td>organizational unit</td>
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<td>foundation</td>
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Source: Author

However, as revealed some broader studies on entrepreneurship, businesses and other organizations with social aims and motives are considerably more in Slovenia. Those are not captured by the
statistics as they have not acquired the status of a social enterprise. The international study Global Entrepreneurship Monitor (GEM), for example, found that there are 3.2% of individuals who are currently involved in the creation of social enterprises, while there are 7.6% individuals involved in the creation of profit-oriented enterprises on average in the world (58 countries) (Bosma et al., 2016). The GEM research defines social entrepreneurship widely (wider than the Act on Social Entrepreneurship in Slovenia), like any business, organization or initiatives that have particular social, environmental or social objectives, achieving a substantial share of the total entrepreneurial activity. The GEM study revealed that in Slovenia 1.7% of individuals are involved in early entrepreneurial activity with a social purpose and this lags behind all of Slovenia’s neighbor countries, as there are in Croatia 6.1%, in Hungary 9.7%, and in Italy 2.3% of social entrepreneurs (Figure 2).

![Figure 2: Early-stage entrepreneurship activity with social purpose in Slovenia and its neighborhood countries](source: Author)

**Conclusions**

Establishing an enterprise requires a set of resources, skills and capabilities, which have to be even more sufficiently combined when establishing a social enterprise. Establishing, running and sustainably developing a social enterprise can be more difficult compared to for-profit oriented enterprises because of the skills needed to begin and manage it. Mostly because social entrepreneurs have to follow a social mission together with the economic one, and because of some other specifics of social enterprises such as difficulties in accessing capital and due to legislative and administrative requirements that social enterprises have to fulfill to retain their status. Therefore, the business ecosystem has to be well shaped and developed to offer support for this particular type of entrepreneurship. An enabling environment that supports social enterprises is even more important because of their specifics. However, particular countries use different approaches to formalizing social entrepreneurship. In Slovenia, the social entrepreneurship domain is formalized using rigorous legislation which is hindering the development of social enterprises. Additionally, the implementation of supporting mechanisms together with the legislation was delayed, including financial measures. Therefore, to support the development of social entrepreneurship in Slovenia, the primary governmental role is to prepare comprehensive implementing measures which will support existing social enterprises as well as motivate other companies to acquire the status of social enterprise.

**References**


MODELLING OF INVESTMENT PROCESSES IN THE SPHERE OF SOCIAL HOUSE BUILDING

Larisa Seliutina,1 Marina Egorova,2 Ksenia Bulgakova3

Abstract: The problem of not enough public housing for low-income citizens is very urgent in the entire world. This article is dedicated to the topical question; how do we select optimal investment projects and implement successful investment programs to fund public housing projects better. We have formulated basic principles for the formation of an optimal portfolio to use as a standard for investment programs for public housing construction projects. As selection criteria, instead of profitability and risk offered in classical portfolio theory to which private investors are paying attention, we propose the use of social satisfaction survey results and amount of available funding to determine the effectiveness of the programs. We have developed several mathematical models that help aid in the selection of investment projects based on these new requirements. The application of these models in the selected projects selection within the framework of investment programs of public housing construction will allow the most effective use of funds directed to the development of the public housing.

JEL Classification Numbers: R39; DOI: http://dx.doi.org/10.12955/cbup.v5.904
UDC Classification: 332.05
Keywords: Construction, housing, investment, finance

Introduction

Regardless of the form of government, comfortable housing is always high on the hierarchy of human needs (Heijden, Haffner, & Hoekstra, 2006). Originally, the role of the social housing sector was to provide universal access to adequate housing (Zhuk, 2012). Today, a majority of the population buy and rent housing based on a market that is a product of the state’s interaction with vulnerable citizens. Improving the interaction between all participants of public housing investment has occurred since the beginning of XVII century. This sphere differs in complexity and versatility. Therefore, it requires a scientific approach to its investigation (Selyutina & Bulgakova, 2014). Without competent control of investments, it is impossible to implement the programs of modern housing, form a favorable investment climate in the region, and carry out structural reforms and responsible housing policy (Berens & Havranek, 2007).

The principle of competent control also works in the opposite direction to increase of people’s quality of life, which is impossible without economic growth. Therefore, during the development of the programs for social housing one should not forget about economic efficiency.

Theoretical Frameworks

Financial theory became a science in the early to mid-20th century when the Fisher income discounting technique (2003) was used for the first time. In this economist’s opinion, to correctly assess future income in the present, one needs to relate the cost of services with capital cost. An evaluation of the main (capital) assets was central in the works of Williams (1995), a recognized investor in the United States of America.

Economists have offered several approaches to evaluate assets to allow controlling investment portfolios. However, all pre-war works were created with a hypothesis about the definiteness of conditions of financial solutions. Therefore, in financial analysis, elementary financial mathematics was used.

The work of Knight (1921) in ‘Risk, Uncertainty and Profit’ contains the first quality analysis of the probability-theoretic mathematical methods of risk events influence. In addition, the recommended set of projects was called investment programs. Some scientists reason that these two concepts are equal. Some economists complete the concept of the investment program, opening it as an element of the investment strategy of the state. For example, Tyrtyshev (2004) emphasizes that the program is a commitment that can create and mobilize resources for its implementation.

1 Petersburg State Transport University Emperor Alexander I Saint-Petersburg, Russia, ya.slarisa@ya.ru
2 The Bonch-Bruevich Saint - Petersburg State University of Telecommunications, Saint-Petersburg, Russia, egorova-mak@ya.ru
3 Saint-Petersburg State University of Economics, Saint-Petersburg, Russia, pierott_89@mail.ru
Possibly, the term ‘investment program’ has a wider meaning than the notion of ‘investment portfolio’ used more so today, but these terms frequently coincide in practice. Therefore, within the framework of this current research, the two terms are considered identical.

Modern investment theory is closely connected with Markowitz (1959; 1987). His models allowed investment projects that were selected because of risk and profitability to be translated into mathematical language. The main results of scientists-economists, acknowledged in the 20th century, are focused on the works of Markowitz, the essence of which being that a project’s portfolio is created using the relation of risk-profitability or certain combinations of risk and profitability (Markowitz, 1959; 1987).

To maximize profit and minimize risks, investors deal not only with one asset but allocate capital to different projects. A combination of projects creates new investment qualities and perspectives. Evaluation of separate assets and their portfolios. Modern investment theory considers two characteristics: risk and profitability, which are assessed quantitatively to allow the investor to form an optimal investment portfolio. The theory of ‘Efficient set of portfolios’ remains a summit of classic economic theory (Merton, 1969). As stated by Investopedia (2017), “Portfolio variance is calculated by multiplying the squared weight of each security by its corresponding variance and adding two times the weighted average weight multiplied by the covariance of all individual security pairs.”

**Data and Methodology**

Main Argument

Based on the assumption that, for the solution of the portfolio formation, the method and order of steps can be determined explicitly, a model is formed under a determined set of characteristics in various investment projects (Pr), where:

\[
\text{Pr = Pr}_1, \text{Pr}_2, \text{Pr}_3 \ldots \text{Pr}_n
\]  

Where the program of social house building (SPr) is derived from the suggested investment-building projects, the program was described as a subset of investment projects from the set, as follows:

\[
\text{SPr} \subset \text{Pr}
\]  

In the investment program, the characteristic vector, \(X (X_1, X_2, \ldots, X_n)\) was used to define the structure of the program. In this case, \(X_i\) was ‘1’ when the \(i\)-th project (\(Pr_i\)) was included in the program and ‘0’ when not.

For selecting optimal projects within the framework of socially-affordable housing, the new representation was social satisfaction (SS\(_i\)) by the \(i\)-th investment project (Pr).

This representation can be interpreted as direct, for example, by the number of citizens having improved housing conditions, as well as indirect, for example, the decrease of tension in society and the formation of new working places. Social satisfaction was evaluated subjectively by each expert based on hypotheses and formulations of this study.

All social investment programs balance the contradictive conditions of limited financing and social effect requirements.

The coefficient of social satisfaction, SS, was determined by experts by estimating the following local social satisfaction factors:

- The number of families who improved their living conditions;
- The features of social adaptation of citizens;
- The load on the existing infrastructure in the area; and
- Possibilities for further construction.

Representations of a social effect and, consequently, social satisfaction were subjective, and every expert calculated these independently.

Representations of social satisfaction were considered deterministic variables or random variables defined on the following probability space:

\[
< S, B, P >
\]  

where
The random variable, SS, of social satisfaction from every investment project available for evaluation was based on:

$$ r_i = (r_{i1}, r_{i2}, \ldots, r_{ik}) $$

where

- \( k \) = sample size of expert values, and
- \( r_{ik} \) = value \( \geq 2 \) derived by experts from the set of projects, characterized by a distribution function, \( F_i(t) \).

The study considered \( F_0 \) as a class of all possible distribution functions, \( F_i(t) \), from which a random sample, \( r_i \) (return of \( i \)-th asset), could be drawn.

Another criterion in selecting an investment project was the amount of financing for an investment program (\( V \)).

Based on the above-mentioned criteria, a mathematical model of the investment project was built for the program of social housing.

The characteristics and conditions of investment projects were defined, a task rarely performed in practice. Hence, every investment project was characterized by the following descriptions:

- \( SS \), a coefficient of social satisfaction of the project; and
- \( V \), the required amount of financial means calculated for the project.

The resulting models allowed one to determine optimal social projects with maximal social effect under a budget constraint.

Where \( V \) suggested financing of the program during a certain period, it was assumed that the total demand for financing should not exceed the possible financing during that fixed period. As a result, the social satisfaction of components of the program, consisting of various investment projects, were determined as:

$$ SS = \sum_{i=1}^{n} SS_i \cdot X_i $$

An investment program of social housing can be constructed using different approaches depending on the choice of criteria and constraints. Based on two key factors, two main models for forming a social housing program were proposed.

Model 1

This model was based on maximizing social significance under limited financing needs. From the set of investment projects, a subset of projects was chosen to form programs that satisfy the constraint of limited financing. Then, among those programs, the program with the maximal social significance was chosen. It was necessary to use a set of vectors \( X = (X_1, X_2, \ldots, X_n) \), where each \( X_i \) had a value of ‘0’ or ‘1’ and

$$ \left\{ \sum_{i=1}^{n} X_i S_i \rightarrow max \right\} $$

$$ \left\{ \sum_{i=1}^{n} X_i V_i \leq V_0 \right\} $$

Model 2

This model was based on minimizing finances based on the required level of social satisfaction. In this case, from the full set, the only investment projects selected to form the programs were those that satisfied constraints, in particular, those with the level of satisfaction at least or lower than \( SS_0 \).

Then, among those programs one with the minimally expected financing was identified. It involved a set of vectors \( X = (X_1, X_2, \ldots, X_n) \), where each \( X_i \) had a value of ‘0’ or ‘1’ and

$$ \left\{ \sum_{i=1}^{n} X_i V_i \rightarrow min \right\} $$

$$ \left\{ \sum_{i=1}^{n} X_i S_i \leq S_0 \right\} $$

The value for \( SS_0 \) represented the required level of social satisfaction of project components. The solution of the program formation resulted with the help of the typical optimization programs.
A mathematical expectation of return in classic theory of investment was an expected return and the variance of return represented the expected risks of investors or risks in general. In the suggested models, the mathematical expectation of significance for projects and programs defined the expected social satisfaction and the variance of significance the risk of investment program or risk in general (Modigliani, 1949).

In practice, investment projects were usually characterized not only by the determined demand in financing but by the random subjective value of social satisfaction, since it depended to a large extent on the experts’ opinion.

The value representing the sample of expert values was \( k \geq 2 \), and some general population were characterized by the distribution function \( F_i(t) \). In this, \( F_0 \) is a class of possible distribution functions \( F_i(t) \), from which sampling \( r \) can be derived as:

\[
    r_i = (r_{i1}, r_{i2}, ..., r_{ik})
\]

The evaluation of the mathematical expectation and dispersion of characteristics was applied to social satisfaction as follows:

\[
    m_i = \frac{1}{k} \sum_{i=1}^{k} r_{ik}
\]

\[
    D_i = \frac{1}{k} \sum_{i=1}^{k} (m_i - r_{ik})^2
\]

\[
    \sigma_i = \sqrt{D_i}
\]

where

\( m_i = \) a mathematical expectation of social satisfaction of \( i \)-th investment project;

\( D_i = \) variance of social satisfaction of members of \( i \)-th investment project;

\( \sigma_i = \) standard deviation of social satisfaction of the members of the \( i \)-th investment project.

The mathematical expectation of social satisfaction of investment program was determined by the formula:

\[
    R = \sum_{i=1}^{n} x_i^2 D_i
\]

For the case of dependent results of satisfaction regarding investment projects, the variance of socially oriented investment program was determined as:

\[
    D = \sum_{i=1}^{n} \sum_{j=1}^{m} x_i x_j D_{ij}
\]

where

\( D = \) the covariance between returns of two investment projects in the case of \( i = j \) being a variance.

It was assumed that \( V_0 \) was the potential amount for financing the socially oriented program during a certain period. Consequently, the total demand for financing of the socially oriented investment program could not exceed this potential amount.

Socially oriented investment programs can be formed and implemented within a day or in a few periods, depending on the established criteria. From this study, under random characteristics of social satisfaction, the following models of formation of optimal socially oriented projects were developed.

The first model of program formation is based on the maximization of expected social satisfaction of investment program under acceptable risk and financing limitations. Then, the economic and mathematical model will be formulated in the following way: it is necessary to choose from the given set of projects such a subset that form programs which satisfy the constraints of limited financing and limited risks. From those programs from the ‘feasible region’ chose the one with the maximal expected social satisfaction. In other words, it is necessary to find such a set of vectors \( X = (X_1, X_2, ..., X_n) \), where every \( X_i \) takes two possible values (0 and 1) to meet the following constraints and among them chose the one which satisfies the maximization criterion:

\[
\begin{align*}
    \sum_{i=1}^{n} x_i m_i & \rightarrow \max \\
    \sum_{i=1}^{n} x_i D_i & \leq D_0 \\
    \sum_{i=1}^{n} x_i V_i & \leq V_0
\end{align*}
\]

where
D₀ = upper bound of the investor’s risks;  
V₀ = upper bound of possible financing of the program;  
Vᵢ = financing of the i-Pr.

The model describes the optimization problem of finding the program, which gives maximal social satisfaction under the terms of limited risks, and limited financing. Its solution can be calculated with the help of typical optimization program.

The second model of program formation is based on the minimization of financing of the program under acceptable risk limitation and achievement of required level of social significance. Such conditions can be described by the following economic and mathematical model. From the given set of investment projects, it is necessary to choose such a subset of projects that form programs which fulfill the constraints. It means that the chosen programs do not need to exceed the maximally acceptable risk D₀ and in the same time their expected social satisfaction should be at least as high as minimally acceptable level SS₀. Those programs form a feasible set of the programs. Moreover, our task is to choose the one program from the feasible set with the minimal financing demands.

That is, the task is to find such a set of vectors \( X = (X₁, X₂, \ldots, Xₙ) \) to achieve for which constraints of achievement at least minimal expected significance of the program SS₀ and not to exceed maximal acceptable risk D₀ are mutually fulfilled. From the set of received programs choose the one with the minimal financing requirements. In mathematical language, this task can be described in the following way:

\[
\begin{align*}
\sum_{i=1}^{n} Xᵢ Vᵢ &\rightarrow \min \\
\sum_{i=1}^{n} Xᵢ Dᵢ &\leq D₀ \\
\sum_{i=1}^{n} Xᵢ SSᵢ &\leq SS₀
\end{align*}
\]

(15)

where

- \( SS₀ \) = minimal social significance, lower bound of the social significance to be reached;
- \( D₀ \) = upper bound of the investor’s risks, this level of risks cannot be exceeded.

**Results and Discussion**

Thus, for selecting social housing investment projects, one can apply the following principles:

- Social significance. To form project portfolio, the authors suggest using new representations of social significance that are of importance of the project for society.
- *a posteriori* return. Evaluation of investment projects of social housing is secondary and can be carried out *a posteriori*.
- Collective decision. Decisions on investment to any project should be made together with experts and investor, using subjective judgments about their advisability. Experts’ opinions and evaluations are considered as random values of some allocation.
- Adaptability. All chosen investment projects should react operatively to changes of external environment, and mainly to continue developing and realization in dynamically changing conditions of the external environment.
- Complexity. Investment program should be, first of all, oriented to complex socially-economic development of the region. Therefore, experts’ decision on projects should be systemic and consistent.
- Consistency (balance of interests). All members of the expert group should serve to the achievement of common goals, and personal goals of each member should not cause contradictions between the links.
- Transparency. The procedure of projects selection, formation, realization, and evaluation of program should be maximally transparent and available to ensure awareness of all desiring investors about the possibility of participation in the program, changes in projects, their possible social significance, return and risks.
- Rationality. Investment budget should be rationally allocated to maximally and minimally effective projects.
- Professionalism. Only competent members should be attracted to investment projects, e.g., government employees, investors, facility managers, appraisers, and other interested persons.
Objective evaluation. There is a need for introducing a united system of monitoring and accounting that will help to evaluate social and economic effects of project realization maximally.

Management resonance. The great value is assigned to identify investments and resonance in the system and maximizing economic and social effect.

Conclusion

The models produced in this study will help with forming an optimal portfolio of investment projects in the framework of limited budget and limited acceptable risks with maximization of social satisfaction. Consequently, to form an optimal package of projects with the minimal financing requirements will provide at least the required number of citizens with housing. Projects will form without exceeding acceptable risks. The key task for the realization of the social housing programs is an increase of regional quality of life from achieving the programs. As a result, more citizens will be provided with comfortable housing and thus, relations between society and state will potentially stabilize. With the most ‘vulnerable’ citizens protected social tension in society should automatically reduce (Selyutina, 2016).

References

HOW MIGHT CLIMATE CHANGE AFFECT MICROECONOMIC WELLBEING IN CENTRAL ASIA

Umar Burkhanov,¹ Feruza Saburova²

Abstract: Climate change may pose serious challenges to the economies of Central Asian countries, but in-depth studies on a national level are lacking. The paper is aimed to contribute filling this gap and devoted to assessing the economic impacts of climate change in selected areas of Central Asia. The methods of the desk study and documental analysis are used to summarize the adverse effects of climate change in rural livelihoods. Moreover, the preliminary results of the survey conducted in selected regions of Fergana valley within MikroKlima project used as a corresponding data for economic impact analysis on a household level. The results reveal that the effects of unfavorable weather conditions uneven for short and long term, and across Central Asia. Moreover, the most potential damage from climate change will affect the rural population, and there is also a high positive correlation between water shortage, increased aridity, and poverty, aggravated by climate change.

JEL Classification numbers: Q51, Q54, O11, O18; DOI: http://dx.doi.org/10.12955/cbup.v5.905
Keywords: climate change, household, income, agriculture, water, Central Asia, Uzbekistan.

Introduction
Central Asia (CA) is a sub-region of Asia. The sub-region covers about 400 million sqr km which constitute of the five former Soviet republics: Kazakhstan, Kyrgyzstan, Turkmenistan, Tajikistan, and Uzbekistan. The total population of people living in the region by the end of 2013 was 67.4 million of which 58% lived in the rural areas (Sommer, Glazirina & Yuldashev, 2012). The new World Bank classification placed the five Soviet republics among the countries with uneven income levels. The World Bank went ahead to classify Kazakhstan and Turkmenistan in the upper-middle-income countries and Uzbekistan, Kyrgyzstan and Tajikistan in the lower middle-income countries.

Kazakhstan and Turkmenistan are rich in oil, and they do not rely much on agriculture. However, the other three countries rely on agricultural production as their primary source of household income (Bobojonov & Aw-Hasan, 2014). The agriculture sector in these countries generates export revenues which are used in the development of their economies. However, these countries face complex environmental challenges, in particular in the areas of food security, healthcare, access to water and energy which made them be the most vulnerable regions in the world (Bucknall et al., 2003; Glantz, 2005). The table below is a summary of the economic statistics of the five CA countries in the focus of biodiversity.

Table 1: Economic statistics of countries in the focus of biodiversity

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Kazakhstan</td>
<td>Upper middle</td>
<td>$25669</td>
<td>1.2</td>
<td>88.4</td>
<td>0.0</td>
</tr>
<tr>
<td>Kyrgyzstan</td>
<td>Lower middle</td>
<td>$3467</td>
<td>3.5</td>
<td>624.1</td>
<td>8.6</td>
</tr>
<tr>
<td>Tajikistan</td>
<td>Lower middle</td>
<td>$2982</td>
<td>6.0</td>
<td>356.3</td>
<td>3.1</td>
</tr>
<tr>
<td>Turkmenistan</td>
<td>Above average</td>
<td>$17347</td>
<td>6.5</td>
<td>34.2</td>
<td>0.1</td>
</tr>
<tr>
<td>Uzbekistan</td>
<td>Upper middle</td>
<td>$6453</td>
<td>8</td>
<td>324.4</td>
<td>0.5</td>
</tr>
</tbody>
</table>


Moreover, the study that was done by Bobojonov & Aw-Hassan (2014) showed a significant uncertainty about the effects of Climatic Change (CC) in Asia sub-regions such as CA. Thus, a

¹ Lecturer at Tashkent Financial Institute, Uzbekistan, uburkhan@gmail.com
² Master’s program student, Tashkent Financial Institute, Uzbekistan, ewulet93@mail.ru
detailed bio-economic characterization of the impacts of CC on households in CA is outstanding. However, there is a need for deeper CC related research at the country level. The paper is aimed to contribute to the filling research gap and devoted to assessing the impacts of CC on household wellbeing in CA.

Literature Review
The study uses the outcomes of different international projects including, "The Env-Linkages Economic baseline projections to 2050"(2011), “Zoi Environment Network project” (2016), Solomon, (2007), “The World Banks” (2009). Most of the scholarly studies reviewed during the research focused on water system management, agriculture and food security (Bezborodov et al., 2010; Siegfried et al., 2012; Sommer et al., 2012; Tirado et al., 2010; Ndamani & Watanabe, 2017; Bobojonov & Aw-Hassan, 2014).

Other studies devoted to the issues of health, adaptation, economics and environment particularly the economic growth, green tax and intergenerational environment cost burden sharing (Bernard, et. al., 2015, Bell et al., 2007; Dessai 2003; Fay et al., 2010; Flaherty, et al., 2016; Lecocq & Shalizi, 2007).

The environmental changes affect global scale effects are discussed by (Stern 2007; Fay et al., 2010; Metz 2007) and some predictions of these studies have been given in Appendix A. However, in recent years, economic impacts analysis on national level has emerged to demonstrate the value of country and city scale works. Despite the proliferation of research on different areas, the assessment of the economic impacts of CC at the national level has received little attention.

Methodology and data source
The methods of the desk study and documental analysis are used to summarize the adverse effects of climate change in rural livelihoods in CA. The research uses the results of the Integrated Model to assess the impact of CC on the main crops which have crucial importance for the households in CA (Bobojonov & Aw-Hassan, 2014). Further, the outcomes of simulation models based on Metz (2007) CC scenario projections, and the results of different modeling approaches, including a Bio-Economic model to assess the effects of CC on food production, Biophysical models at various crops using SOYGRO, CERES, DSSAT modeling are also employed in this study.

The research uses some of the results of the survey conducted by Bobojonov & Aw-Hassan (2014) among 97 respondents living in Osh oblast, Kyrgyzstan as the primary source of data on a household level.

Findings and discussion
The environmental changes add to the problems in the CA and increase the vulnerability of people living in rural areas. Notably, the recent increase in the frequency of droughts is resulting in severe damage to the livelihoods of farmers in semiarid and arid regions. For instance, the poorest population living in mountainous areas of CA droughts in 2000–2001 and 2007–2008 have caused significant socio-economic is hitting the hardest because of increased frequency of heavier rainfalls in winter and subsequent floods.

Rural populations are already severely suffering from the increasing sequence of extreme events, which will predict even to increase in future. The study by Metz (2007) indicates that the region may face declined precipitation during spring, summer, and autumn and slightly increased rainfall during the winter (Solomon, 2007). Further, the rise of temperature by 3.7 °C can occur on average by the end of this century. The followed extreme weather expected to occur during summer, which is the most important season in the vegetation period. The increased temperatures may cause a higher probability of drought during the vegetation period which may lead declining harvest in agriculture (Metz, 2007).

Table 2 shows the significant role agriculture plays in household income in CA countries with employment in the agricultural sector as over 25% in all CA countries. For instance, in Tajikistan, two-thirds of the population depends on agriculture for their livelihood, whereas in Kyrgyzstan more than half of labor force employed in agriculture sectors.

Within MikroKlima project we surveyed the importance of agriculture in household income, in October 2016. The household sources of revenue were ranked in the order of importance: wage, remittances from abroad, and sales of primary agricultural products (sales of farm products from the household plot account for 20% of family earnings). These findings are consistent with the earlier
(FAO, 2014) studies which indicated that even small farmers don’t wholly rely on agricultural produce. Although only 4 out of 97 respondents showed the sale of agricultural commodities as the primary source of income source, their earnings mostly come from sales of both plants and animal produce. Most of the plant output sale seasonally. Among the livestock production, animals and meat are mostly sold seasonally and even less rare than that, whereas dairy and eggs sale daily and weekly.

Table 2: Importance of Agriculture in CA (Employment and GDP)

<table>
<thead>
<tr>
<th>Countries</th>
<th>Employment in Agriculture</th>
<th>Agriculture as % of GDP</th>
<th>Major Exports (agriculture)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kazakhstan</td>
<td>&lt;10%</td>
<td>&lt;10%</td>
<td>Grains</td>
</tr>
<tr>
<td>Kyrgyzstan</td>
<td>55%</td>
<td>35%</td>
<td>Cotton, Horticulture</td>
</tr>
<tr>
<td>Tajikistan</td>
<td>n/a</td>
<td>25%</td>
<td>Cotton</td>
</tr>
<tr>
<td>Turkmomenistan</td>
<td>n/a</td>
<td>30%</td>
<td>Cotton</td>
</tr>
<tr>
<td>Uzbekistan</td>
<td>40%</td>
<td>20%</td>
<td>Cotton, grain</td>
</tr>
</tbody>
</table>

Source: Granit et al., 2010.

The study of the role of agriculture also reveals the dominance of cotton production in the sector. For instance, Uzbekistan is currently the second largest exporter of cotton in the world, selling over 800,000 metric tons every year (Bernauer & Siegfried, 2012).

The results of existing studies show the adverse effects of CC on the livelihoods of small farmers and households who are currently operating at a small margin of profits. Survey reveals that unexpected freezing in 2016 has impeded timely harvest of beats and ripening of tomatoes in Osh oblast. Such loss hits the revenue basket of the producers, as they only have a seasonal chance to obtain income.

Furthermore, the vulnerability of animal farming to CC lies in the perceptivity of animals to diseases with increasing temperatures and lack of drinking water with increasing aridity. Moreover, do not have access to financial resources and advanced technologies in the region raises the vulnerability of them.

The data for Europe and CA demonstrate substantiality of the economic impact of CC over the past 30 years; climate-related disasters have caused $70 billion in economic losses (Glantz, 2005). The existing studies at national or sub-national levels of the economic impacts of CC on agricultural production in CA are limited.

Water Resources & Irrigation system

CA already meets notable warnings from weather change, with some serious risks already in evidence. Today, traditionally critical sectors of economies in CA the water and agriculture became the most vulnerable area to CC (Solomon, 2007).

The value of water and agriculture hard to overestimate for the region. Those two sectors are acknowledged together since in the CA they are firmly interlinked – more than 90% of water in the area goes to irrigated farming. For instance, the results of a survey conducted in Osh oblast reveal that 90 respondents out of 97 irrigated at least a small chunk of their land, which means that the rest (only seven respondents) do not use any irrigation.

According to Glantz (2005), the agriculture sector contributes about 30% of the CAs GDP and hires more than 60% of the population. The studies of potential adverse effects from the unfavorable weather conditions evidence that suffer from such a changes will be more than 70% for the agriculture sector. One of the cases on how aridity, caused by weather change, may affect people's living, is the dryness of 2008 in Tajikistan (Anisimov & Ginsburg, 2008). Because of it, many families lost a considerable part of the wheat crop and had to sell their cattle as the grain harvest totals were short by 30-40% through the whole year.

3 According to data from Statistic Committee of Uzbekistan this indicator was 27% in 2016.
4 One of the first few assessments was done by Savoskul et al. (2004) for the Syr Darya river basin.
The studies reveal that the lack of fresh water may become the acutest problem in CA. According to Metz’s (2007) forecast, in western and southern regions of CA, where the farming facilities established, and the substantial amount of the people lives, the decline of yearly runoff may reach by 10-20%.

The situation aggravated by increasing unevenness of flow effected by the disappearance of icecaps as stream accumulators; consequently, seasonal floods expected to become more rapid and significant water shortage in the summertime. It seems contradictory as the global medium precipitation volume persists approximately the same level; the rainfall frequency is shifting more uneven regarding time and area.

In Uzbekistan, Amu-Darya basin covers 81.5 % of the country’s need for water, and Syr-Darya basin includes 13.5 % (Dukhovny & Sokolov, 2003). There are many irrigation constructions along the two rivers. These irrigation schemes significantly reduce the volume of run-off in both rivers and thus the inflow into the Aral Sea.

The research reveals that in the past century, Tajikistan’s icecaps have lost more than 20 km³ of the glacier. Iceberg decrease has transformed the water stream. As a result, during the last three decades, the average yearly water flow has declined by 3.3 km³ in Tajikistan (Alamanov et al., 2006).

The other primary factor which documented well in literature is the extremely irrationality of water use and archaic irrigation (“World Bank,” 2004) which contributed to the most catastrophic CC event - the disappearance of Aral Sea. According to studies of the reasons for Aral Sea disappearance, the only one-fifth is defined by physical stream deficiency, and 80% undisputedly associated to the inefficient treatment of water for agriculture demands).

The Metz (2007) 3rd statement presents a comprehensive examination of difficulties of the rainfall modeling and forecasting. Notwithstanding inconsistencies in the estimates for various models, it was feasible to make the aggregate prediction of variations in yearly runoff based on 12 models.

Uzbekistan is facing growing problems to satisfy future demand for water. By the 2040s, even with an increase in the flow of river basins of Amu-Darya and Syr-Darya, a general shortage of water for irrigation in Uzbekistan, according to estimates, could reach 8.0%, at constant drain – 15.4%, while reducing the flow of water deficit could reach 33.5%. Within short time due to increase in temperature on a global level, the water supplies of the big rivers in Kazakhstan may reduce by 20–40%.

Water in CA represents an extremely political subject due to its uneven allocation between upstream and downstream nations and can cause water conflicts (Glantz, 2005). Thus, the water challenges and political stability cannot be addressed independently (Bernauer & Siefgried, 2012). The study on water shortage factors in CA reveals that the existing obsolete irrigation system remains the primary cause of water loss and soil degradation. Further, insufficient funds mainly resulting from low collection rate do not allow modernization of the water supply systems and increases the maintenance costs. And finally, the lack skilled specialists, especially in the remote areas lead to inefficient water management.

The importance of irrigated agriculture in the region requires modernization of the irrigation system and enhance the effectiveness of water consumption. The farming practice should be adapted to combine new crops that are more proper to new weather circumstances and diverse soil structure and precipitation. One consequence of a declining agricultural area is the growing challenge of securing maintenance in the countryside, encouraging migration to city centers.

Conclusion

CA faces notable signals from weather change, with some severe risks already in evidence. The results of the study show that there is an increase of shortage of water resources and decline of water condition, the likelihood of appearance of critical and extreme climate events, such as dehydration, extremely high or low temperatures. Moreover, the results indicate that the chance of appearance of social disorder and pressure connected with CC and adverse effects on the current environment and a warning to biodiversity continues to increase. Being essential for food security and stable household income in CA, the water and agriculture, at the same time are the two of the most vulnerable sectors to CC.
The results of the surveyed Osh Oblast shows that sales of primary agriculture products are the second largest household income (20% of cash earnings) after remittances from abroad. The results of the assessment conducted by the National Accounts show that agriculture contributes about one-third of GDP in CA and supplies jobs for more than 60% of the people. However, unfavorable weather and climate conditions cause 70% potential damage on agriculture in the CA. According to Metz (2007) forecast, in western and southern areas of CA, where the farming facilities established, and the diverse population lives, one may assume yearly runoff to reduce by 10-20%. For instance, Uzbekistan is facing increasing problems to satisfy future demand for water, and by the 2040s, the water deficit could reach 33.5%.

As such, a better perception of the environment change impacts in CA requires to support the national governments to interact with other sub-national and local decision-makers, mobilize political will, assess options and design cost-effective and timely responses. In the face of general geographical vulnerabilities, nations in CA should collaborate in improving responses to weather impacts. To this end, mitigation and adaptation interventions need to be precisely planned not to aggravate or exacerbate tensions in the region. Finally, it is means to advance understanding of the dangers of CC in the regional scope and enables action across scales to address CC.

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THE GENERAL TRANSPORT INFRASTRUCTURE - A KEY DETERMINANT OF COMPETITIVENESS OF TOURISM IN ROMANIA AND CEE-EU COUNTRIES

Mihai Costea,1 Cristian-Valentin Hapenciuc,2 Gabriela Arionesei3

Abstract: After the fall of communism, Romanian tourism was considered a sector which, by with relatively modest efforts, could be quickly restarted with the capacity to have a positive influence over the entire economic relaunch process. Although it has been more than 27 years, an economic revival through tourism has not yet occurred. Moreover, in recent decades, Romanian tourism has steadily lost some competitiveness in relation to other tourist destinations in the region. In this context, through this study, we tried to show that a major cause of the low level of competitiveness is represented by the significant deficiencies recorded in terms of the general transport infrastructure. The availability of a secure and fast transport network by road, air and water to the most important tourist centers of a country is vital. Without a general infrastructure no tourist resource, no matter how important, can be put forward in an efficient manner. Thus, we can unequivocally say that the absence or an insufficient development of infrastructure in Romania is the prime factor of the lack of development of tourism activity and of the serious deficiencies recorded when it comes to enhancement of the national tourism offer. This conclusion is supported by the analysis of the data provided by the World Economic Forum (through the Tourism Competitiveness Index) and EUROSTAT. To reflect Romania's position in the general picture of the competitiveness of the transport network, we performed a comparative analysis considering the results achieved by ten other EU countries in Central and Eastern Europe (hereinafter referred to as CEE-EU countries).

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Keywords: transport infrastructure, Romania, Bulgaria, tourism competitiveness, CEE-EU countries.

Introduction

According to Paicu and Hristache (2013) Romania can be proud of a variety of landscapes, a relatively rich cultural and historical heritage, and of the existence of some unique monuments and natural landmarks, some of them being UNESCO heritage sites. For this reason, in Romania many forms of tourism can develop: seaside, mountain, balneary tourism, hunting and fishing, itinerant tourism with cultural, religious valences, business tourism, rural tourism, ecotourism etc. However, the efficient development of tourism in Romania and the enlargement of its attractiveness towards foreign tourists and investors becomes literally impossible without an appropriate general infrastructure. We refer to the infrastructure of the air, land (road and railroad) transport, but also naval, especially because cruise ship tourism has been an ever growing segment in recent years. We proposed that through this study, we make an objective analysis of the transport infrastructure in Romania, in comparison with ten other member countries of the European Union, from Central and Eastern Europe (hereinafter referred to as CEE-EU countries). Throughout this study we emphasized the comparison with the neighboring country Bulgaria, because between these two countries the economic, geopolitical, historical and geographical similitudes are more evident. Including the tourism point of view, the potential is broadly similar, but, nevertheless, the degree of development of the tourism activity and the performances registered regarding the number of arrivals of foreign tourists, the number of nights spent or the average period of stay are clearly superior in the case of Bulgaria (Costea, Hapenciuc and Arionesei, 2016). Are there such differences also from the point of view of the general transport infrastructure, as determining factor of tourism competitiveness? This is the question for which we look for an answer in this study.

Literature review

The importance of transport infrastructure in the general picture of tourism competitiveness is confirmed by organizations like The World Economic Forum, and is the basis of the study of tourism competitiveness of 141 countries, including through the analysis of the pillars regarding the air, land and port transport infrastructure. Starting from the data obtained by the World Economic Forum through the Travel and Tourism Competitiveness Index, Kayar and Kozak (2010) make a comparison between 28 countries regarding tourism activity, concluding that air and land transport infrastructure are among the factors that influence tourism competitiveness the most of a destination. Another international organization that certifies the importance of transport infrastructure is the Organization

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1 Ștefan cel Mare University of Suceava, Romania, mihai_costeaa@yahoo.com
2 Ștefan cel Mare University of Suceava, Romania, valentinb@seap.usv.ro
3 Ștefan cel Mare University of Suceava, Romania, gabriela_arionesei@gmail.com
for Economic Cooperation and Development (OECD). With a vast expertise, including the tourism field, OECD published in April 2013, through the tourism committee coordinated by Dupeyras and MacCallum (2013), a list of indicators useful for national governments in the analysis of the competitiveness of the tourism sector, air transport being among them. In the context of the study of competitive advantage, Crouch and Ritchie (1999) are part of the category of authors that consider infrastructure as being an indispensable element for the development of tourism activity. Before them, Kaul (1985) is one of the first authors that recognizes the importance of transport infrastructure in the growth of tourism competitiveness of a tourism destination, by creating new attractions. The more recent studies reconfirm the importance of transport infrastructure in obtaining a competitive position on the tourism market. For example, Khadaroo and Seetanah (2007) study the role of infrastructure in the increase of the number of tourists in the famous destination Mauritius. They find that transport infrastructure contributes positively to the attraction of tourists, especially those from Europe, USA and Asia. Vila, Darcy and Gonzalez (2015) study the impact of different factors on the accessible tourism competitiveness from Spain and Portugal. In their opinion, infrastructure becomes extremely important in gaining a bigger share of this market. Among authors that don’t hesitate in their recent studies to discuss the importance of transport infrastructure in the growth of tourism competitiveness we mention: Cvelbar, Dwyer, Koman and Mihalič (2015), Khan, Qianli, SongBo, Zaman and Zhang (2017), Biemonte, Ferrini and Grilli (2016), Duval and Weaver (2016) and others.

Methodology
In order to analyse the disparities from the point of view of the transport infrastructure, we chose for comparison eleven countries: Romania, Estonia, Lithuania, Latvia, Slovakia, Slovenia, Hungary, Poland, the Czech Republic, Croatia and Bulgaria. Starting from the terminology proposed by the Organization for Economic Cooperation and Development – CEE, referring to the countries from the Central and Eastern Europe, we chose to refer in the study to the listed countries as CEE-EU countries, namely member countries of the European Union, situated in the Central and Eastern Europe. The comparative analysis was based first on the data obtained by the World Economic Forum through the Travel and Tourism Competitiveness Report, 2015. Practically, we chose to use the data regarding the Travel and Tourism Competitiveness Index (TTCI) and focus strictly on the pillars that assess air transport infrastructure and the land and port infrastructure. In order that the analysis is as complete as possible, we chose to process the data available from The National Institute of Statistics from Romania regarding the situation of public roads and EUROSTAT regarding the number of kilometers of highway or the length of railroads. In order to ensure comparability, the data obtained was processed with the help of Microsoft Excel, version 2007.

Results and Discussion
From the data obtained by the latest World Economic Forum Report from the year 2015, regarding the Travel and Tourism Competitiveness Index (TTCI), Romania is at the 66th position from 141 countries, while Bulgaria its direct competitor is in the 49th position. If we relate to pillars no. 10 (air transport infrastructure) and no. 11 (land and port infrastructure) of tourism competitiveness, we will see that Romania is by far the lowest placed country in the regional classification, especially from the point of view of land and port infrastructure (Table no. 1).

| Table 1: The 14 Pillars of Tourism Competitiveness at the CEE-EU Region Level |
|-----------------|-----------------|-----------------|-----------------|
| Country         | P10 Pos. | Score | P11 Pos. | Score |
| Bulgaria        | 79       | 2.5   | 79       | 3.3   |
| Croatia         | 53       | 3.1   | 44       | 4.2   |
| The Czech Republic | 51   | 3.1   | 18       | 5.2   |
| Hungary         | 69       | 2.7   | 36       | 4.5   |
| Poland          | 73       | 2.6   | 47       | 4.1   |
| Romania         | 87       | 2.3   | 91       | 3.1   |
| Slovakia        | 129      | 1.8   | 43       | 4.2   |
| Slovenia        | 82       | 2.4   | 19       | 5.1   |
| Estonia         | 59       | 3.0   | 37       | 4.4   |
| Lithuania       | 86       | 2.4   | 33       | 4.5   |
| Latvia          | 52       | 3.1   | 42       | 4.2   |

Source: Author
Air Transport Infrastructure

Airborne connectivity is essential for carrying out air travels, that is why the role of this pillar is to measure the volume of air transport, the number of departures, the number of the airports, the number of airlines which operate in a country, the quality of the airport infrastructure for domestic and international flights. Considering this pillar, the lowest placed countries in the CEE-EU region are Slovakia (129th place with 1.8 points) and Romania (87th place with 2.3 points). In contrast, the most competitive countries in the region are Croatia, the Czech Republic and Latvia, all the three countries registering a score of 3.1 points. It’s worth mentioning that all the CEE-EU countries have deficiencies regarding their air transport infrastructure, as none of them was placed in the first 50 positions at the global level, with the top lead by Singapore and the United Arab Emirates.

In contrast to Romania, Bulgaria is placed on the 79th position, with 2.5 points. The superiority in comparison with Romania is in the higher quality of the infrastructure. From this point of view, Romania is placed on the 104th position globally, worrisome if we consider that countries like Nicaragua, Guyana, Senegal, Ghana or Rwanda have a more modern and efficient air infrastructure.

Having a more modern infrastructure than Romania, Bulgaria managed to attract more airlines that operate line, low-cost and charter flights. Thus, according to the data obtained by IATA for 2014, in Romania there were 43 airlines of different dimensions, whereas in Bulgaria the number of airlines had reached 45 (Table no. 2). Although the number of airlines that operate flights from and to Romania is smaller than in Bulgaria, the air traffic is more intense from the point of view of the number of departures of the airplanes per mile of inhabitants. This result is normal, because the population of Romania is much bigger than the population of Bulgaria, that is why the need of air transport and implicitly, the number of domestic and international flights is higher.

Table 2: Comparative Analysis Romania - Bulgaria from the Point of View of Pillar 10 - Air Transport Infrastructure

<table>
<thead>
<tr>
<th></th>
<th>Romania</th>
<th>Score</th>
<th>Bulgaria</th>
<th>Place</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>The quality of the air transport infrastructure (score)</td>
<td>104</td>
<td>3.6</td>
<td>69</td>
<td>4.3</td>
<td></td>
</tr>
<tr>
<td>Departures of airplanes per 1000 inhabitants</td>
<td>80</td>
<td>2.3</td>
<td>87</td>
<td>1.6</td>
<td></td>
</tr>
<tr>
<td>The density of airports (per 1 million inhabitants)</td>
<td>57</td>
<td>1.3</td>
<td>95</td>
<td>0.8</td>
<td></td>
</tr>
<tr>
<td>The number of airlines which operate in the analyzed country</td>
<td>50</td>
<td>43</td>
<td>42</td>
<td>54</td>
<td></td>
</tr>
</tbody>
</table>

Another aspect where Romania has a better position in comparison with Bulgaria is the density of airports per 1 million inhabitants: 1.3 in Romania, in comparison with 0.8 in Bulgaria. This greater number was predictable because as we mentioned, the population and the surface in square kilometers of Romania are clearly greater than that of Bulgaria. In absolute values, Romania has now 16 operational airports at Arad, Bacău, Baia Mare, Bucharest (2), Cluj, Constanța, Craiova, Iași, Oradea, Satu Mare, Sibiu, Suceava, Târgu Mureș, Timișoara and Tulcea, and Bulgaria has 5 airports at Sofia, Burgas, Varna, Plovdiv and Gorna Oryahovitsa.

Land and Port Infrastructure

In order that a destination can assume a competitive position, it must have an appropriate network of roads and railroads. Also, it is necessary to ensure optimum conditions of naval transport. Therefore, for the first stage the existence of ports where the cruise ships can anchor in safe and comfort conditions for tourists is necessary. One must not underestimate the importance of country roads, usually not asphalted, that can, to a certain degree, be a picturesque tourist attraction, evidently in specific contexts of time and space.

From the point of view of the land and naval transport infrastructure, the most competitive countries in the region are: the Czech Republic (the 18th place worldwide with 5.2 points) and Slovenia (19th place with 5.1 points). In contrast, Romania is on the last place at the CEE-UE region level (91st place with 3.1 points). One of the biggest problems that Romania faces is with its quality of roads, being placed on the 121st place globally from this point of view. According to the World Economic Forum, Romania has, alongside the Republic of Moldova, the worst roads in Europe. Under these
circumstances, Romania’s claims for an increase in the domestic tourist flow in the coming years should be moderate, especially if we take into account that in the world classification of land and port infrastructure, Romania is placed lower than countries like Bangladesh (2,9 points), Cameroon (2,9 points), Sierra Leone (3 points), Zimbabwe (3,3 points), Malawi (3,3 points), Zambia (3,6 points) or Ethiopia (3,8 points).

![Table 3: Comparative Analysis Romania - Bulgaria Considering the Variables of Pillar 11 - Land and Port Infrastructure](image)

It is already more important for the economy of transport the existence of a modern road network. According to the National Institute of Statistics (2015), at the end of 2015, the public roads from Romania totaled 86,080 km, of which 17,606 km (20,5%) of them were national roads, 35,316 km (41,0%) county roads and 33,158 km (38,5%) local roads. From the point of view of this type of covering, Romania registered in the year 2015 32,641 km (37,9%) modernized roads (with heavy and medium-curing asphalt), 21,136 km (24,6%) roads with light blankets and 32,303 km (37,5%) paved and earth roads. It’s worth mentioning that, from the total of national roads 35,2% (6,193 km) are European roads, 4,2% (747 km) highways, 1,6% (281 km) three-lane roads, 10,3% (1,807 km) four-lane roads, 0,1% (22 km) six-lane roads.

Highways have a significant importance today because they are public roads which enable transport at higher speed and, at the same time, have the capacity to carry the increasing number of vehicles that run on public roads. By far the biggest network of highways is registered in Hungary and Poland (Table no. 4).

![Table 4: Numbers of Kilometres of Highway in the CEE-EU Countries](image)

Also, these countries are linked through highways to the neighboring countries. We find that in the case of Romania, the highway building is quite slow because within the period 2005-2014 only 455 km were built, whereas in countries like Hungary or Poland, within the same period, more than 1000 km were built.

We must mention that the real necessities of highways are also directly proportional with the country’s surface, respectively with the population and number of vehicles that run on public roads. Subsequently, relating the number of kilometers of highway to the country’s population will show us that Romania registers the lowest results, in comparison with the other countries in the region (except Latvia that doesn’t have any kilometer of highway) (Table no. 5)
Romania experiences deficiencies also regarding the port and railroad infrastructure, the results showing an inferiority in comparison with its neighbouring country Bulgaria. It is true that with the passage of time, railroads are less used. Table no. 6 presents the evolution of the railroads in the CEE-EU region countries, within the period 2005-2014. One can see that in the majority of the countries the number of kilometres of railroad is diminishing every year, except Lithuania, where one can see significant increase, Hungary, that managed to increase in the year 2014 the railroad network by nearly 4000 km in comparison with the previous year. In Romania, the railroad network has a total length of over 20,000 km, being the 7th network largest in the European Union from this point of view.

We think that the railroad transport will remain one of the main means of transport, especially for domestic travels. Also, all the transportation policies in the European Union present the advantages of railroad transport. These are also mentioned in the National Strategy for Sustainable Development of Romania - Horizons 2013-2020-2030.

The deficiencies of the passenger railroad transport in Romania are not related to the length of the network, but to its poor maintenance in the last decades, and the lack of modernization investments. These causes lead to the fact that the average speed of railroad transport is 50 km/h, lower than the registered speed within the interwar period (60 km/h). Consequently, most of the times the travels are slow and tiresome. The low speed and the precarious comfort conditions lead to the decrease in the number of passengers beginning with the year 1990.

Regarding the average speed of railroad transport in Bulgaria, it is approximately 55 km/h, reduced in comparison with the developed countries from the European Union, where a speed of 150 km/ hour is a decent speed. Recently, Bulgaria began a wide reform process in railroad transport. So that, this year,
the Ministry of Transportation opened a new line of railroad transport which links the second biggest Bulgarian city-Plovdiv to the border with Greece and Turkey. On this line, the train reaches speeds up to 226 km/h, but the average speed is 170 km/h.

An indicator which shows a clear superiority of Romania in comparison with Bulgaria is related to the density of railroads per 100 square kilometers, but as we mentioned before, the quality of the railroad transport (through comfort and speed) must prevail, not necessarily the quantity.

Regarding the port infrastructure, we must mention that Romania has, in Constanța, one of the most important ports from the Black Sea, situated at approximately 340 km North from the Bosphorus Strait and 160 km South from the flow of the Danube into the Black Sea. At present the Constanța port also has a cruise ship terminal, but the greatest part of the activity carried out here is related to cargo ships, and less to the passenger transport. Although the cruise tourism represents one of the segments with the fastest growth in the industry, in the year 2016 there is no major cruise line with a tourism program that includes Constanța/ Romania. In the last years there were few attempts to include Romania in such a program, but most probably, because of the lower demand, the cruise lines chose to give up putting our country on the map with ports to be visited. After a period of increase of the number of passengers processed by the Constanța port within the period 2010-2014, in the year 2015, there was a registered decreases of approximately 46 % in comparison with the previous year, as a consequence of the decrease of the number of the passenger ships which docked at the port (Table no.7).

| Table 7: Number of Passengers and Passenger Ships Processed by Constanța Port |
|-----------------------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Passengers                  | 21.286 | 23.878 | 34.010 | 54.226 | 64.861 | 35.000 |
| Passenger ships             | 58 | 43 | 52 | 69 | 95 | 36 |

By comparison, the commercial port of Bulgaria from Varna processed almost 21.000 passengers in the year 2014, while being, like the Constanța Port, concentrated especially on freight transport and less on passenger transport.

**Conclusions**

The results of the comparative analysis unequivocally show that Romania does not excel at any of the tourism competitiveness pillars that assess, from the qualitative and quantitative point of view, the general transport infrastructure. The investments in general transport infrastructure are the ones that could offer Romania an interesting route in the actual European context. Because there are obvious disparities regarding both infrastructure, and the relative contributions of tourism to the national economy of the countries in the region, Romania must be placed better in order to capitalize on the predicted tourism demand, that is why it is necessary that in the context of international competition, investments in tourism is intelligent and well directed. In order to achieve intelligent investments, a close collaboration is needed between the public and private sector from tourism and the related fields, and also making efforts to become attractive as country for foreign investors. We consider that only breaking the barriers in the development of tourism infrastructure and the general infrastructure may contribute to a strong gain of the competitive position of Romanian tourism on the international market.

The development and implementation of projects with European funding that take into account the improvement of priority problems that the Romanian tourism industry is faced with may constitute a viable solution for the revitalization of Romanian tourism. But, at present the level of these projects is very low, Romania being one of the countries which are faced with a low rate of absorption of funds with European funding. The slow economic evolution of ex-communist countries, like Romania, can be ascribed to the galloping evolution of corruption, a phenomenon that both Romania and Bulgaria were faced with in the last two decades and which affected the credibility of the two countries internationally, reducing also the attractiveness for direct foreign investments and the efficiency in attracting European funds.

Though measures for the improvement of the rate of absorption are necessary, we can affirm that, in the last years, progress was seen. For the tourism industry, the structural funds represent a major opportunity regarding the areas that have potential for development, and those underdeveloped. More
than that, the European funding sources certainly help improve the competitiveness of tourism destinations on the traditional markets, but also on the emerging markets.

References
THE CLASSIFICATION AND CHARACTERISTICS OF CONTROL CHARTS
Izabela Dagmara Czabak-Górska

Abstract: Control Charts are the basic tool for quality control. They were developed in the 1920s when the dominant type of production was mass production. In order to properly use classic Control Charts, the data from the manufacturing process should meet the following assumptions: an empirical distribution of measurement data should be normally distributed or close to a normal distribution, measurement data should be independent, the manufacturing process should be capable of quality depending on the type of Control Chart, a sample that is large enough (sometimes made of several elements) must be taken. Currently, a shift can be observed from mass production towards short production runs, which causes the proper use of the traditional approach to be impossible. In recent years, control charts are once again in the spotlight, and consequently many scientists, i.e. Reynolds, Zimmer, Costa, Calvin and Chan have undertaken the task to adapt the classic idea of keeping Control Charts to modern conditions of production. The development of science in this area allows for the avoidance of making major mistakes in the conduct of Control Charts and for making the wrong decisions based on erroneous analysis. However, the appearance of new literature pieces implies the need to classify Control Charts, therefore, this article describes the idea of conduct, the most important assumptions and distribution of classical Shewhart's Control Charts, as well as a suggestion for the distribution of advanced Control Charts that meet the needs of the currently used production types. The work also contains a concise description of the chosen control charts as well as the threats resulting from their inappropriate selection. This elaboration is an extension to the article of Czabak-Górska (2017).

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Keywords: SPC, the classification of control charts, Shewhart's charts, charts of the new generation, sequential charts, standardized charts, adaptive charts, special charts

Introduction
Control Charts are the basic tool for quality control which was developed in the 1920s when the dominant type of production was mass production. Increased quality awareness and technological progress are driving companies to introduce and modify existing solutions and methods to monitor and control production processes. In addition, intense global competition and the need to meet the needs of the customer who increasingly focus their attention on high quality at low prices are the main reasons for changing the type of production. Increasingly, mass production is moving away from series production, piece production or make-to-order production. Consequently, it leads to differentiation of production. These types of actions also cause the processes to become more and more complex, so it turns out that some of the assumptions from the 20s are not met by processes. This results in the fact that some of the classic SPC tools cannot be properly used in practice. Many scientists, such as Reynolds, Zimmer, Costa, Calvin, and Chan, have adapted the classic idea of Control Charts to the modern conditions of production. The aim of the paper is a literature review of the modification of classic Control Charts and special Control Charts developed to enable them to be used for monitoring and controlling production processes when the normality and autocorrelation of process measurement assumptions is not fulfilled.

A brief review of literature
The main purpose of a manufacturing process is to produce a product with the support of, among others, quality control whose main task is to extract and reject non-conforming units which do not meet certain criteria (requirements). To make the identification of these units profitable a preventive strategy should be undertaken that disables the production of useless products, and consequently protects the company against unnecessary financial as well as temporal losses. For this purpose, among all Control Charts an essential tool in Statistical Process Control (SPC) are used and are based on graphical and statistical analysis. According to Greber (1999) the idea of Control Charts is monitoring and controlling the process in real time (i.e. on-line control), which allows for systematic observation of the controlled process. Yen, Hong & Ha (2013) write that they enable, in a relatively easy way to distinguish common causes from special causes. Then, the person supervising the manufacturing process may, on the basis of the controlled product characteristics, track its progress and evaluate whether the variations of the statistical measure (chose on the basis of the type of production)
conducted Control Chart e.g. average, standard deviation) of the controlled features are so significant that they indicate deregulation of the process.

The efficacy of the use of this tool is mainly based on the proper selection of a chart and its adjustment to the characteristics and course of the processes (also taking into account the economic conditions), from the most common ones (e.g. specific for mass production) to processes which are non-standard (e.g. unit or multi-series production). Scientific research carried out in enterprises, as well as the author's own experience show that the misuse of Control Charts leads to serious errors in their conduct. According to the research conducted by Kowalczyk (2012), the first primary problem results from the use of specifications to determine the limits of intervention in the manufacturing process, which will only contribute to process control without the possibility of its improvement. In this situation, Control Charts are treated as a kind of "lifebelt," which will be used in case of reclamations. Analysis of key characteristics of the use of Control Charts only in the case of "emergency" situations as documentation of the correct process. Kowalczyk (2012) also stated that the next mistake is trivializing the role of the manufacturing employee, whose task is to conduct Control Charts without any substantive preparation (an employee receives specific guidelines which he must follow, without the possibility to make any decisions, e.g. on stopping the process or signaling the need to introduce corrective actions). In these types of situations, SPC comes down to a rigid indication of relevant statistics and creating documentation, which eventually turns out to be useless.

Classic Control Charts were introduced in the 1920s, when the dominant model was mass and multi-series production. Constantly progressive economic and social transformations, globalization and the unification of the market, as well as technological development, in a natural manner changed the type of production in enterprises. As a result, it appears that traditional SPC tools (including Shewhart's Charts), due to certain assumptions cannot be practically used in an appropriate manner.

Increasingly, a trend can be observed of companies undertaking production of small batches and in short production runs (which is particularly evident in micro and small enterprises). Multi-assortment production and short production runs are very often associated with frequent retooling of machines within one manufacturing process. This in turn leads to a situation where there is no possibility (also due to lack of a sufficient amount of time) of obtaining a sufficiently large sample to determine the stability of the manufacturing process. Kujawińska & Więcek-Janka (2010) emphasize that a large amount of various types and configurations of the manufactured products lead to the establishment of an "infinite" number of control charts each time there is a change in the assortment. In addition, studies of real production processes carried out by Kujawińska & Więcek-Janka (2010) and Boypati, Nasiru & Lakshmi (2015) indicate that the assumption of a normal distribution of the measurement data is not always respected. Kujawińska & Więcek-Janka (2010) proved that the use of Shewhart's Charts in this type of situations can lead to, among others, the appearance of false alarms indicating process deregulation, failure to detect special causes or deterioration of the course of the process.

Due to the situations mentioned above, a number of theses have appeared related to the new Control Charts for example Boypati, Nasiru & Lakshmi (2015), Ali, Pievatolo & Göb (2016), Mohammed, Panesar, Laney & Wilson (2013), which have been adjusted to specific situations which occur in the manufacturing process. Therefore, there is a real need to elaborate their classification. The aim of this article is to update the division of the selected Control Charts and prepare their concise description, which takes into account the most recent scientific findings and market trends.

**Classic control charts of Shewhart**

Dahlgård, Kristensen & Kanji (2000) indicate that the first Control Charts were developed in 1924 by W. A. Shewhart, in order to determine the boundaries in which a manufacturing process should be held (i.e. variation control). As is well known, no production process proceeds in a perfectly stable manner, due to the existing, previously mentioned, common and special cause, whose definitions, in accordance with ISO 3534-2 (2010) standard, are as follows:

- **common cause** - "factors typically existing in large numbers, where each of them is of relatively little importance, leading to variability, which must necessarily be identified",
- **special cause** – "factors (usually systematical), which can be detected and identified as those causing qualitative property changes or changes in the level of the process".
Hamrol (2009) underlines that, in case of using Shewhart’s Control Charts, it is important to preserve the assumption of the normal distribution of the measurement data or being as close to normal distribution as possible, which means that the process is statistically regulated. Failure of meeting this assumption determines the need to apply a different type of Control Chart, due to the emerging risks which will be described in the next chapter.

To verify whether the distribution of the measured data is normal or close to normal, a so-called pilot sample should be carried for at least 100 observations (these data are usually read from a Check Sheet). Then, based on a histogram or an appropriate statistical test, a verification of the assumption of normal distribution occurs. Next, an assessment of the process’s capability is carried out, which, depending on the branch should be maintained at the level of \( c_p \geq 1.33 \) (\( c_p \geq 1.66 \)).

If the above assumptions are met, an appropriate Control Chart should be chosen, taking into account the kind of studied feature/product characteristic (measurable or unmeasurable), as well as the size of the taken samples which are usually determined by economic reasons (Fig. 1).

The above division determines two methods of implementation and design of Control Charts - design and stabilization. Kowalczyk (2012) writes that the first of them concerns the charts with pre-defined normative values, thanks to which it is possible to check whether the tested feature is significantly different from the specified normative values, with values greater than expected (it is assumed that the production process is affected by a special cause). On the other hand, according to Kowalczyk (2012), the stabilization method is based on the determination whether the studied measurements differ between each other by a value greater than that which should only be attributed only to random disturbance.
When conducting Control Charts, the abilities to read the stability of the process and interpret graphs are equally important. In general, when monitoring the process with the use of Control Charts, it is expected that subsequent points on the graphs will be arranged symmetrically around the center line. In addition, the ISO 8258+AC1 standard (1996) describes 8 situations that may indicate process deregulation, they are the so-called process configuration tests:

- one point outside zone A,
- fifteen points in zone C above or below the center line,
- nine subsequent points in zone C or beyond it on the same side of the center line,
- six consecutive points constantly increasing or decreasing,
- fourteen points subsequently alternately increasing and decreasing,
- two of three consecutive points in zone A or outside it,
- four out of five consecutive points in zone B or beyond it,
- eight subsequent points on both sides of the center line, but none in zone C.

Olszewska (2008) emphasizes that the above-mentioned configurations do not determine a one hundred percent deregulation of the process. They only constitute information about any worrying symptoms of deregulation.

Source: Author

Modern Control Charts

The author presents a suggestion for the division of Control Charts, meeting the needs of the twenty-first century, and defines them as Modern Control Charts (Fig. 2). Two main categories of Modern Control Charts have been distinguished: Shewhart’s classic ones (this type of chart persists to be used in the industry) and the new generation (Olszewska (2008) defines it as an alternative to Shewhart’s Control Charts in the case where no assumption listed in the previous section is met, as well as one identifying even small results of special interferences much faster). In turn, the charts of the new
generation are grouped into four subcategories: Sequential, Adaptive, Standardized and Special (the distribution of Shewhart's Charts is in accordance with Fig. 1).

According to Bartkowiak (2011), Sequential Charts prove greater sensitivity to the variability of the process in comparison to Shewhart’s Control Charts and are used to detect emerging trends and small shifts in the average value of the production process. Montgomery (2009) notes that Shewhart’s Control Charts use information about the process originating from the last observation of a sample and ignores all the information provided by a whole sequence of points, which, in turn, causes them to become less sensitive to small changes, e.g. technological ones. Among sequential charts, the following can be distinguished: Cumulative Sum Control Chart (CUSUM), Move Average (MA) and Exponentially Weighted Moving Average (EWMA). Their descriptions and application examples have been described, for example, by Sałaciński (2009).

Olszewska (2008) indicates that Adaptive Charts constitute an alternative to Sequential Control Charts, as they are also very sensitive to small changes in the process. Generally, the design and operation of Control Charts requires the determination of three parameters: sample frequency, sample size, coefficient for control limits (it determines the distance of the lower and upper tolerance limit from the Center Line respectively and is expressed in the number of standard deviations). According to Psarakis (2015), a Control Chart is considered to be adaptive if at least one of the parameters can be changed in real time depending on the position of the observation of the previous samples with respect to Control Limits. Psarakis (2015) notes that Adaptive Control Charts are more efficient than Shewhart's Charts, as they use archived data to determine the future scheme of the process. Psarakis (2015) described the rules for process control with the use of Adaptive Control Charts, according to which if the current measurement is too far from the Center Line, there is a suspicion of displacement of the process. Otherwise, it can be concluded that the process runs properly. Therefore, if the measurement is within the Control Limits and at the same time close to them, it is reasonable to increase the sample size while at the same time reducing the sampling frequency. Whereas, in a situation in which the measurement is close to the Center Line, it is possible to reduce the size of the sample while increasing the sampling frequency. The principle of extracting Control Limits both for a normal distribution (e.g. Variable Sample Size chart - VSS, Variable Sampling Interval chart - VSI, Variable Parameters chart - VP) as well as for other than normal (e.g. symmetric and asymmetric Burr's Charts) has been described, e.g. by Olszewska (2008).

Kowalczyk (2012) indicates that the Standardized Charts have use in the case of production characterized by short series. They are versatile in application and do not require practically any prior assumptions. Exemplary Standardized Charts are the Z and Z* Chart (both are most often conducted with a moving range of mR), u* and p*. Oakland (2004) suggests using a Z or Z* Chart in a situation in which the numerical values of tolerance significantly differ from product to product. Kowalczyk (2012) indicates that this type of charts is perfect for the analysis of products with different parameters on a single chart.

In turn, Special Charts were divided into: Short Series, Multivariate, for monitoring the Time Between Events, distributions other than normal and for autocorrelated data. Boyapati, Nasiru & Lakshmi (2015) note in the case of short production runs, data for determining Control Limits is usually lacking, because the process is completed before they are estimated, leading to a situation in which stability assessment occurs afterwards. Boyapati, Nasiru & Lakshmi (2015) also indicate that in cases when it is possible to collect the appropriate amount of data, it is followed by conversion of machines and changing assortment, which is connected to the establishment of a new chart. In these types of situations, charts like Deviations from Nominal (DNOM-mR), Mean and Range Short Run Control Chart (X-R short run), Qusenberry (Q chart) or Hiller are well suited. A way of determining Control Limits has been described by Qusenberry (1991) and Hiller (1967, 1969) respectively. It turns out, however, that these charts are by far the least frequently used in manufacturing enterprises, though they are constructed on the basis of a few preliminary measurements. Kujawińska & Więcek-Janka (2010) indicate that the DNOM Chart is used for a situation when the process variability with respect to specific series is identical (which is subject to additional verification). The way of determining Control Limits for these type of control charts has been described, for example, by Montgomery (2009).
In their studies, Ali, Pievatolo & Göb (2016) indicate that in order to control high-quality manufacturing processes, which require a very low level of defectiveness (expressed mostly in pieces per million produced) characteristic to automatic production (i.e. arms systems, integrated circuits) the so-called Between Time-Events Charts (TBE Charts) are to be used. Instead of controlling the number of events occurring in a specific sample interval, TBE graphs monitor the time between the occurrences of events. According to Yen, & Chong Ha (2013) the term "event" refers to the appearance of incompatible components in the manufacturing process, e.g. failures in reliability analysis, accidents, arrival of client, etc. whereas, the "time" refers to other variables (both discrete and continuous) monitoring the number of observations between subsequent events. These are the so-called Synthetic-Type Control Charts. Examples of their use have been described, e.g. by Yen, Vhong, Ha (2013) or Ali, Pievatolo, Göb (2016).

There are many situations in which simultaneous monitoring and control of two or more associated qualitative features/characteristics is necessary, and their independent control may prove to be misleading. According to Montgomery (2009), this is caused by the fact that both the error of the I type (recognizing that the process is dysregulated in the case of its stability) as well as the probability of the occurrence of an observation in Control Limits are not the same as in the case of a one-factor chart. The answer to this type of need is constituted by Multivariate Control Charts i.e. Generalized Variance Control Chart (GV Control Chart), T2 Hotelling Control Chart, Cumulative Cum for Individual Observations (MCUSUM) and Mean Values (MEWMA). Their description can be found e.g. in the work of Montogomery (2009).

The most commonly occurring distributions of measurement data, apart from normal distribution, are skew distributions. For inclined populations, Karagöz and Hamurkaroglu (2012), indicate the risk of the occurrence of a false alarm increases along with the value of the k₃ asymmetry index, the reason is the discrepancy in the variation of the normal and asymmetric distribution. In literature, a number of heuristic methods can be found used to indicate the Control Limits in the case of distributions other than normal (including skewed), with the use, for the example, of skewed distribution percentiles, the Skewness Correction Method (SC Method), the Weighted Variance Method (WV Method) or the Weighted Standard Deviations Method (WSD Method). The idea of determining the Control Limits for this type of charts has been described by for example Karagöz and Hamurkaroglu (2012) as well as Czabak-Górska (2016).

Magaji, Yahaya, & Asiribo (2015) point to the fact that in the case of continuous processes, the assumption of measurement data independence is not always assured, in particular when subsequent units are similar to each other. They also point out that along with the increased dependence of data, the probability of the occurrence of false signals on the Control Chart increases. Karaoglan & Bayhan (2011) suggest three possible approaches to the control of correlated data:

- modification of data using the Autoregressive Integrated Moving Average model (ARIMA) and classic Shewhart's Charts,
- the adjustment of standard control limits in conventional Control Charts to account for autocorrelations resulting from the observation of the process,
- eliminating autocorrelation from the data with the use of Engineering Controllers.

Additionally, Keller (2011) suggests the use of dedicated charts i.e. Regression Control Chart, EWMA Chart with Moving Center Line, Batch Means Charts.

**Conclusion**

An accurate selection of Control Charts for a particular type of production and economic conditions constitutes an important element of monitoring and improving production processes. Ignoring the assumptions which constitute an integral whole with which a particular type of Control Chart may result in, inter alia, a situation where the stability assessment process is inadequate, which may in the end even result in its deregulation. A Control Chart which is improperly adjusted to the process may indicate false signals suggesting the appearance of special causes or in extreme cases even "mask" them, which may also lead to a shift in the process setup.

In the recent years, Control Charts have been booming again. Many scientists have undertaken the adaptation of the classic idea of conducting Control Charts to the modern production conditions, i.e. Ali, Pievatolo, Göb, Yen Chong Ha. Thanks to this, it is possible to avoid committing basic errors
implying the formation of the above-mentioned situations. Modern Control Charts, i.e. Sequential, Adaptive, Standardized or those defined by the author as Special Charts can be much more effective than traditional Shewhart’s Charts, but require a very good diagnosis of the process nature, i.e. whether the distribution of the measured data is of a normal distribution character or other than a normal type of production, etc.

Changing the type of production of modern manufacturing enterprises (for meeting the expectations of customers) from mass production to small-series production leads to a lack of possibilities to take a sufficient sample (often multi-element) in order to conduct a pilot test which ultimately leads to the abandonment of the idea of process control using Control Charts. In such cases, assessment of stability usually occurs afterward, and the employees and management do not have the possibility to undertake appropriate steps at the right time, to prevent and eliminate the formation of errors. In turn, the inability to monitor processes using one Control Chart in the case of for example multi-assortment production causes great confusion and leads to the formation of useless documentation as well as entails huge costs and is completely unprofitable.

References


AN ANALYSIS OF OCCURRENCE OF THE HIDDEN FACTORY PHENOMENON IN PRODUCTION – BASED ON THE SELECTED YIELDS – CASE STUDY

Izabela Dagmara Czabak-Górska,¹ Marcin Lorenc²

Abstract: This article describes a procedure for identifying the phenomenon of ‘hidden factory’ based on classic and Six Sigma yields, a term attributed to wastefulness during production. The paper presents a study that aims to establish a method for improving the efficiency of production by eliminating this wastefulness. The first part of this article presents a synthesized review of the current literature regarding the negative influence of the ‘hidden factory’ on production efficiency. The theoretical considerations involve a case study with quantitative data collected from a metal foundry of Zawiercie in Poland, which specializes in producing iron castings, including connectors for water, gas, and vapor installations, as well as minor machine castings. The results indicate a hidden factory within this company’s production line. The analyzed example underlines the efficiency of the applied method for detecting the undesired phenomenon of the ‘hidden factory.’

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Keywords: ‘Hidden Factory,’ performance of the production, case study, classic yields, Six Sigma method, yields

Introduction
Growing competition as a result of globalization is causing production companies to search for new ways of improving their financial gains. In many areas, the fiercely strong rivalry between competitors makes it impossible to raise the product prices that would quickly and directly lead to financial success. Porter (1979) stresses that except for the intensity of competition in a given branch, four other factors can influence profitability in varying degrees, though managers, especially production managers, have little influence on these factors. Nevertheless, there are other areas, as defined by Gryffin (2010), where their efforts can achieve smooth and efficient operations in managing production. This article focuses on one such area, the problem of the ‘hidden factory,’ which directly influences the efficiency of manufacturing and consequently, the final financial outcome of a company.

Literary Review
The Phenomenon of the ‘Hidden Factory’
Harry and Schroeder (2005) defined the ‘hidden factory’ as all processes, activities, and systems aimed at correcting errors arising in the various stages of production. Miller (2001) stated that the ‘hidden factory’ does not lower the fulfillment of client’s expectations (most frequently expressed in a nominal value and tolerance limit). To the contrary, to a large degree, it increases the company’s requirements for fulfilling client’s expectations. Miller (2001) also underlined that it generates problems connected with costs, which usually increase due to the lack of awareness of such a phenomenon. According to the research of Kosiny (2013), the savings resulting from the reduction of the costs connected with the ‘hidden factory’ are directly proportional to the savings from Six Sigma projects. Also, spending to improve the quality is nonrecurring and results in long-lasting profits.

Furthermore, Dobrzyński and Waszczura (2012) stressed that, in the end, maintaining a ‘hidden factory’ considerably overrates the quality of production (‘sigma’ level). Therefore, it is imperative that companies become aware of this phenomenon. Figure 1 depicts the operation of a ‘hidden factory.’

The product is processed in the order in stages from 1, 2, 3, 4 to 5 (Figure 1). Figure 1 shows flaws detected at stage 3 with the product being returned from stage 5. This is usually performed without the knowledge and consent of management where the detected flaw is eliminated, and then the product is moved to position 6 where the final operations are carried out, and the control of the finished product is run. Such activities negatively influence production, and the company incurs additional costs because the time of production has been lengthened, while management is unaware of the disturbances occurring in the process. Nawrocki (n.d.) underlines that the ‘hidden factory’ does not improve production. Moreover, long-term, it becomes an integral part and is unnoticed by management, and

¹ Faculty of Production and Logistics Engineering, i.czabak-gorska@po.opole.pl
² Faculty of Production and Logistics Engineering, m.lorence@po.opole.pl
thus, in turn, leads to wastefulness by the company. Identification of the ‘hidden factory’ phenomenon is relatively straightforward and is based on a comparison of classic and Six-Sigma derived yields. Thompson et al. Nieckula (2005) revealed the weak aspects of classic yields, which usually appear after the occurrence of the ‘hidden factory.’ They are critical of the first-time yield, which does not include the number of flaws per selection unit nor the entire set of processes necessary to manufacture a product. Thompson et al. (2005) identified the superiority of yields from the Six Sigma method compared to that of the classic. The advantage is due to the former’s selection method, i.e., counting flaws as well as faulty units. Also, Miller (2011) believed that the difference between rolled throughput yield and final yield should alert companies to the true efficiency of their operations, which is relatively low, and that their ‘hidden factory’ exaggerates the fulfilling of clients’ expectations. Interpretation and functional dependencies of yield from both classic and the Six Sigma approach are described in Czabak-Górska and Lorenc (2015).

**Figure 1:** Diagram depicting the operation of a ‘hidden factory.’

**Figure 2:** Flow chart of the casting manufacturing process

1. Workstation No. 1; 2. Workstation No. 2; 3. Workstation No. 3; 4. Workstation No. 4; 5. Workstation No. 6; 6. Workstation No. 7

Source: Author

Source: Authors
Data and Methodology

‘Hidden Factory’ Phenomenon – Case Study

The identification of the ‘hidden factory’ was carried out for a casting production line at Odlewnia Żeliwa S.A. in Zawiercie (Poland). This metal foundry specializes in producing iron castings, including connectors for water, gas and vapor installations, as well as minor machine castings. Production at the foundry consists of various stages (Figure 2). The production line operates on technology with mechanical extra-operational transport.

The results of the quality control documentation shown in Figure 2 formed the basis of the analysis. At each production stage there was a possibility of the following casting flaws that were listed as critical for quality: a fold or teeming arrest, dent, or burst (quality controls 1–3); precipitation, cold lap, or transposition (quality controls 1–3); and exterior bubble, ignition, or hot cracking (quality control 1).

Throughput yield denoted the probability of manufacturing all elements of a product in compliance with requirements. The normalized yield was the average of throughput yield expected at any stage of production. The yield (Y) denoted the probability of manufacturing all elements without a flaw.

Results and Discussion

Figure 3 compares incompatible products and other incompatibilities at every investigated stage. It also shows the yields, for throughput and rolled throughput. The remaining results are compared in Table 1.

At the beginning of manufacturing, the process planned to produce 2 365 units of castings (Figure 3). After manufacturing, the molds, pouring, and castings shake-out stage had 15 rejected pieces as waste products (i.e., defects unfit for further processing and subject to re-melting). At this stage, there were 395 pieces of castings that needed repair with a total 450 units detected with defects. Continuing operations, i.e., the finishing of castings and mechanical treatment of castings, involved 2 350 pieces. Quality Control 2 showed 10 units of castings needed repair and 30 had casting defects, without demonstrating the need to recognize any nonconforming unit. Then, after mechanical treatment of castings, none of the castings had defects, and there was no need for repair (Figure 3).
The first-time yield (FTY₁) indicated that stage 1, preparing the matrix, potting, and striking castings, was the least efficient, from the perspective of fulfilling clients’ expectations (Table 1). The probability that a product will pass a quality control in this first stage was 82.7%, which is 16.9% lower than that for the finishing stage. The results indicate 100% efficiency of the mechanical processing. The final yield showed that 17.1% of castings would not pass the quality control the first time. The number of flaws per million possibilities was 11 276 (Table 1), which is an extremely high value. In the three-sigma approach the ‘perfection threshold’ for defects per million opportunities (DPMO) is 0.002 and in Six Sigma method, 3.4.

The probability that a flaw would not appear in the product as a result of the process (Y) was 81.5%, which is a value close to the probability compatible with the requirements of manufacturing all elements of the product (81.6%). As well, it corresponds to a probability that the product, having passed through the entire process, will be without flaws (81.6%). The ‘sigma’ level was 2.33, which is an exceedingly poor result that leads to the conclusion that the process needs improving.

Comparing final yield (FY) with the rolled throughput yield (YᵣT) showed a 1.3% difference, which infers a ‘hidden factory’ in the process. Furthermore, the higher value of the normalized yield (Y₉A) of 93.5% compared to yield (Y) and throughput yield (Yᵣ) means that correction activities can be undertaken. This conclusion results directly from the definition of the indicators, which denote respectively: average expected as throughput yield at any stage of production (Y₉A), probability that processing would proceed without a flaw (Y) and probability of manufacturing all elements of a product in compliance with requirements (Yᵣ). Additionally, another concern is the activity of the ‘hidden factory’ with the relatively low ‘sigma’ level. In addition, the coexistence of the ‘hidden factory’ phenomenon with a relatively low ‘sigma’ level can cause that the efficiency of the production to be significantly inflated. As a consequence, the elimination of the “hidden factory” phenomenon without implementation of suitable strategies for improvement may result in a high percentage of defective product.

**Conclusion**

The problem of the ‘hidden factory’ in production facilities often ensues completely unnoticed by the management of the company. As the low to medium level managers, and particularly employees working directly on production lines, believe that flaws in production are a natural consequence of the whole process, such a phenomenon ‘must’ appear with regular frequency. At the same time, this personnel does not undertake appropriate activities aimed at improving the efficiency of the whole process. This study focused on identifying the phenomenon of a ‘hidden factory’ based on classic yields and those used in Six Sigma. The suggested yields were used to analyze production at a metal foundry in Zawiercie (Poland). The obtained results show the presence of a ‘hidden factory’ in the manufacturing of this company. As a way to improve the company’s competitiveness, and at the same
time, its financial gains, it is recommended the board of the company undertakes activities for maximum constraint of the ‘hidden factory.’ In particular, a situation where the running of production is characterized by excessive defects (high DPMO yield) and low efficiency (low ‘sigma’ level) indicates a borderline between an uncompetitive and competitive middle-class enterprise.

References
ACCOUNTING AS A 21ST CENTURY BUSINESS VALUE DRIVER
Marius Costin Daraban

Abstract: Companies have focused for decades on maximizing the value creation process of direct productive business activities. The information revolution has left its mark and has started an irreversible transformation of classical business processes and activities. In the new 21st century information and data driven society, commodity is value and knowledge, making Porters value chain concept an important key factor for successful and innovative businesses. Business value creation was during the industrial revolution a topic strictly liked to direct productive activities. The increased and transformed business environment required innovative and sustainable competitive advantages for business organizations. The indirect productive business activities, and the business support services have been considered business value consuming and having no contribution towards the company value chain. 21st century accounting has evolved from the role of record keeper to a business value driver that assures and contributes to the company value chain by using its internal knowledge pool. The existing scientific publications are approaching accounting from different perspectives and support the main conclusion of the paper: accounting, in the 21st century is not a “bean counter” anymore, accounting is a certain and consistent business value driver.

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Introduction
The activities within any company are direct productive and indirect productive, or business services directly linked to the outcome of the company and business support services that support and enable the smooth and plane business operation.
The 21-st century, also known as the information revolution century, where the information revolution has made its mark on the classic approach of doing business. Information and information management has become one of the key “commodities” of the modern, profitable and efficient company. Information management has become the defining element of the modern, efficient and sustainable business.

Any activity with a company must have a productive, useful, and efficient outcome regardless of the direct or indirect relation to the business output and core activity.
The purpose of this paper is to show that indirect productive business activities, also known as business support services, are 21st century business value drivers that need to be handled with care, properly managed, and measured.
Accounting is a “classical” example of indirect productive business activity that will be used to demonstrate the research hypotheses of this paper. The research hypotheses of the current paper are:

- Accounting activities as knowledge based organization
- Accounting activities as a business value generator
- EVA of accounting activities

Genesis of accounting
Concerns of numeration and counting can be traced back to the early development stages of human society. The development and establishment of states and authorities that have as a basis a form of taxation as a public income have necessitated besides the knowledge of numbers also the knowledge of calculation and counting. The need of recollection of numerical topics can be considered as a very early form of keeping accounts and records. This need of keeping records of numerical facts has laid the foundation of the science of accounting.

In 1495 Luca Pacioli published in Venice his book “Summa de arithmetica, geometria, proportioni et proportionalita” (Summary of arithmetic, geometry, proportions and proportionality)” that was a comprehensive summary of Renaissance mathematics, including practical arithmetic, basic algebra, basic geometry and accounting, written in Italian for use as a textbook. (Wikipedia, 2017). In one of the sections of his book about business, the section Particularis de computis et scripturis (Details of calculation and recording) describes the accounting system used by the Renaissance Venetian

1 Lucian Blaga University of Sibiu, marius.daraban@ulbsibiu.ro
merchants and this is one of the first documented sources about the today's double entry accounting system.

Since Pacioli was a Franciscan friar, he might be referred to simply as Friar Luca. While Friar Luca is often called the "Father of Accounting," he did not invent the system. Instead, he simply described a method used by merchants in Venice during the Italian Renaissance period. His system included most of the accounting cycle as we know it today. For example, he described the use of journals and ledgers, and he warned that a person should not go to sleep at night until the debits equaled the credits! His ledger included assets (including receivables and inventories), liabilities, capital, income, and expense accounts. Friar Luca demonstrated year-end closing entries and proposed that a trial balance be used to prove a balanced ledger. (Smith, 2013, p. 2).

**Role and fields of accounting in business organizations**

Accounting is also known as the “language of a business” because it communicates the information that owners, investors, managers and government use to evaluate the business performance towards the ultimate business goal to create value for its stakeholders and shareholders. The generic role of accounting can be defined as a sum of three key activities: record, report, and interpret financial data that are used for business decision making.

The key basic activities of accounting can be challenging, especially in the dynamic changing, globalized markets. The recording and reporting of financial data is made easy by the 21st century modern accounting software packages, that enable a more standardized and uniform approach to accounting rules and standards. The recording and reporting of financial transactions, also known as financial accounting, is governed by standardized rules and regulations defined by fiscal and tax authorities and accounting organizations. Governments define the fiscal and tax rules and regulations for their economic environments, that every business organization must follow.

Independent worldwide recognized organizations like FASB (Financial Accounting Standards Board) that have issued GAAP (General Accepted Accounting Principles) that are widely used, with local variations, in the Anglo-Saxon countries. Due to internationalization and globalization of business and financial worlds the IASB (International Accounting Standards Board) have issued the IFRS (International Financial Reporting Standards) that are widely accepted and used by European companies and non-US-based companies.

Due to an ever-increasing business complexity that implies a more and more globalized approach and because of the fully internationalized capital and financial markets companies worldwide are starting to adopt IFRS as an accounting standard.

Because of the needed standardization of accounting principles, the development of modern accounting software has made the recording and reporting of the financial statements, also known as financial accounting, more simplistic, standardized and streamlined. The recording and reporting of financial data has become today a “commodity,” a standardized process that will evolve and develop into a world-wide standardized process that allows easy comparability and understanding.

The interpretation, communication and management of financial data, also known as management accounting, is the more demanding and complex of the accounting activities because it is more flexible, it is not regulated so much by 3rd parties, and requires and particularized approach.

**Accounting as an internal knowledge based organization**

The key defining concepts of the 21st century are information and knowledge that have had a major impact on business organizations all over the world. Business organizations must redefine their strategies and their values to assure their competitive advantage in the increasingly fast moving global market place. (Daraban, 2016, p. 1).

A knowledge based organization is an organization where workers use processes and infrastructure to produce, change, manage, use, and share knowledge based products and services to achieve the organizational goal. (Daraban, 2016, p. 4)

The generic role of an accounting department is to record, report, and to read the financial data of business organization. Therefore, it can be concluded that accounting is meeting all the main characteristics of the 21st century knowledge based organization.
The accounting organization uses defined and established processes and infrastructure in the collection, recording, and reporting of financial data. The collection, recording, and reporting of financial data is strictly regulated by financial and fiscal authorities and is the main activity of financial accounting. The regulations need to be understood and implemented by the accountants for each specific business case or business model. The created records and reports are shared with internal stakeholders, that use the received information for the business and management decision process, and external stakeholders (like government, suppliers, clients, investors, etc.) that use the information for the business performance evaluation. Financial accounting is the form of reporting business performance, and value creation, in a form imposed by governments, that has transferred the business value creation through accounting to business entities for a price, taxes and fees. Financial accounting is a mandatory activity for all business activities, worldwide, having as stakeholders the business organization and the local fiscal authorities and regulatory state organizations. Because of its implications, possible penalties and legal responsibility, financial accounting can make or break a business if taken lightly. Non-compliance with fiscal regulations can lead to insolvency and bankruptcy. Therefore, financial accounting is a radical business value creator or destroyer through the knowledge and understanding of accounting rules and regulations.

Management accounting is using and “translating” the financial accounting information and received knowledge, in form of financial statements, into data that is used by and in the management and business decisions process. The “translated” financial accounting data, received in form of the financial statements, are reinterpreted by management accountants for the business value optimization process; one major objective being cost reduction, legal minimization of tax obligations. Both accounting fields, that are quite different but serve a common goal, strive towards the achievement of the ultimate business goal of value creation by recording, reporting, and reading financial data. Financial accounting is more retrospective by analyzing and reporting on past business actions, whereas management accounting is using the past analyzed events and is trying to find the best options and alternatives to improve and increase the efficiency and value of the business.

One of the knowledge generators of the 21st century modern, knowledge and information driven, business organization is the accounting organization that records, handles, and disseminates information based business internal and external rules and regulations like an independent, external knowledge based organization.

**Accounting as a business value driver**

Value creation is the most important goal of any business activity. By assuring the continuous business value creation through stable, efficient and innovative processes the company safeguards its future and assures its competitive sustainable advantage.

Therefore, in an ever-increasing business complexity, globalization and internationalization of business processes and transactions business organizations must tap and assure that all available and available resources are used at their maximum efficiency and effectiveness.

To be able to survive companies must develop mid and long term strategies that give them the sustainable competitive advantage by efficient and profitable set up of all involved business processes.

“Competitive advantage cannot be understood by looking at a firm as a whole. It stems from the many discrete activities a firm performs in designing, producing, marketing, delivering, and supporting its product”. (Porter, 1985, p. 33)

In his book, Competitive Advantage, Michael Porter is defining primary and support activities as being contributors to the “margin,” and profitability of the business. In the defined value chain, under Firm Infrastructure he mentions the business support services as being the services that support and sustain the rest of the business. The contribution of business support services towards the creation of business value has been recognized and determined by Porter in his book, Competitive Advantage, 1985 where he introduced the value chain concept. In the value chain concept, the support services, which also include accounting, are listed under support activities that contribute to the margin of the business.

Triggered by the information revolution and by the huge developments and changes in information management and IT systems and infrastructure the classical concepts have been undergoing an irreversible change and development process.
At the time when Porter introduced the value chain concept as being the sum of all discreet business activities, in 1985 the impact of the information revolution and information technology was in the early stages, at that time the business activities have been seen in their classical view.

The support services, including accounting, have been understood in the “classical role.” Accounting has been seen and defined as a record keeper and nowhere close to the value driver role of the 21st century. Since 1985 accounting has been going through major changes in concepts, understanding of business transactions and use of accounting tools.

Accounting has been undergoing major transformations determined by the internationalization and globalization of businesses and of the increasing complexity of business transactions. Today’s financial accounting is characterized by the following aspects that reflect Porter’s value chain and is contributing to business value creation and margin increase:

- Financial accounting is following besides the local statutory fiscal and financial legislation, IFRS principles that allow a standardization and comparability of financial statements almost worldwide determined by globalization and increasing internationalization and complexity of business transactions
- Today’s financial accounting systems enable a higher standardization and commoditization of transactions recording by elimination of points of failure and increase of transparency
- Most of the today’s modern financial accounting systems are real time systems, most transactions are visible and show their business impact
- Statutory reporting is automated and is supported by the integrated ERP’s
- The understanding and interpretation of the financial data and financial accounting records can be enabled by usage of business intelligence software tools that allow an automated transformation of data and financial records for decision making and business analysis

Because of the transformations that the support services have been going through the classical approach of support services has suffered a dramatic change. Accounting has developed from the classical role of record keeper to a real business value driver. The business value driver role is conditioned by the development and adoption of:

- Modern information and management systems that enable and support rapid and accurate recording, dissemination and interpretation of the financial data used for management and business decisions
- Value based management that implies a consistent change in the view of classical concepts of business and management, the business activities (primary and secondary activities) need to contribute to the growth, profitability, and efficiency of the company

A value driver is an activity or capability that adds worth to a product, service or brand. More specifically, a value driver refers to those activities or capabilities that add profitability, reduce risk, and promote growth in accordance with strategic goals. (Rouse, 2016)

The considerations and developments of the 21st century has put accounting into a new position that added to the classical role of accounting features that enabled the transformation of the classical view. The modern accounting meets has benefited from the information revolution; data recording and dissemination has increased in speed and accuracy that enabled value creation by information availability in due time for the business and management decision process.

**Valuation of accounting services**

Value is not easy to determine, especially if we are talking about intangibles. For tangibles, fixed assets, one way of determining the value is by evaluating its intrinsic value. For the intangibles, immaterial assets it is not that easy to have an objective value.

IAS 38, issued by the International Accounting Standards Board, defines the characteristics of intangibles assets.

**Intangible asset:** an identifiable non-monetary asset without physical substance. An asset is a resource that is controlled by the entity as a result of past events (for example, purchase or self-creation) and from which future economic benefits (inflows of cash or other assets) are expected. [IAS 38.8] Thus, the three critical attributes of an intangible asset are:
• identifiability
• control (power to obtain benefits from the asset)
• future economic benefits (such as revenues or reduced future costs)

**Identifiability:** an intangible asset is identifiable when it: [IAS 38.12]

- is separable (capable of being separated and sold, transferred, licensed, rented, or exchanged, either individually or together with a related contract) or
- arises from contractual or other legal rights, regardless of whether those rights are transferable or separable from the entity or from other rights and obligations.

(Deloitte Global Services Limited, 2017)

Based on the definition of intangibles, accounting activities, are meeting most requirements. Accounting activities are only indirect identifiable through the human resources, specifically the finance professionals that are performing the activities. As an employee of the company or as an outsourced activity the accounting activities are under the full control of the firm. The future economic benefits are very clear, without accounting activities the firm would not be able to operate legally nor would it have needed financial information about business operations, if we consider the different accounting fields, financial accounting and management accounting.

Under the IAS 38 definition we could assume that the involved human resources in accounting activities are the assets that the firm has bought and invested.

An invested capital, in this case in accounting staff and systems, is expected to have a contribution towards the value creation of the firm. Common indicators to measure the return of invested capital and the value addition of the invested capital are ROIC (return on invested capital) and EVA (economic value added).

ROIC is defined as the ratio that shows how profitable the invested capital is turned into profits whereas EVA is defined as a measure of surplus value on the investment.

ROIC and EVA can be determined per the formulas from below:

\[
ROIC = \frac{NOPAT}{IC} \Rightarrow NOPAT = ROIC \times IC \\
EVA = NOPAT - CC = NOPAT - (WACC \times IC) = (ROIC \times IC) - (WACC \times IC) = IC \times (ROIC - WACC)
\]

Where

- ROIC = return on capital employed
- NOPAT = net operating profit after tax
- IC = invested capital
- WACC = weighted average cost of capital
- EVA = IC \times (ROIC - WACC)

The valuation of the contribution of accounting services cannot directly be determined, the services being indirect productive and not having direct impact on the sales of the firm. Therefore, it can only determine when EVA is positive, when value is created and accounting is contributing to the value chain of the firm.

\[
ROIC - WACC > 0 \Rightarrow EVA > 0 \text{ the company is creating value through its growth and assures that the expectations of investors are met.} \\
ROIC - WACC < 0 \Rightarrow EVA < 0 \text{ the company destroys value and needs an immediate adjustment of operations} \\
WACC \text{ is the minimal level of return on invested capital where no EVA is generated by business development and growth.}
\]

For accounting services, it can be considered that the invested capital is the total amount paid as salaries for the accounting team as a way of procuring the needed and mandatory resources, knowledge in the case of accounting activities. Financial accounting is mandatory for most of the world markets being imposed by financial and fiscal local authorities; it can be considered as being the cost of doing business in a specific market, cost that is being paid to the market regulator and supervisor.
To have a legal running business that is based on sound economics and profitability, the minimal return on invested capital would be at least at the level of WACC, where EVA neutrality (EVA = 0) would be assured.

**Conclusions**

Value creation has become a central problem concerning enterprises. It is invoked mainly by shareholders, but also by managers and financial analysts, as it represents an imperative for the company, but also a key factor for justifying major decisions (for example, activity cessions, disinvestments operations, staff cutbacks, etc.). Value creation for the shareholders should be constant. (Petrescu & Apostol, 2009, p. 1)

The financial theory emphasizes the importance of maximizing shareholder wealth as the ultimate goal of business firms. At present the business environment is faced with numerous challenges that can have a major impact on the performance of firms. (Vasilescu & Popa, 2011, p. 1)

Companies are facing a major hurdle, to survive globalized and the complex business environment. Nowadays companies must excel in all their functional and organizational areas by creating a steady and sustainable flow of value. In their quest for value creation companies must reinvent themselves and innovate the classical way of doing business. Therefore, a detailed and very systematic analysis must be performed on all business processes and activities to assure that no growth and value creation potential remains untapped.

For decades’ companies, during the industrial revolution, have focused mostly on the direct productive activities and their extensive development to assure growth and profitability. The impact and challenges of the information revolution, combined with the complexity, internationalization and globalization of business environments have led companies to focus and to maximize the value potential also from business support activities.

A company value stream cannot be considered only coming from direct activities, the economic value stream of a company is the sum of all value streams generated by all business activities direct and indirect.

Modern accounting, with its two major fields financial accounting and management accounting, have left their mark in the development of the company business. The transformation of the classical view of accounting as record keeper has started and is not reversible. During the information dominated markets and societies the accounting is providing business information post- and ante-fact that can and will be used by managers in the business decision process.

Accounting activities, financial accounting and management accounting, have a gain momentum in the business data and information delivery. The provided data and information about past and future business actions have a certain and business value. Management accounting is providing data and information, with help of modern IT tools, that are the basis of modern business intelligence.

Value is subjective and particularized especially for immaterial, intangible services from within business organizations. Economic Value Added (EVA) can be used as a tool for the determination and illustration of the value created by indirect business activities.

The output of accounting activities can be assimilated to the current definition of company intangibles due to increasing complexity and influence and impact of the modern IT systems and tools that make business information more and more available.

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ENHANCEMENT OF ASSESSMENT OF THE INTANGIBLE ASSETS OF THE COMPANIES BY MEANS OF SUBTLE SETS
Andrei Diamandescu,¹ Ion Ioniță²

Abstract: The reason for approaching this topic in our article starts from the fact that the value of goodwill (GW), which is an indicator that expresses the intangible value of the company, that is a factor with essential contribution to the company’s market value, is determined through a method which we consider to be imprecise – respectively as difference between the price of sale of the asset and the value estimated by the evaluator. Or, the result obtained by this method is not accurate, and it does not answer the knowledge and information needs of the manager. In this article, we refer to the fact that managers also want to know, besides the GW, the factors that contributed to its achievement and factors that contributed to its achievement and in what percentage. The need appears more important in cases of the sale of companies when both the buyer and the seller are interested in establishing a fair price, based on the market value of the company in question. Starting from this practical requirement, the authors plan to elaborate econometric models based fuzzy set, by which they would determine the right level of the goodwill and to provide information in connection with the generating factors.

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Key words: goodwill, fuzzy sets theory; subtle sets theory; movable assets; tangible assets

Motivation
The property that in economics takes the form of capital is subject to some specific processes such as privatization, sale, division, merger, liquidation, etc., processes that create a market of the companies. The accomplishment of any of these processes requires a complex assessment study of evaluation by which to determine an estimated value that will stay at the basis of establishing the asset’s alienation price.

The evaluation represents the activity of estimation of the value of an asset, concretized in an evaluation report, performed in accordance with the standards specific to this activity and with the professional deontology, by a certified assessment evaluator. Concretely, by the evaluation of an asset, its market value is established, that is obtained by adding to the value of the tangible assets (tangibles), expressed by the net corrected asset (ANC), the value of intangible assets expressed by the goodwill. (Ioniță et al., 2004)

Stock-in-trade is made up of the aggregate movables and immovable assets, tangible and intangible, used by a trader for developing its activity. They are tangible assets (furniture, stocks, etc.) and intangible assets (company’s trademark, goodwill, etc.). Thus, the goodwill in its aggregate is deemed an intangible asset of commercial nature that is however made up of the tangible assets and intangible assets. The intangible assets of the stock-in-trade are divided into groups:
- The assets that are accounted and may be evaluated distinctly. They are recorded individually in the balance sheet and are classified depending on their nature;
- Assets that are not individualized, but are reunited in an aggregate of assets referred to as goodwill, accounting notion that is recorded in the balance sheet and of which calculation represents the topic of our article.

The goodwill, according to the accounting provisions from Romania, represents the part of the goodwill that is not recorded within the other patrimony assets, but which competes in maintaining or developing the company’s potential. The goodwill represents, in fact, the company’s reputation in a certain area, reputation given by the management quality; by the fabrication mark, trade and services; by the company’s customers, and by the commercial connections which it maintains in a certain geographic area, etc. The goodwill is an important factor in the processes of procurement or combination of some companies, as it influences favorably or unfavorably the company’s purchase price and depending on the accuracy that it was established with. (Ioniță & Stoica, 2009)

If the accounting practice makes a difference between the stock-in-trade and the goodwill, the same is proceeded also in the process of assessment of the goods. The intangible assets are part of the company’s patrimony of assets and must be included in the final value established by the evaluator. In

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¹ “Nicolae Titulescu” University, Bucharest, Romania, andrei.diamandescu@gmail.com
² Bucharest University of Economic Studies, Bucharest, Romania, ion_ionita@yahoo.com
the methodology used currently by evaluators, intangible assets of the goodwill are not subject to an evaluation and nor of a separate recording in the balance sheet, however, they contribute in maintaining and development the potential of the company’s activities. In this context, we appreciate that a fair assessment of a company is only the one including in the final value established by the evaluator and surplus of value or of the goodwill which the goodwill generates and that is calculated with a high degree of accuracy. Also, in the evaluation, it must be taken into account the effect of the synergy of the goodwill, in the meaning that its value is bigger than the sum of the values of its assets taken separately.

As the intangible assets bring additional profit in relation with other companies from the same category, but that don’t benefit of the mentioned items and that, as we showed before, determines the goodwill, value of the company \( (V_0) \) should be established by adding GW to the value established for tangible assets, respectively ANC, according to the ratio (Ioniță, 2008)

\[
V_0 = ANC + GW
\]

The calculation of the company’s value by this ration presents however a series of deficiencies deriving, as mentioned, from the modality of determining GW of which its dimension is established in the current methodology of assessment as the difference between the purchase price (or the value of contribution of the stock-in-trade) and the updated value of the asset items. The resulted difference is included in the value of the goods that make the purpose of the sale purchase agreement or that is recorded in the account of goodwill, without knowing the factors that determined it and the weight of participating of each of them. Or, such information is essential for the purchaser’s information that always aims a clear image over the future profitability of the company. In our appraisal, this objective can be achieved by means of the econometric models based on fuzzy and subtle sets.

**Specifications concerning the role of subtle sets and of the fuzzy sets in the company’s assessment**

In connection with the subtlety concept, we mention that it was treated even since the 16th century by the mathematician Gerolamo Cardano in his work “About subtlety” (Cardano, 1554) published in Latin. In the substantiation of the concept, the author specially emphasized the diagnostic and forecasting analysis, items that made such conception be presented also on the current medical practice.

The fuzzy sets although they were studied before by Lukasievicz and by Moisil, were only defined in 1965 by Zadeh, so that further on they can be developed by many more authors (Zadeh, 1965). Although there are separated from the concept treated by Cardano, it may be asserted that by the conception treated in his book, Zadeh anticipates the concept of subtle space, putting the basis of a new way of thinking in the activities developed currently in the vital fields of the economic and social life. Thus, by their means, many applications were made in economics, in psychology, and in sociology. In our country, the model fuzzy sets are applied to the evaluation of the companies (Ioniță et al., 2004). In the economic field, in the case of our evaluation, a big interest for the application of the fuzzy sets is represented by the evaluation of the intangible assets. Although they hold an important weight, in the final value of the company, their evaluation is not made by a rigorous methodology, based on mathematic calculations that would assure us that the result is correct. On the contrary, the evaluation process, as it is developed presently, introduces a series of imprecision items that might be corrected by means of fuzzy sets. In order to clarify the role of fuzzy sets in determining with an acceptable accuracy the value of the intangible assets (generating goodwill), we will analyze the possibility of their application to the evaluation of one of the main factors participating in obtaining the goodwill value in a company. We, however, mention that the method proposed by us may be applied with good results also for modelling some activities from other fields of economics, especially those of management. (Mordeson & Davender, 2014)

**Methods of evaluation of the inventive – innovative potential of the companies based on fuzzy sets**

In accordance with national and international legislation from the field of industrial protection, innovations represents solutions that are applicable to an asset, process, etc. that lead to their perfection, while an invention signifies an original technical solution. The innovation expresses therefore only an improvement with the character of novelty applied to some original technical
solutions. From a legal point of view, the difference consists in rating the term of legal protection as it follows: 10 years for innovations and 20 years for inventions.

The main actions related to the evaluation of the inventive – innovative potential of the companies may classify as follows (Stoica et al., 2006):
- Actions that may be generated by the entire mass of employees of the company;
- Actions that are generated by the company’s specialized services (research-development, designing, trials of prototypes, workshops, etc.);
- Actions generated by specialized institutions and experts from outside the company (consulting companies, universities, research-designing institutes, licensors, individuals, etc.), from the country and abroad.

These actions are followed by a series of technical and economic indicators of goodwill that will be evaluated in a positive way and others of bad will that will be negatively valuated. The indicators represent potential results of effective results. Obviously, for potential results, smaller degrees of trust will be granted than the effective ones (obtained as a result of determinations from the real economic system and not from the simulated system).

Further on, we disclose the method of evaluation of these results for various stages and compartments.

**Evaluation of the innovating potential**

An elementary indicator that must be evaluated is the total number of innovators NTv, of which: Nv1 represents the number of innovators with a single innovation approved; Nv2 - number of innovators with two innovations approved, etc. It is awarded a score for the number of innovators with a single innovation approved Piv1, a score Piv2 for the number of innovators with two innovations approves and so on. The total score PTv, for the number of innovators is:

\[
PT_v = N_{v1} \times P_{iv1} + N_{v2} \times P_{iv2} + \ldots + N_{vn} \times P_{ivn}
\]  
(2)

For the proposals of innovations endorsed NivAF it is awarded a number of points PivAF, and the total number of points is obtained with the following ratio:

\[
PT_{iv}^{AF} = N_{iv}^{AF} \times P_{iv}^{AF}
\]  
(3)

Some of the innovations endorsed affirmatively may enter among those applied immediately NivAl, and others enter in experimenting NivAex. It results that the restriction (4) must be satisfied as a part of the innovations cannot be experimented due to the impossibility of bearing of the experimenting cost by the company:

\[
N_{iv}^{Al} + N_{iv}^{Aex} \leq N_{iv}^{AF},
\]  
(4)

Further on, the innovations accepted after experimenting, noted by NivAp, will be applied in the production process, and the others, that prove unfeasible in technical terms or inefficient in economic terms, will be rejected (NivAex). Therefore, the relations expressed in the following ratios will be observed:

\[
N_{iv}^{Aex} \leq N_{iv}^{Aex} \quad \text{and} \quad N_{iv}^{Aex} = N_{iv}^{Aex} - N_{iv}^{Ap}
\]  
(5)

Of course, the scores increase as the innovations reach a stage closer to the current production. If we note with PivAl the score awarded to innovations that may be applied immediately in production with PivAex the score awarded to innovations that needs to be experimented and with PivAp the score awarded to innovations that were experimented with success and are applied already to production, then we will have the following restrictions:

\[
P_{iv}^{Aex} \leq P_{iv}^{Al} \quad \text{and} \quad P_{iv}^{Aex} \leq P_{iv}^{Ap}
\]  
(6)

And the total score for experimenting and production will be determined with the ratio:

\[
PT_{exp} = N_{iv}^{Al} \times P_{iv}^{Al} + N_{iv}^{Aex} \times P_{iv}^{Aex} + N_{iv}^{Ap} \times P_{iv}^{Ap}
\]  
(7)

There may be also introduced bad-will items for rejected innovations, like:
\[ PT_{BW} = -(N_{iv} Aexr \times P_{iv} Aexr + N_{ivrp} Aex \times P_{ivrp} Aex) \]  

In which:

\[ N_{iv} Aexr \] – number of innovations rejected following the experimenting;

\[ P_{iv} Aexr \] – number of points of penalization for the innovation rejection after experimenting;

\[ N_{ivrp} Aex \] – number of innovations accepted as feasible after experimenting, but that proved to be inefficient on the basis of the results effectively obtained after application in production;

\[ P_{ivrp} Aex \] – number of penalizing points for the innovation rejected after application in production;

\[ PT_{BW} \] – total number of penalizing points for rejected innovations.

Obviously, the restriction will be made up:

\[ P_{ivrp} Aex >> P_{iv} Aexr \]  

Finally, the score for innovations, totaling each stage carried out from the scheme and diminished with the badwill is:

\[ PT = PT_{iv} + PT_{inv AF} + PT_{exp} - PT_{BW} \]  

These scores are added with the technical and economic results obtained following the effective application. A global result might be the profit increase obtained by the company following the application of all these innovations. Be it \( \Delta P \) of this profit. Then it may be calculated of form- profit indicator obtained on point awarded for innovations, as it follows:

\[ \Pi_1 = \frac{\Delta P}{PT} \]  

For \( \Pi_1 \) it is awarded a score \( P_{iii1} \), where: \( P_{iii1} > P_{iv} Aiv \)

To the effective profit \( \Delta P \), it is granted a degree of trust bigger than the total PT score. It might however, raise the issue of also considering other criteria than the profit, such as for example, ecological, ergonomic, psychological criteria, etc.

Consequently, it might be likely to be calculated a global utility of innovations \( U_i \), by an interdisciplinary team of economists, technicians, psychologists, sociologists, physicians, biologists, etc. In the end, an efficiency indicator \( u_i \) can be calculated that would express the utility of the awarded point, like:

\[ u_i = \frac{U_i}{PT} \]  

**Evaluation of the potential for investments**

In an analogical way with those presented for innovations, the total number of inventors among the employees will be established \( NT_{inv} \) where:

\[ N_{inv}^1 \] - number of inventors with a single patented invention;

\[ N_{inv}^2 \] - number of inventors with two patented inventions, etc.

A score \( P_{inv}^1 \) is awarded for inventors with a single patent, a score \( P_{inv}^2 \) for inventors with two inventions, etc. The total number of points for inventions made by the employees may be determined with the ratio:

\[ PT_{inv}^A = N_{inv}^1 \times P_{inv}^1 + N_{inv}^2 \times P_{inv}^2 + ... \]  

Further on, it is considered the number of proposals of inventions endorsed affirmatively \( N_{inv} AAF \) as well as the score awarded for an invention endorsed affirmatively \( P_{inv} AAF \), which allows establishing the total score for this category of inventions, as follows:

\[ PT_{inv} AAF = N_{inv} AAF \times P_{inv} AAF \]  

A part of the inventions endorsed affirmatively may be directly applied (without experimentations) in production; obviously, at the beginning, with an experimental character and then in definitive terms.

We will note this category of inventions with \( N_{inv} Aexr \). Another part, which we note by \( N_{inv} Aexr \), require
experiments for which the company has funds for bearing the costs of prototypes, trials, etc. It still remains a part, noted with $N_{INV}^{anex}$ of inventions that must be experimented, but for which the company does not have the funds necessary to execute prototypes, trials etc. They will be returned to the authors for finding a financing source or, with their consent, a stock $S_{INV}^{anex}$ of the uncompleted inventions is made up. Therefore, the following restriction must be checked:

$$N_{INV}^{AI} + N_{INV}^{anex} + N_{INV}^{anex} = N_{INV}^{AF}$$  \((15)\)

The total score $PT_{INV}$ awarded for these inventions is:

$$PT_{INV} = N_{INV}^{AI} \times P_{INV}^{AI} + N_{INV}^{anex} \times P_{INV}^{anex} + N_{INV}^{anex} \times P_{INV}^{anex}$$  \(16\)

where: $P_{INV}^{AI}$, $P_{INV}^{anex}$, $P_{INV}^{anex}$ represents the score awarded for inventions from the appropriate category.

It may be considered $P_{INV}^{anex} \approx 0$, taking into account that these inventions were already scored in the ratio that expresses the total number of points awarded to employees, and if the authors will find funds for experimenting and of they will prove as efficient, they will be scored in the ratio that expresses the total number of points awarded for the endorsed inventions.

On the basis of the inventions presented by the employees and experimented by means of the company's research and designing service, $N_{INV}^{anex}$, a number of prototypes $N_{PE}^{1}$, are made, that can be calculated by the ratio:

$$N_{PE}^{1} = c_1 \times N_{INV}^{anex}$$  \(17\)

where: $c_1$ = average number of prototypes necessary to experiment an invention of the employees.

In an analogical way, $N_{PE}^{2}$ is determined, which represents the number of prototypes necessary for experimenting the inventions proposed by the company's research and designing service, by using the ratio:

$$N_{PE}^{2} = c_2 \times N_{CP}^{INV}$$  \(18\)

In which: $c_2$ = average number of prototypes necessary to experiment an invention made by the company's research and designing service.

After the endorsement and technical and economic analysis of the results of the experimenting, it is obtained a number of prototypes with positive results $N_{inv}^{FAV}$ and another number $N_{inv}^{AF}$ with unfavourable results. For inventions with favourable results $N_{INV}^{FAV}$, respectively $N_{INV}^{FAV}$ (of the employees and those of the company’s research and designing service) patenting files are drawn out, that are submitted to the competent authorities spending the taxes $T_{1,1}$, respectively $T_{1,2}$. In parallel with patenting, experimental implementation may be started. A technical and economic analysis of the results of the experimental implementation is made and if the results are not favourable, redesigning occurs, and if it is then favourable, final implementation is started.

On the basis of the financial accounting situations, the profit effectively obtained due to the implementation of the inventions $P_{inv}^{EF}$ of the employees may be assessed, respectively of the company’s research and designing service. The total score of made prototypes $PT_{PROT}$ can be calculated by means of the ratio:

$$PT_{PROT} = N_{PE}^{1} \times P_{PROT}^{1} + N_{PE}^{2} \times P_{PROT}^{2} + (N_{PE}^{1} \times P_{n}^{1} + N_{PE}^{2} \times P_{n}^{2}),$$  \(19\)

where: $P_{PROT}^{1}$, $P_{PROT}^{2}$ – the score attached to the experimented prototypes made by employees, respectively by the company’s research and designing service;

$N_{PE}^{1}$, $N_{PE}^{2}$ – number off prototypes that require certain corrections;

$P_{n}^{1}$, $P_{n}^{2}$ – negative score awarded to prototypes that require certain corrections.
The score awarded for successful development of the experimental production of the prototypes $PT_{PEX}^{INV}$ will be determined by the ratio:

$$PT_{PEX}^{INV} = N_{FAV}^{INV} \times P_1^{INV} + N_{FAV}^{INV} \times P_2^{INV},$$

(20)

where: $N_{FAV}^{INV1}, N_{FAV}^{INV2}$ – number of prototypes that behave positively (of the employees, respectively of the company’s research and designing service);

$P_1^{INV}, P_2^{INV}$ - the score awarded to abovementioned prototypes.

Also, a score $P_{PREM}$ is awarded for each of the $N_{PREM}^{INV}$ inventions that were prized. Finally, the total score generated by inventions $PT_{G}^{INV}$ is:

$$PT_{G}^{INV} = PT_{A}^{INV} + PT_{AE}^{INV} + PT_{INV}^{INV} + PT_{PF}^{STUD} + PT_{PEX}^{INV} + (N_{INV}^{P} \times P_{PREM} + S_{INV}^{INEX} \times P_{S}),$$

(21)

where: $P_{S}$ the score for the stock of unused inventions (very close to zero).

Another number of points is awarded for the studies drawn out with own forces, of which a part endorsed affirmatively and for the studies paid to consulting companies (only if they are endorsed affirmatively). This score is noted by $P_{STUD}$ and is given by the ratio:

$$P_{STUD} = N_{FP}^{STUD} \times P_{STUD}^{FP} + N_{AF}^{STUD} \times P_{STUD}^{AF} + N_{CONS}^{STUD} \times P_{STUD}^{CONS},$$

(22)

where:

$N_{FP}^{STUD} =$ number of studies made by own forces;

$P_{STUD}^{FP} =$ the score for the studies made inside the company;

$N_{AF}^{STUD} =$ number of studies endorsed affirmatively;

$P_{STUD}^{AF} =$ the score awarded to studies endorsed affirmatively;

$N_{CONS}^{STUD} =$ number of studies achieved by consulting (paid only if they are endorsed affirmatively);

$N_{FP}^{STUD} =$ the score awarded to studies achieved by consulting.

For the technical and material basis of the technology transfer, the score $PB_{TM}$, is awarded, that is calculated by the ratio:

$$PB_{TM} = NLC \times PLC + NP \times PP + NPP \times PPP + NAIPA \times PAIPA$$

(23)

where: NLC - number of research laboratories;

NP - number of the staff occupied in research-design activities;

NPP - number of prototype projects;

NAIPA - number of prototype trial laboratories.

The patents will be scored as follows:

- For the patents of the inventors among employees (NB), that were supported by the company with the payment of taxes $T_{s1}$, the score (PB) is awarded;

- For the patents of the inventors among employees $NB^S$ that undertook the tax $T_{s1}$, the score $PB^S$ is granted;

- For the patents obtained on behalf of the company, $NB_F$ and for which it paid the tax $T_{s2}$, the score PB$_F$ is awarded. The total score for patents $PT_B$ is calculated with the ratio:

$$PT_{B} = NB_A \times PB_A + NB_A^S \times PB_A^S + NB_F \times PB_F$$

(24)

For licenses, a score $PT_L$ is awarded, given by the ratio:

$$PT_{L} = N_{Lj}^A \times P_{Lj}^A + N_{Lj}^S \times P_{Lj}^S + N_{Ln}^A \times P_{Ln}^A + N_{Ln}^S \times P_{Ln}^S$$

(25)
where: \( N_{lf}^A \) = number of autochthon licenses used in the production process;

\[ P_{lf}^A = \text{the score associated to these licenses;} \]

\[ N_{lf}^S = \text{number of foreign licenses used in production;} \]

\[ P_{lf}^S = \text{the score associated to these licenses;} \]

\[ N_{ln}^A = \text{number of unused autochthon licenses;} \]

\[ P_{ln}^A = \text{the score associated to these licenses (} P_{ln}^A \rightarrow 0 \text{ or even} P_{ln}^A < 0 \text{).} \]

\[ N_{ln}^S = \text{number of foreign unused licenses;} \]

\[ P_{ln}^S = \text{the score associated to these licenses (usually} P_{ln}^S < 0 \text{).} \]

The total score total for preparing the workforce \( PTP_{FM} \) is given by the ratio:

\[ PTP_{FM} = NPS_L \times PS_L + NPS_{FP} \times PS_{FP} + hc \times P_{es} - hg \times P_g, \]  
(26)

where: \( NPS_L \) – number of persons specialized by the licensor;

\( PS_L \) - the score awarded for a person specialized by the licensor;

\( NPS_{FP} \) - number of persons specialized by own forces;

\( PS_{FP} \) - the score awarded for a person specialized by their own forces.

\( hc \) - number of hours for conferences achieved by the organization for convincing employees that the technology transfer will be a benefit for employees;

\( P_{es} \) - the score awarded for the conferences organized for convincing employees about the advantages of the technology transfer;

\( hg \) - number of strike hours organized by workers as a protest against the technology transfer;

\( P_g \) - the negative score for the strikes of protest against the technology transfer.

The profit is forecasted according to the feasibility studies for certain technology transfer projects, that promote inventions or that use purchased licenses. Be it \( P_p \) such a profit. The follow-up stage is started during which the effective achieved profit \( P_e \) is established. If \( P_{T_e} \) represents the total number of points awarded for the technology transfer achieved by the considered feasibility study, then the forecasted profit is calculated on points awarded with the ratio:

\[ \Pi_p = \frac{P_p}{P_{T_e}} \]  
(27)

Or the profit achieved on awarded points:

\[ \Pi_r = \frac{P_r}{P_{T_e}} \]  
(28)

If: \[ |\Pi_p - \Pi_r| \leq \varepsilon \] (where \( \varepsilon \) = maximum accepted limit as lag between the forecasted level and the one effectively achieved), then for the general score of know-how, a number of points \( TP_r \) is added. If, on the contrary, such limit is exceeded, a number of \( TP_{PN} \) points awarded as penalty for non-fulfilment of the provisions from the feasibility study are deducted. The number of these points is established by specialists.

Totalizing all mentioned points gives us a number that estimates the vastness of know-how and with which the patrimonial value of the company will be corrected.

**Conclusions**

In the current practice, establishing the value of an asset is achieved by using evaluation methods based on tangible and intangible assets. The first one leads to the determination of ANC, and the last ones to the determining the super profit or of the goodwill. The price proposed by the seller is made up by adding to the value of ANC the goodwill value. If the determination of ANC, for which the necessary information is collected from accounting, does not raise special problems, when the accounting is well drawn out, determination of GW complicates the evaluation process, as the
necessary information are not found in the accounting. Such information originates from the subjective assessment of some intangible assets such as the management quality, the good custom, clients’ fidelity, etc.

The profit surplus, expressed by the term “goodwill,” is, therefore, the result of an additional profitability in relation with the other agents from the field, of which will benefit the owner of the company. As a result, the final value of a company, established by the evaluator, must include the correctly calculated dimension of the goodwill.

In the development of some market economic specific processes, such as the privatization, sale, division, merger, etc. their partners are interested in also knowing the items that generate goodwill, including the weight that they participate. That is why, the analysis of the possibilities of calculation of the goodwill and establishing the factors which they determine, remain a large interest research topic for specialists in the field. There may be use for econometric models based on the theory of subtle sets and of fuzzy sets, as presented in the article. By the application of these models, the main deficiency of the current methods may be eliminated, which on the one hand, does not provide information related to the goodwill generating factors, but on the other hand provides very useful information both for the company’s buyer and for its seller.

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THE POWER OF PRIVATE BRANDS
Savica Dimitrieska,1 Ljiljana Koneska,2 Kostadinka Gavazova Kozareva,3 Jasna Teofilovska4

Abstract: National brands are well-known and popular brands of manufacturers, such as Coca Cola, McDonald's, Milka, Maggi, Colgate, Toblerone, Evian, Knorr, etc. These brands usually are well accepted and favorites of consumers. They associate with high quality, availability, feelings, experiences, promotions, and events. However, their popularity is increasingly threatened by private brands. Private brands are brands of retailers and distributors, that starting from the 14th century, and especially today, have conquered lots of consumers. Initially, private brands appeared among consumer goods (food products) and were without name, style, design, with relatively low quality and with much lower prices than national brands.

Economic crises, low living standard, poverty that existed in several countries in the middle of the XIX-th century caused the consumers to become more sensitive to prices, and they began to show interest in private brands. The greater demand for these products the richer became the retailers. Retailers had a great advantage: they knew the needs and wants of consumers. With time, retailers have invested more in quality, taste, packaging, design, style, and colors of their brands that have attracted more customers. Today, private brands represent a severe competitive threat to national brands. Some recent research shows that private brands are more popular and more required than national brands. This paper aims to reveal the future of national and private brands with the help of empirical research.

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Introduction
By the 1960's of the last century, the market was dominated by national (producer) brands. They were brands of companies-manufacturers. According to Business Dictionary, the word “brand” means unique name, design, sign, symbol, shape or a combination of these, employed in creating an image that identifies a product and differentiates it from its competitors. (http://businessdictionary.com) These manufacturer brands have been favorites to consumers, recognized for their quality, functionality, performance, as well as their emotional connection, feelings, experience, events, and memories. During this period, the role of trade was insignificant and pure logistics. Trade served as a mediator between production and consumption. Its main task was to distribute the products of manufacturers to consumers in the required quantities, assortment, places, and deadlines.

But in the 1960s significant structural changes occurred. Trade received an increasingly important role in the exchange. These changes were due to the high concentration of trade, cooperation, and integration on a horizontal and vertical level, trade internationalization, strengthening the marketing orientation of trade, technological progress, and competition in innovations. Retailers began to invest their capital surplus in the development of their own brands. Initially, retailers were not aware what “boom” this will make to the market. Private (store brands, retailer brands, own brands) labels were brands of retailers and distributors that were mostly offered in the retail chains.

According to Blazeska (2013), the main reasons for the occurrence of these brands were:

- A need to create low cost products and services,
- A need for creating loyal customers,
- Taking the opportunity to make greater profits,
- The continuous change of shopping habits of consumers,
- Fulfilling the unsatisfied needs of consumers.

Retailers slyly noted their comparative advantage in the market and they started to offer their own products which were, at first, “no name,” generic, affordable as well as cheaper than national brands. Having in mind the economic crisis, poverty and declining living standards, consumers showed an interest in these products, and over time they became loyal customers.

1 Faculty of Economics, European University-Republic of Macedonia, Savica.Dimitrieska@eurm.edu.mk
2 Faculty of Economics, European University-Republic of Macedonia, Ljiljana.Koneska@eurm.edu.mk
3 Bayer Macedonia, Kostadinka.Kozareva@bayer.com
4 Faculty of Economics, State Univerzitety-Tetovo, Teofilovskajasna@yahoo.com
Retailers began to make large profits by selling their own (private) brands that had much larger margins than the profits made off selling other brands. Larger profits were primarily result of the fact that retailers cared for the design, production, promotion, distribution of products by themselves. They were specialized in promotion and distribution that helped them to reduce the costs and sell the products at a lower, more competitive price than national brands. With time, retailers started to invest in product quality, design, style, packaging that attracted consumers even more. As a result, the dominance of national brands has declined.

By investing in quality and value, private brands have become a serious competitive threat to national brands. Private-label success was strongest in commodity-driven, high-purchase products and those where consumers perceive little differentiation.

As stated in the Nielsen Report of 2014 (http://nielsen.com/pk/en.html), private brands are mostly developed in Western Europe. Switzerland has the highest private-label share at 45%, followed closely by the U.K. and Spain at 41% each. Private label is less developed in Eastern and Central Europe, where the share varies greatly from as high as 24% in Poland to as low as 5% in Ukraine. The percentage of participation of private labels in Canada, USA, and Africa is 18% each. The weighted global average reaches 16.5% dollar share of private brands in 2013. Some marketing experts believe that this percentage will increase in the future and private brands will dominate the global market.

**Literature review**

Private brands are generally perceived by consumers as low quality-products. Private label brands are defined as products produced by one manufacturer and sold under the name of a different company. As Mbayé (2009), Burton, Lichtenstein, Netemeyer and Garretson (1998) state, private labels are those sold under the retailer’s brand instead of the manufacturer’s. A private label product is manufactured by a contract or third-party manufacturer and sold under a retailer’s brand name. Private brands, also known as “store brands”, “retailer brands”, “own brands”, “own labels”, and “generics” are owned by distribution channel actors (retailers, wholesalers, distributors, etc…) and are sold only, under a particular brand name, in their stores (De Wulf et al., 2005).

There are five fundamental drivers of renewed growth and market penetration of private brands: (http://bridgestrategy.com)

- **The Recession.** Consumers' increased focus on value, price and affordability, a result of an economic crisis, is one obvious explanation for the rise in private label sales. Consumers have shown their willingness to purchase lower-priced alternatives.

- **Retail Landscape Consolidation.** Private label penetration has proven to be highly correlated with the level of retail concentration. Higher levels of trade concentration not only give retailers greater negotiation power against brand manufacturers but also create the critical mass required for making investments in the development of more sophisticated private label brands.

- **Improved Product Quality.** Private label quality has improved dramatically since the days of generic products. Several consumer studies have claimed that the quality gap between national brands and private label products has been reduced or eliminated. Accordingly, consumer perception has improved substantially creating a highly positive attitude towards private label.

- **Enhanced Retailer Capabilities.** Over the past several years, many retailers have been improving the skills and capabilities required to develop and manage increasingly sophisticated private label brands. They have hired brand and category managers, invested in marketing analytics and innovation and branding capabilities. As a result, retailers have developed a deeper understanding of consumer needs and wants, as well as segmentation and targeting techniques.

- **Renewed Strategic Approach.** The traditional approach to developing low-cost, generic alternatives to national brands, targeting price-sensitive, brand-agnostic shoppers, is giving way to a much more strategic role for private label, as part of more thoughtful shopper segmentation, category management, and assortment planning strategies.

There are four main stages in the evolution of private brands: (Blazeska, 2013)

- **The first stage** was represented by private brands that had low quality and low price. They had the same name as a retailer or retail chain. They did not have any elements of brand identity as design, packaging, color, slogan, logo, jingle, etc…
In the second stage, private brands gained some elements of brand identity like their own name, symbol, color, design and sometimes slogan. Products in this stage had a certain level of quality and still low competitive price...

The third stage is characterized by private brands with improved quality and reasonable price that still is lower than the one of the national brands. The price continues to be the main reason that attracts and retains customers.

The last stage of evolution, the one that still is unclear, will be presented with the leadership of private brands in some product categories or close cooperation between national and private brands. Although initially private brands were limited to commodity-based products (tea, sugar, fresh fruits, vegetables) and were perceived as low quality and unbranded alternatives to national brands, by time their products’ range extended in almost every product category, such as: (uhra.herts.ac.uk)

- Personal care,
- Beverages,
- Cosmetics,
- Paper products,
- Household cleaners,
- Condiments and salad dressings,
- Dairy items and
- Frozen foods (or more than 90% of consumer packed goods).

Even though private labels have a low market share, retailers continue to keep private brands in stock because of the profit margins they represent, being higher than national brands. Also, there is a large sector of consumers who take these private brands as a second-rate alternative, considering them as inferior in quality when compared to national brands (Raju et al., 1995; Beldona & Wysong, 2007; Gonzalez Mieres et al., 2006). However, despite the tendency of private brands to be considered as lower quality products than national brands, in the last decade they significantly have improved their quality. With the investments in their quality and value, they are above national brands in the same product category. (Apelbaum et al., 2003; Gomez-Arias & Bello-Acebon, 2008). Private brands are generic products that compete with national brands through price and later through value.

However, national brands still dominate the market for products with very high quality, prestigious and rare products, specific and complex products. These products include jewelry, clothing, household appliances, computers and computer equipment, cars, furniture, etc… Private brands penetrate in those product categories where retailers have power and strength to offer better products than national brands in the market. Private label brands become less popular in those product categories in which the difference in quality between national and private label brands is higher (Gonzalez et al., 2006). Private labels tend to do better in categories where price sensitivity is higher to a consumer (Raju et al. 1995; Hoch & Basenji, 1993).

Private brands have substantial benefits for both retailers and consumers. Some of their biggest advantages for retailers include: lower costs, higher profit margins, higher chain profitability, increased differentiation and product turnover, control over shelf space, control over production, control over pricing, adaptability, generating store loyalty, control over branding, and strong visual identity. (Ashley, 1998; Bonfrer and Chintagunta, 2004, Ailawadi et al., 2008)

Advantages of private brands for consumers can be summed up as follows: lower price, improved quality, improved accessibility, variety of alternatives, etc. According to Cunningham et al. (1982), private brands can offer substantially lower prices (15%-40%) than national brands. Market share has doubled after the 1990s and private brands have higher market share than national brands in about 30% of product categories (Quelch and Harding, 1996).

Data and Methodology

For the purpose of this paper, secondary and primary sources of data were used. Secondary data refers to the use of professional literature in the field of marketing and consumer behavior.

The primary source of data that was used refers to the questionnaire that was constructed and conducted among consumers in the capital of Macedonia, Skopje. The questionnaire included socio-economic data (data about sex, educational level, age and household income) and questions (open-
ended and multi-choice) about consumers’ attitude toward private and national brands. The research was conducted in the period of 15th of January to 15th of February 2017, and 80 respondents were approached. Keeping in mind that only 61 (76%) out of 80 respondents purchased and were interested in private brands, only these respondents were analyzed.

**Results and Discussion**

In Macedonia, there are many supermarkets that sell their own private brands. At the beginning of 2000s, many markets promoted their own brands. However, for the purpose of this paper, two markets were analyzed that sell national brands and private brands: Tinex and Zito. The selection of these two markets is made on the basis of their long-term experience, image and extensive coverage with stores across the country. Tinex sells its private brands under the name “Extra,” and Zito under the name “5-ka”. These retailers closely collaborate with a network of different manufacturers that produce the products for them.

Mainly, their private brands occurred in the following product categories: food products, dairy products, canned vegetables, cereals, dietary food and beverages, confectionery, sanitation items, personal hygiene products, pastry and bread, frozen foods, and fish. The distribution of the products is only within the retail chain.

<table>
<thead>
<tr>
<th>Product</th>
<th>Price per unit in Macedonian Denars</th>
<th>National Brand</th>
<th>Tinex - store brand</th>
<th>Zito - store brand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toilet paper, double layer 8/1</td>
<td>141.00</td>
<td>111.00</td>
<td>92.00</td>
<td></td>
</tr>
<tr>
<td>Liquid soap, 500 ml</td>
<td>135.00</td>
<td>82.00</td>
<td>50.00</td>
<td></td>
</tr>
<tr>
<td>Detergent, 1L</td>
<td>110.00</td>
<td>87.00</td>
<td>70.00</td>
<td></td>
</tr>
<tr>
<td>Softener 2L</td>
<td>249.00</td>
<td>182.00</td>
<td>180.00</td>
<td></td>
</tr>
<tr>
<td>Cow cheese 1 kg</td>
<td>269.00</td>
<td>233.00</td>
<td>223.00</td>
<td></td>
</tr>
<tr>
<td>Ketchup, 500 gr</td>
<td>56.00</td>
<td>55.00</td>
<td>45.00</td>
<td></td>
</tr>
<tr>
<td>Bread</td>
<td>38.00</td>
<td>25.00</td>
<td>22.00</td>
<td></td>
</tr>
<tr>
<td>Rice, 400 gr</td>
<td>70.00</td>
<td>67.00</td>
<td>66.00</td>
<td></td>
</tr>
<tr>
<td>Cooking chocolate, 200 gr</td>
<td>128.00</td>
<td>80.00</td>
<td>80.00</td>
<td></td>
</tr>
<tr>
<td>Sugar, 1 kg</td>
<td>60.00</td>
<td>59.00</td>
<td>59.00</td>
<td></td>
</tr>
<tr>
<td>Non-Carbonated Water, 1 L</td>
<td>40.00</td>
<td>22.00</td>
<td>18.00</td>
<td></td>
</tr>
<tr>
<td><strong>Total Sum</strong></td>
<td><strong>1296.00</strong></td>
<td><strong>1003.00</strong></td>
<td><strong>905.00</strong></td>
<td></td>
</tr>
</tbody>
</table>

Source: Author

The above table (Figure 2.) shows that the prices of private brands are lower than those of national brands, in some product categories even lower than 40%.

As already mentioned, out of total 80 respondents that were approached, only 61 responded affirmatively that they buy private brands, even if in only just one product category. 13 of the respondents were male (21%) and 48 female (79%). According to the education level, 8 respondents
(13%) had basic (elementary) education, 30 respondents (79%) had secondary education and 23 respondents (38%) were with higher education. In terms of age, 4 respondents (7%) were below 20 years, 18 (30%) were aged between 20-40 years and 39 respondents (63%) were over 40 years. Regarding household income, 48 respondents (79%) had a monthly income of 10,000 Macedonian Denars, 10 respondents (16%) had between 10,000 to 20,000 Macedonian Denars and 3 respondents (5%) had an income over 20,000 Denars.

According to these data, the average consumer profile that purchase private labels is a middle-aged woman (over 40), with secondary education, with low or average monthly income (socio-economic status).

On the question of what kind of private brands consumers buy frequently, they provided the following responses:

**Figure 3: Mostly purchased private brands**

<table>
<thead>
<tr>
<th>Percentage use of private brands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food products</td>
</tr>
<tr>
<td>Sanitary products</td>
</tr>
<tr>
<td>Bread and pastry</td>
</tr>
<tr>
<td>Personal hygiene products</td>
</tr>
<tr>
<td>Canned food</td>
</tr>
</tbody>
</table>

Source: Author

According to respondents, the price is the main criteria for buying private brands. On the question what are the most important characteristics of private brands they ranged them as follows:

- Price,
- Quality,
- Availability,
- Design and
- Packaging

The answers show that consumers buy private brands because of their reasonable and still lower price than national brands, their improved quality and availability. To them packaging is not so important.

The biggest disadvantages of the private brands were illustrated by the following statements (open questions were used):

- There is a need of greater availability of private brands in more markets,
- There is a need of greater investment in the quality of private brands,
- Markets should offer more promotional activities for private brands,
- Private brands should be included in other product categories, such as cheap jewelry, cosmetics, clothing, shoes, etc.
- There is a high risk and uncertainty related to the quality of products.

The consumers also buy national brands, especially when they need high quality-products and are willing to pay higher prices.

On the question of how they see the private brands in future, the respondents answered that they expected more private brands in different product categories in more markets. They believe that over time they will dominate the market with higher quality and reasonable prices.

**Conclusion**

There is no clear realistic scenario about the future of private brands. However, in recent years, private brands showed great achievement in particular product categories. Many experts believe that their growth will accelerate in the upcoming years. Private brands are expected to increase their market
share and become more pervasive in most product categories. They are becoming a greater competitive threat to national brands. Brand manufacturers can no longer ignore private brands. They need to change their strategies and offer the appropriate responses to private brands.

In some product categories, brand manufacturers can take opportunities to explore together with retail partners. Namely, the market situation is as follows: manufacturers of national brands are under pressure to cut prices, and retailers (producers of private brands) to raise the quality and intensely to invest in promotion, which will inevitably lead to an increase in their prices. This market situation will impose a need for cooperation between producers and traders. Each party should do what is doing the best way on the market, meaning that retailers have to focus on carrying out sales activities, and manufacturers on high quality and functionality of products. Only in this way, customer will get the best from the market.

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INNOVATIVENESS OF BELARUSIAN ECONOMY THROUGH THE PRISM OF ITS COMPETITIVE POSITION IN INTERNATIONAL TRADE

Krzysztof Falkowski

Abstract: The main purpose of this study is to answer the question of how innovative Belarusian economy is. Its innovativeness has been assessed through an in-depth analysis of Belarus’ position in international trade, especially in high- and medium-high-technology goods, on the back of the assumption that any competitive advantages possessed in them testify to the economy’s high innovativeness. The analysis of the dynamics of long-term revealed comparative advantages in Belarusian foreign trade by using Balassa’s RCA methodology and covering the years 2000-2014, has shown that the country was generally characterized by low innovativeness, as evidenced by the possession of such advantages only in trade in goods of relatively low technological intensity (medium-low technology). Meanwhile, in hi-tech goods (high and medium-high technology), Belarus did not have any (or only had relatively small) long-term revealed comparative advantages. Moreover, Belarus’ competitiveness in international trade deteriorated over that period, not only regarding high and medium-high technology goods but also in foreign trade overall. This seems to be, amongst others, the consequence of low efficiency of the country’s current innovation policy.

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Keywords: innovativeness, competitiveness, comparative advantages, international trade, Belarus

Introduction

In the contemporary time, amidst the advancement of globalization and internationalization of business activities on a global scale, it is becoming increasingly difficult to meet the growing competition in the international markets for goods and factors of production, which is one of the important reasons for the strong diversification of economic growth and development of individual countries in the twenty-first century (Hämäläinen, 2003). Experiences of many countries around the world, being a kind of empirical exemplification of a number of different theoretical concepts, indicate that today the most important factors of international competitiveness, as well as of the aforementioned economic growth, are – apart from wider institutional factors – human capital and essential innovations/innovativeness of the economy (Aghion & Howitt, 1992; Arrow, 1962; Atkinson & Ezell, 2012; Drucker, 1992; Lucas, 1988; Lundval, 1992; Romer, 1989).

For these reasons, it seems worthwhile to take a closer look at the competitiveness of Belarusian economy, being a consequence of its level of innovativeness, to answer the question how this largest European country without access to the sea, strongly associated with Russia and the post-Soviet economic area, manages to cope in an era of ever-fiercer international competition increasingly based on knowledge, modern technologies, and innovations. Another important reason for analyzing this issue is a striking shortage of research papers concerning Belarus and its economy in international economic literature, including also those covering research on the innovativeness and competitiveness of Belarusian economy.

In this article, an attempt has been made to assess the innovativeness of Belarus through the prism of the competitiveness of its economy in international trade, especially in technologically advanced goods. It is based on the core assumption that the possession of any long-term comparative advantages in international trade in the field of hi-tech goods (i.e. the goods of high and medium-high technology) directly testifies to the high innovativeness of the whole economy. Moreover, the strengthening of the existing comparative advantages or acquiring new ones with respect to these hi-tech goods, over time, is by definition evidence of effective innovation policy pursued by the country. To assess the level of Belarusian economy’s competitiveness, the method of analyzing revealed comparative advantages developed by B. Balassa is applied.

Based on the results of the analysis above, this study puts forth the thesis according to which, in the case of Belarus, the absence of any (or only relatively small) long-term competitive advantages in international trade in hi-tech goods demonstrates the low innovativeness of this country’s economy. Also, the low effectiveness of its innovation policy can be considered, which is particularly disadvantageous for its further economic growth and development.

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1 Warsaw School of Economics, Poland, kfalkow@sgh.waw.pl
Literature review

The state of research on the innovation of Belarusian economy and its competitiveness in the contemporary international trade, published in English and available to all those interested in this issue around the world, still leaves a lot to be desired. Regrettably, an almost complete lack of this kind of research papers and publications can be observed, even though both the country itself, as well as this issue, not only from an economic point of view, seem to be very relevant and exciting. A significant barrier to such research, especially the one survey-based one, is undoubtedly the availability and reliability of the necessary data. Also for this reason, amongst others, Belarus is not included in the most widely-known and popular publication concerning competitiveness, The Global Competitiveness Report, prepared annually by the World Economic Forum (Schwab, 2016).

About the competitiveness of Belarus, which is no doubt a direct consequence of its innovativeness, Dobrinsky et al. (2016) state that the two categories of goods in which Belarusian industry is most competitive globally are agricultural and food products, and chemicals. They go on to observe that although under the Eurasian Economic Union (EAEU) framework protectionist measures have been imposed and state interventions have been undertaken to support high value added sectors, the competitiveness of the relatively more advanced sectors has been in decline over the last decade. Thus, Belarus can serve as a counter-argument to the 'infant industry' argument, also as it is part of the EAEU which comprises countries facing similar development problems stemming from the insufficient modernization of their industries, as well as from weak infrastructure and institutions.

What's more, Freinkman, Bakanova, and Sidarenka (2010) also note that Belarus' comparative advantages have steadily weakened over the last several years. Based on the estimates of revealed comparative advantages (RCA), they observe that the country’s comparative advantages have changed from labour- and capital-intensive goods to natural resources and petroleum, which puts limits on creating jobs and improving productivity. Moreover, what has hardly changed is the so-called “export sophistication,” a feature of more developed countries which can export a wide variety of higher value goods. This would indicate, amongst others, that the shift has been towards goods with lower technological content. Alarminglly, Belarus also seems to be losing its share in markets with higher export sophistication (such as Russia). Similar conclusions were also reached by Falkowski (2013, 2016). Also, as noted by Dabrowski (2016), Belarusian enterprises are increasingly losing their competitiveness on the traditionally significant markets of Russia and other CIS countries. This, in turn, largely explains the gradually deteriorating overall competitive position of Belarus on international commodity markets (Havlík, Astrová, & Pindyuk, 2012).

The major challenges facing Belarusian economy, also in the context of the actual relatively low international competitiveness being a consequence of its relatively low innovativeness, are described by i.a. Bikar and Kmet’ko (2015), Egorov (2014), Shirow, Sabchishina and Potapenko (2016).

Research methodology and data

In the literature, a multitude of different methods for assessing the international competitiveness of economies is in use, both from their capacities as well as their innovation position. One of the methods of assessing innovativeness in an economy is to analyze the structure of its foreign trade, especially in goods of high technological intensity. It is also one of the methods applied to assess the innovativeness of economies in “Innovation Union Scoreboard” reports, commissioned by the European Commission. Among indicators used by authors of these reports are the shares of high-technology and medium-technology goods as well as of knowledge-based services in the export of the country (The European Union, 2014). A similar methodology of measuring innovativeness is also applied by creators of Global Innovation Index reports (Dutta, Lanvin, & Wunsch-Vincent, 2015).

In this study, however, to conduct an in-depth analysis of the innovativeness of Belarusian economy, the method of analyzing revealed comparative advantages (RCA) in international trade developed by Balassa (1965, 1989) has been applied; specifically, the study uses Balassa’s original logarithmic formula of:

\[ RCA_i = \ln \left( \frac{x_{ij}}{x_j} \times \frac{x_i}{X} \right) \]

where:
RCA$_i$ – the revealed comparative advantages index of the given country in the $i$ goods category

$X_{ij}$ – exports of the $i$ goods category from the given country to the $j$ country or category of $j$ countries

$X_j$ – total exports from the given country to the $j$ country or category of $j$ countries

$X_i$ – global total exports of the $i$ goods category

$X$ – global total exports

The logarithmic form of the formula ensures the symmetry of both positive and negative values of the RCA$_i$ index in the region around 0, which facilitates their interpretation (Vollrath, 1991). If RCA$_i$ > 0, then the country enjoys a revealed comparative advantage in trading goods from the given category and the value of the index indicates the degree of such an advantage. On the contrary, if RCA$_i$ < 0, then no such revealed comparative advantage, to a higher or lower degree, exists.

In order to identify potential long-term comparative advantages in foreign trade of Belarus, especially in the field of hi-tech goods (i.e. the goods of high and medium-high technology), as it is their occurrence and intensity which should be regarded as a kind of acid test for innovativeness of the economy, the entire commodity structure of foreign trade of Belarus in the years 2000-2014 is analysed herein below. Also, the analyzed goods have been broken down into four basic categories according to the OECD classification based on their technology intensity, namely into the goods of high, medium-high, medium-low and low technology (Hatzichronoglou, 1997; Organization for Economic Co-operation and Development, 2011). Such methodological approach makes it possible to formulate certain conclusions about the innovativeness of Belarusian economy in the contemporary global economy. All data used for the analysis are derived from the United Nations Commodity Trade Statistics Database.

**Empirical research results**

When analyzing the development of long-term revealed comparative advantages (RCA) in the foreign trade of Belarus in the years 2000-2014, taking into account the aforementioned OECD classification of goods based on their technological intensity, it must first be very clearly emphasized that throughout the analyzed period the country had the greatest comparative advantages in trade in the medium-low technology category (see Figure 1). However, what can be noted is that starting from 2009 on these benefits began to diminish. On the other hand, in the case of the low- and medium-high-technology categories, Belarus had certain, admittedly relatively low, but still present, comparative advantages throughout the entire analyzed period. However, in the last two years covered by the analysis, that is 2013-2014, a gradual deterioration became noticeable about the medium-high-technology category, leading to the loss of these advantages.

*Figure 1: Dynamics of Revealed Comparative Advantages (RCA) in international trade of Belarus in the years 2000-2014 according to the OECD classification of manufacturing industries based on their technology intensity*

<table>
<thead>
<tr>
<th>Year</th>
<th>HT</th>
<th>MHT</th>
<th>MLT</th>
<th>LT</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>1.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2002</td>
<td>0.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2003</td>
<td>0.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>-0.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>-1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>-1.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>-2.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td>-2.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>-3.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>-2.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2011</td>
<td>-2.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td>-1.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td>-1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2014</td>
<td>-0.5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Author
On the other hand, concerning the hi-tech goods, especially significant from innovativeness of any economy, as they come from industries intensively using common factors of production and characterized by a high level of innovation, the situation in Belarus has for years been dramatic. Not only did Belarus not have any comparative advantages in the period 2000-2014 years in this category, but the competitiveness of Belarusian goods from this category in total has deteriorated.

Secondly, because, as indicated above, particular attention in the context of innovation of Belarusian economy should be paid to its competitiveness regarding two categories, i.e., the high- and medium-high-technology categories. Figure 2 shows the dynamics of RCA indices for Belarus in these two categories in the years 2000-2014.

According to the OECD classification, the category of high-technology goods includes the following five subcategories of goods: aircraft and spacecraft; medical, precision and optical instruments; office, accounting, and computing machinery; pharmaceuticals; radio, TV, and communications equipment.

The analysis of the data presented in Figure 2, concerning the competitiveness of Belarusian economy in the international trade and individual subcategories of goods within the high-technology category according to the OECD classification, in the years 2000-2014, has revealed that Belarus did not have any comparative advantage (RCA values < 0) in any of them. By far the most uncompetitive in the international arena was Belarus traditionally in the aircraft and spacecraft subcategory (the lowest values of RCA recorded throughout the entire analyzed period, with a negative trend).

Among all subcategories of goods within the high-technology category, regarding its international competitiveness, as measured by the RCA index, Belarus fares relatively the best in the medical, precision and optical instruments subcategory. However, even for this subcategory overall, the RCA is negative, which indicates that Belarusian economy does not have any comparative advantages in international trade in this subcategory either. Nevertheless, the relatively best situation in respect of the remaining subcategories is the consequence of the fact that if we look deeper into the structure of Belarusian goods trade at the level of individual, specific categories of goods, and specific values of the RCA index, it turns out that it is in this very subcategory, i.e., medical, precision and optical instruments, that Belarus has the highest comparative advantages out of all hi-tech goods (Table 1). It is, therefore, a kind of Belarusian export specialization.

The second category of goods, which from the point of view of the innovativeness of Belarusian economy should be assessed, is the category of medium-high-technology goods, according to the OECD classification which includes the following five subcategories: chemicals excluding...
pharmaceuticals; electrical machinery and apparatus, n.e.c.; machinery and equipment, n.e.c.; motor vehicles, trailers and semi-trailers; railroad equipment and transport equipment, n.e.c.

Table 1: High-technology goods with respect to which Belarus recorded the highest comparative advantages (the highest RCA) in 2014

<table>
<thead>
<tr>
<th>No.</th>
<th>Category</th>
<th>Name</th>
<th>Value of the RCA index</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>HT</td>
<td>Telescopes for arms/other equipment, periscopes</td>
<td>3.02</td>
</tr>
<tr>
<td>2.</td>
<td>HT</td>
<td>Monoculars, telescopes, etc</td>
<td>3.00</td>
</tr>
<tr>
<td>3.</td>
<td>HT</td>
<td>Gas supply/production/calibration meters</td>
<td>1.75</td>
</tr>
<tr>
<td>4.</td>
<td>HT</td>
<td>Parts and accessories for binoculars, telescopes, etc</td>
<td>1.50</td>
</tr>
<tr>
<td>5.</td>
<td>HT</td>
<td>Instruments to measure or detect ionizing radiations</td>
<td>1.48</td>
</tr>
<tr>
<td>6.</td>
<td>HT</td>
<td>Binoculars</td>
<td>1.25</td>
</tr>
<tr>
<td>7.</td>
<td>HT</td>
<td>Parts and accessories of optical appliances nes</td>
<td>1.17</td>
</tr>
<tr>
<td>8.</td>
<td>HT</td>
<td>Parts and accessories for optical microscopes</td>
<td>1.10</td>
</tr>
<tr>
<td>9.</td>
<td>HT</td>
<td>Non-medical X-ray equipment</td>
<td>1.06</td>
</tr>
<tr>
<td>10.</td>
<td>HT</td>
<td>Spectacle lenses of glass</td>
<td>0.45</td>
</tr>
</tbody>
</table>

Source: Author

International competitiveness of Belarus in the subcategories mentioned above within the category of medium-high-technology goods is very differentiated (Figure 3). Belarus has by far the strongest comparative advantages in this category with respect to chemicals excluding pharmaceuticals. What’s more, also in the subcategory of machinery and equipment, n.e.c. Belarus showed a certain level of international competitiveness, although over the years 2000-2014 the RCA index for this subcategory of goods was getting lower year by year, and in the years 2011-2012 and in 2014 was even negative. This, sadly, demonstrates the worsening competitive position of Belarusian economy in this area.

Figure 3: Dynamics of Revealed Comparative Advantages (RCA) in international trade of Belarus with respect to goods from the medium-high-technology category in the years 2000-2014

Source: Author

On the other end of the scale, the lowest competitiveness in international trade (the lowest value of the RCA indices) characterizes Belarus in the subcategories: electrical machinery and apparatus, n.e.c. and railroad equipment and transport equipment, n.e.c. In the case of the latter subcategory, a dramatic decline in the competitiveness of Belarusian economy occurred in the years 2002-2010. Even though in 2011-2013 some improvement was observed in this area, Belarus still did not record any comparative advantages, which proves that Belarusian railroad and transport equipment was not competitive in the international trade over the entire period.
Table 2 below, in turn, presents the most internationally competitive Belarusian goods from the medium-high-technology category (with the highest values of the RCA index). It turns out that 6 out of 10 most competitive Belarusian goods from this category are from the subcategory of chemicals excluding pharmaceuticals.

<table>
<thead>
<tr>
<th>No.</th>
<th>Category</th>
<th>Name</th>
<th>Value of the RCA index</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>MHT</td>
<td>Threshing machinery, n.e.c.</td>
<td>5.39</td>
</tr>
<tr>
<td>2.</td>
<td>MHT</td>
<td>Potassium chloride, in packs &gt;10 kg</td>
<td>4.71</td>
</tr>
<tr>
<td>3.</td>
<td>MHT</td>
<td>Anti-knock preparations, except lead compounds</td>
<td>4.55</td>
</tr>
<tr>
<td>4.</td>
<td>MHT</td>
<td>Oil additives n.e.c., oxidation, corrosion, gum inhibitor</td>
<td>3.92</td>
</tr>
<tr>
<td>5.</td>
<td>MHT</td>
<td>Filament tow of acrylic or modacrylic</td>
<td>3.89</td>
</tr>
<tr>
<td>6.</td>
<td>MHT</td>
<td>Milling machines, knee-type n.e.c. for removing metal</td>
<td>3.53</td>
</tr>
<tr>
<td>7.</td>
<td>MHT</td>
<td>Diesel powered trucks weighing &gt; 20 tonnes</td>
<td>3.20</td>
</tr>
<tr>
<td>8.</td>
<td>MHT</td>
<td>Liquid dielectric transformers &lt; 650 KVA</td>
<td>3.05</td>
</tr>
<tr>
<td>9.</td>
<td>MHT</td>
<td>Urea-ammonium nitrate mixes in solution, pack &gt; 10 kg</td>
<td>2.98</td>
</tr>
<tr>
<td>10.</td>
<td>MHT</td>
<td>Hydrazine and hydroxylamine, inorganic salts</td>
<td>2.93</td>
</tr>
</tbody>
</table>

Source: Author

Therefore, it is no surprise that it is in this subcategory that Belarus has traditionally been most competitive. Among the goods with the highest values of the RCA index in 2014 were also, amongst others, threshing machinery and milling machines, knee-type n.e.c. for removing metal from the machinery and equipment, n.e.c. subcategory.

Conclusions

The subject-matter of this study was an in-depth analysis of the international competitiveness of Belarus, with respect to the categories of goods of high and medium-high technology, conducted to assess the country’s innovativeness and the effectiveness of its innovation policy.

The snapshot analysis, based on the assumption that the gauge of the innovativeness of Belarusian economy is its competitive position in international trade, has revealed that in the analyzed period of 2000-2014 Belarus was characterized by low innovativeness, as evidenced by a general lack of comparative advantages in the high-technology category overall. The situation was better in the case of goods from the medium-high technology category overall as Belarus did periodically possess some, although not high, comparative advantages in this regard. Of course, this does not mean that Belarus is not competitive in international trade concerning some goods from the high-technology or medium-high-technology category (according to the OECD classification), although such cases in the Belarusian foreign trade are sporadic. However, Belarus can compete internationally in respect of relatively low-tech (medium-low technology), low value-added, capital-intensive goods, coming basically from industries employing semi-skilled workers.

On the other hand, if we look at the results of the studies dynamically, i.e. analyzing the development of the RCA indices in the category of high- and medium-high-technology goods throughout the whole period of 2000-2014, as well as looking at the entire structure of Belarusian foreign trade (according to the OECD classification of goods based on their technological intensity), it turns out that generally Belarus’ competitiveness deteriorated over that entire period. What are the reasons? Firstly, it is down to the low effectiveness of the innovation policy current pursued by Belarus, which is a direct consequence of, amongst others, the country’s highly dysfunctional National Innovation System, its inability to use its relatively well-educated human resources in a pro-innovative way, low innovation awareness of Belarusian enterprises and the actual lack of policies supporting private innovation projects and start-ups. It is also the result of some serious structural weaknesses of the country’s economic and socio-political system, which adversely affects its international investment attractiveness, and thus the possibility of improving the relatively low endogenous innovation capacity of Belarusian economy through know-how coming with foreign direct investments, as well as the efficiency of the entire economy. Secondly, the declining competitiveness of Belarus in international...
trade in goods of high technological intensity identified in this article is, to a large extent, also the effect of the increasing importance attributed to knowledge, technology, innovation, and consequently innovativeness in a growing number of countries of the contemporary globalized and dynamically changing world, in which high- and medium-high-technology goods are becoming more and more important. Thus, without implementing a feasible and consistent innovation policy, in the long run, Belarus will not be able to keep even these comparative advantages which it currently holds.

Based on the results of the analysis of Belarusian economy’s competitiveness in international trade as evidenced by the presence of comparative advantages in the most innovative categories of goods, i.e. high-technology and medium-high-technology, the following general recommendations for Belarus can be formulated: 1) the country’s pro-innovation potential should be used more pragmatically, especially in order to maintain the existing competitive advantages in the category of medium-low-technology goods, as well as to achieve sustainable advantages in international trade in medium-high-technology and low-technology goods; 2) institutional conditions for doing business should be improved in order to effectively attract high-tech foreign investment creating spillover effects and increasing the innovativeness of Belarusian economy, which could translate into obtaining some competitive advantages in hi-tech goods; 3) workable innovation policy should be consistently implemented aimed to foster effective cooperation of state institutions, research centres and enterprises for the creation and commercialization of technologically advanced solutions. What’s more, it seems that the effective execution of these recommendations will not be possible without the greater openness of Belarusian economy onto the world and without implementing structural economic reforms aimed to build a knowledge-based market economy. Undoubtedly, this will be a major challenge for Belarusian authorities; however, rising to it seems necessary in the rapidly growing, increasingly globalized world economy.

References


ONLINE RECOMMENDATION SYSTEMS’ USAGE BY COMPANIES IN BALTIC COUNTRIES

Elina Gaitniece

Abstract: Global retailers are using sophisticated online recommendation systems (ORS) which enhance customers' loyalty towards the specific site. Online markets in Baltic countries are growing fast, but Baltic e-commerce sites are not using a wide enough range of eWOM tools. The aim of this paper is – to evaluate how eWOM through ORS is perceived and used by digital marketing specialists and e-commerce players in the Baltics. Research methods used were: literature analysis on ORS's influence on consumer purchase decisions, and an expert survey and monitoring study. The research results revealed major barriers for advanced ORS usage in the Baltics, as they discovered a gap between experts' opinion and the current reality in the Baltics. The article provides recommendations to online retailers in the Baltics on improvements that are needed.

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UDC Classification: 658.8
Keywords: recommendation system, eWOM, Baltic countries

Introduction

The fast development of digital media during the last decades provides consumers a wide choice of opinions originating from many diverse sources. Today consumers are not only consumers, they are also producers of new information online (Flanagin & Metzger, 2013). Word of mouth communication, in general, has been recognized as an important influencer for consumers' purchasing decisions, and is thought to influence 20-50% of all purchasing decisions (Berger, 2013) (Strauss & Frost, 2014). Recent research shows that the influence of eWOM is growing hand in hand with the growth of a range of different communication channels and tools (Oestreich-Singer & Sundararajan, 2012). From the range of eWOM tools, one type are online recommendation systems (ORS), whose systems can be very basic or highly advanced. Pine (1995) states that ORS are a critical factor increasing consumer’s loyalty towards the specific e-retail site. And it is also known that one of the main sources of eWOM communication is online reviews which have become an important tool of marketing communication due to the fact that many consumers search online reviews before making their purchase (Park & Lee, 2009) (Chatterjee, 2001). But online retailers in the Baltics are only utilising the potential of ORS in very small extent. This is because of the prevailing opinion that consumers in the Baltics only tend to leave negative reviews.

But, the specifics of the online market is that borders are open, global players are stepping in and competing along with local retailers. All while, effectively working ORS systems which help a consumer to make the right decision, might become a competitive disadvantage for online shops which are not yet using them.

Due to this, the aim of this paper was – to evaluate how eWOM through ORS is perceived and used by digital marketing specialists and e-commerce players in the Baltics. To reach the aim, some tasks were defined: 1) to check previous studies on ORS influence to purchase journey; 2) to interview digital marketing experts and e-commerce players; 3) to prepare recommendations for ORS usage in the Baltics.

Literature review

As defined by Burrow (2012) WOM is sharing of information between consumers through different communication tools, frequently also called “storytelling”. In the past, oral communication was almost the only way how to transfer information, but after the invention of writing and other communication tools, WOM processes have become more advanced, and hence it is not anymore linked so much with the “mouth” part of equitation (Burrow & Fowler, 2012).

The power of WOM has already been recognized long ago in the marketing world. As Berger stated WOM is the primary factor in 20-50% of all purchase decisions (Berger, 2013) and is already a multi-billion dollar industry by itself. But today's consumers are sharing their opinions with more than just

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1 Faculty of Business, University of Latvia, elina.gaitniece@gmail.com
their friends and family; consumers can learn from complete strangers who shared their opinion in the digital environment. This is frequently referred as eWOM.

When a consumer wants to get an info about some product – he can “Google it”, post a question on a social network site, read online customer reviews or do other online activities which will provide a wide range of “consumer experiences” in the form of eWOM (Kaufman & Horton, 2015). eWOM encompasses a wide range of different forms and technologies (e.g., blogs, tweets, and shopping bots) of which online reviews are the most accessible and most frequently used (Thurau et al., 2004).

Online customer reviews are an important source of product information, and consumers rely on these reviews to infer product quality and to make purchase decisions. The influence of online customer reviews compels online retailers to use review systems that allow purchasers of the product to share their experiences with others by posting product reviews on the website (Pang & Qiu, 2016). Online ratings are a quantitative summary of experiences, attitudes, and opinions usually expressed as stars or points whereas, reviews are open-ended, user-generated text messages about a product or service. The two forms can occur separately or in combination. The most prominent example of online ratings and online reviews is that by online retailer Amazon.com. (Floh et al., 2013). Gathering knowledge about online consumers is becoming a critical success factor for businesses and online recommendation systems are one of a large range of tools to do so (Liao & Chang, 2016).

An experiment done by Senecal and Nantel showed that ORS have a strong influence not only on loyalty but also on consumers’ purchasing decisions. Results showed that subjects who viewed product recommendations selected recommended products twice as often as subjects who did not consult recommendations. The experiment also showed that an online recommendation source in the form of a “recommender system” was more influential than traditional recommendation sources even when perceived as possessing less expertise than human experts and as being less trustworthy than other consumers (Senecal & Nantel, 2004).

Schafer et al. (1999) worked out a classification system for ORS, which divided ORS into four major groups – non-personalized; attribute based; item-to-item correlation based, and people-to-people correlation based. Systems are measured and compared by two dimensions level of automation and the level of persistence in the recommendations as visible in Figure 1.

Figure 1: Recommendation Taxonomy

![Recommendation Taxonomy Diagram](image)

Source: Author

The most simple form is non-personalized ORS – this just takes into account feedback received from other customers, and where everybody gets the same offer. The next level, – attribute based ORS makes choices based on attributes searched by a particular customer and analyses syntactic properties of products to offer. The next level of ORS (item-to-item correlation ORS) takes into account customer’s behavior during his previous visits. And the most sophisticated level is people-to-people correlation ORS which seeks correlation between habits of different customers (Schafer, Konstan, & Riedl, 1999). According to Oestreicher et al., (2012) people-to-people correlation ORS is very effective and triples purchases of complimentary products. Also, Senecal and Nantel (2004) proved with an experiment that ORS influences a lot of consumers purchasing intentions – consumers who
were reading recommendations purchased recommended products twice as often as those who did not read recommendations. It also showed that ORS systems were more influential than human advisors.

**Data and methodology**

A survey of 53 digital marketing specialists in the Baltics was carried out during February and May 2016, and further on followed up by a monitoring study. The author used a purposive nonprobability sampling method and selected digital marketing specialists by using a range of professional contacts. The group included e-commerce owners and digital marketing specialists. Twenty-seven e-commerce owners representing all three Baltic countries got an invite to participate in the survey, sixteen of them provided answers. The group of digital marketing specialists was smaller, twenty-six specialists from the Baltics were invited to participate and thirteen provided their opinion. Latvia was represented by fifteen responses, Lithuania – by ten and Estonia – by only four. Due to the small number of responses gathered on country by country level – all conclusions were done only on a Baltic level and hence there was no possibility to compare responses between countries. Further on, 15 e-commerce retailers in the Baltics were monitored and their usage of ORS was evaluated using Schafer’s classification.

**Results and Discussion**

Survey results revealed that specialists in the Baltics recognize the impact of ORS – highest scores were given to the basic level of ORS “consumer reviews and ratings” – sixty-six percent of specialists rated them as “high” or “very high” influencers of consumers’ decision making about the purchase.

As Figure 2 shows ORS “frequently bought together” was evaluated as high or very high influencer by 45% of surveyed specialists. The most sophisticated ORS has the highest influence on consumer decision if compared with another advanced ORS “consumers who bought this item also bought…” was recognized as important influencer only by forty-one percent of specialists.

**Figure 2: Digital marketing specialist opinion about online recommendation systems influence**

<table>
<thead>
<tr>
<th>Influence Level</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No influence</td>
<td></td>
</tr>
<tr>
<td>Low influence</td>
<td></td>
</tr>
<tr>
<td>Average influence</td>
<td></td>
</tr>
<tr>
<td>High influence</td>
<td></td>
</tr>
<tr>
<td>Very high influence</td>
<td></td>
</tr>
</tbody>
</table>

Source: Author

An important barrier to starting using sophisticated ORS was the recognized value of needed investments and also the availability of good and qualified specialists. As Figure 3 shows other
obstacles got much lower scores. Additionally, it was mentioned by respondents that management attitude plays an important role in decision to go for advanced ORS in an e-shop. The previous assumption of the restrictive factor that the perception about consumers leaving mostly negative reviews was not proven, as only twenty-four percent of specialists mentioned this as an obstacle. It is also worth to mention that the majority of specialists recognize that competitors – mostly global online players are already using quite sophisticated ORS. Additionally, monitoring studies covering both pure player and “brick&click” channel e-commerce players revealed that there exist even retailers who do not use any ORS, whereas the majority uses only one type of ORS (usually the basic one) and there is no online retailer who would use more than 2 types of online recommendation systems. The most popular system was the attribute based online recommendations system as it was used by 47% of online shops monitored. The author also recognized that this study might produce different results if some specific product group would be selected and that the results might also change over the time. Still, it was recognized that online recommendation system usage level in the Baltics seriously lacks behind from the level reached by global e-commerce players.

**Conclusion**

The study revealed that previous research in the field confirms that eWOM through different online recommendation systems is an important influencer to the consumer during his decision journey – particularly on the alternative evaluation phase – which brand and product to choose from several options, and also on the purchase phase – widening range of considered alternatives and possibly enlarging purchase basket. The survey results also confirm that online marketing specialists in the Baltics recognize the importance of ORS, it did not confirmed the previous assumption that ORS in the Baltics are not used due to expected negative reviews from consumers. Instead there were several other factors mentioned as barriers to using advanced ORS in e-commerce sites in the Baltics. Most relevant barriers – value of needed investment and availability of qualified specialists. Because of this, the usage of ORS in local online shops is very limited. Therefore, the author suggests to online retailers who are competing in the Baltic market, side by side with global players, to start using the most advanced ORS to keep their customer loyalty and not to lose momentum when first time users make their first purchases and get used to certain helping tools which guide them through their purchase decision journey. This study will be continued by a wide consumer survey which will identify factors which consumers find relevant in influencing them in online recommendation systems.

**References**


TECHNIQUES AND ANALYSIS OF MANAGEMENT AUDITS

Peter Gallo,1 Romana Pichová,2 Anna Šenková,3 Daniela Matušíková,4 Jana Mitriková5

Abstract: The proper management of an enterprise involves a set of complex activities that, in the current rapidly changing world, require adoption of modern market requirements. This paper describes a study concerning management audits. The study aims to identify and evaluate the specific techniques that are useful for obtaining information for audits in evaluating management, and examines modifications and applications of the model by McKinsey, ‘model 7S’, with an ‘IFE Matrix’. As practice shows, until now, the ‘model 7S’ approach is the most frequently used tool to assess the current state of management executives in business. The proposed models in the paper’s conclusion can be used individually or by combining two separate models to create a ‘two-staged adaptive model 7S’.

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Keyword: management audit, model 7S, Adaptation model 7S, effectiveness, efficiency

Introduction

The main goal of most enterprises is continued improvement of their management system, which requires, in particular, an understanding of the current state regarding its strengths, and weaknesses, and a proposal to improve or overhaul the system where needed. The management of the company must first approve the audit of the management system in their company as a prime activity.

Many authors have defined the requirements of a management audit. For example, Law (2009) defines a management audit as an independent review of corporate governance, which is executed by professional management consultants, specializing solely in this type of review.

According to the authors, Wheelen and Hunger (2012), a management audit can be described as an analysis of business management with the audit compiling a list of questions from various areas of management and areas that affect management with the aim of receiving objective and honest responses.

The simplest definition of a management audit is given by David (2011), who characterized management audit as a gathering and evaluation of information about management activities within the company.

As the above characteristics indicate, a management audit is a special type of business management support, not a supervisory authority that only searches for errors and weaknesses. A management audit serves managers or management leaders as an administration tool since it has to provide impartial information about management systems used in the enterprise (Spencer, 2011).

All activities implemented in the management audit are performed by specialized personnel, who must not only know the theory and principles of corporate planning, organization, and management, but also business practices (Kotler, 2013).

According to Trunečka (2004), a management audit aims to identify and assess the current state of corporate governance, i.e. to identify and characterize problems in the company that prevent effective management.

Other management techniques, such as controlling, benchmarking, and internal analysis methods, are also used to assess the current stage of management. Examples given by Gallo (2013) include a Balanced Scorecard; a Space Analysis; the Strengths, Weaknesses, Opportunities, and Threats (SWOT)6 analysis; Internal Factor Evaluation (IFE) matrix of business processes; and an analysis of the key factors based on the model 7S proposed by McKinsey (Schawel, Billig, 2012). This paper

1 Faculty of management, Prešov University, Slovakia, peter.gallo@unipo.sk
2 Faculty of Management, Prešov University, romca.pichova@gmail.com
3 Faculty of Management, Prešov University, anna.senkova@unipo.sk
4 Faculty of Management, Prešov University, daniela.matusikova@unipo.sk
5 Faculty of Management, Prešov University, jana.mitrikova@unipo.sk
describes a modified version of the ‘7S Model’ proposed by McKinsey (McDonald, D. 2014) and its application as a tool to assess the current state of management within the business.

### Table 1: Adaptation of 7S Model

<table>
<thead>
<tr>
<th>Factors</th>
<th>Evaluation indicators</th>
<th>Evaluation parameters</th>
<th>Overall rating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1. Efficiency (max. 5)</td>
<td>2. Effectiveness (max. 5)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0 – 5</td>
<td>0 – 5</td>
</tr>
<tr>
<td><strong>Structure</strong></td>
<td>Flexibility; Centralization - Decentralization of cognizance; Levels and range of management; Corporate bonds and relationships</td>
<td>entry points of the evaluation questions - area structure</td>
<td>entry points of the evaluation questions - area structure</td>
</tr>
<tr>
<td><strong>Systems</strong></td>
<td>Communication system; System of utilization of enterprise resources; system of used management methods and techniques; adaptation to the enterprise</td>
<td>entry points of the evaluation questions - area systems</td>
<td>entry points of the evaluation questions - area systems</td>
</tr>
<tr>
<td><strong>Management style</strong></td>
<td>Appropriateness; Flexibility; Limitation of Liability of managers; Use of Managers’ power</td>
<td>entry points of the evaluation questions - area management style</td>
<td>entry points of the evaluation questions - area management style</td>
</tr>
<tr>
<td><strong>Group</strong></td>
<td>Qualifications and education (training) of employees; Work environment and relationships in the workplace; Motivation and stimulation of employees; Evaluating and rewarding of employees</td>
<td>entry points of the evaluation questions - area groups</td>
<td>entry points of the evaluation questions - area groups</td>
</tr>
<tr>
<td><strong>Skills</strong></td>
<td>Ability to plan; Ability to organize; Ability to manage; Ability to control</td>
<td>entry points of the evaluation questions - area skills</td>
<td>entry points of the evaluation questions - area skills</td>
</tr>
<tr>
<td><strong>Strategy</strong></td>
<td>Appropriateness; Intelligibility and clarity; Acceptability and feasibility; Backlogs in shorter-term methods</td>
<td>entry points of the evaluation questions - area strategy</td>
<td>entry points of the evaluation questions - area strategy</td>
</tr>
<tr>
<td><strong>Shared values</strong></td>
<td>Aims; Vision; Mission; Role</td>
<td>entry points of the evaluation questions - area of shared values</td>
<td>entry points of the evaluation questions - area of shared values</td>
</tr>
</tbody>
</table>

Source: Authors

---

7 Efficiency signifies a level of performance that describes a process that uses the lowest amount of inputs to create the greatest amount of outputs.

8 The degree to which something is successful in producing a desired result; success.
An important characteristic of a management audit is that, it does not have fixed or mandatory procedures or standards. While these are controls that an auditor could use, a management audit has a creative form (Kumar & Sharma, 2015).

The function of a management audit in the company itself does not need to be established but can be secured from external sources by outsourcing the management audit. Managers or the company management leaders must assess and choose the form of management audit needed (Montana & Charny, 2008).

Table 2: Evaluation of scoring range

<table>
<thead>
<tr>
<th>Factors</th>
<th>Evaluation questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structure</td>
<td>Is organizational structure of the enterprise flexible? Is the number of degrees of management corresponding to the specifics of the enterprise? Are there in the enterprise defined relations of subordination and superiority? Is it set the degree of centralization or decentralization of powers to subordinates enough? Is the number of subordinate employees to individual managers optimum? Is it conveniently used a range of enterprise management?</td>
</tr>
<tr>
<td>Systems</td>
<td>Are there used appropriate methods and techniques of communication in the business? Is it used in the optimal enterprise combination of business resources? Are there used appropriate and modern management methods and techniques in the business? Can enterprise correctly respond to changes in its corporate neighborhood? Are there used appropriate information systems in the enterprise?</td>
</tr>
<tr>
<td>Management style</td>
<td>Do the managers use the appropriate leadership style to subordinates in the enterprise? Do the managers adapt their management style in the company according to the current situation in the company? Is there clearly defined the responsibility of managers and their subordinates in the company? Do the managers use the possibility of delegating powers to subordinates, so they do not abuse their power of supervisor? Is teamwork the used?</td>
</tr>
<tr>
<td>Group</td>
<td>Does the enterprise have optimal - sufficient number of staff? Is qualification of employees optimal to perform their job responsibilities? Do the workers have the opportunity for career growth and progress? Are the job descriptions of individual employees defined (including the definition of their responsibilities)? Do the managers use appropriate style and way of motivation and evaluation of subordinates?</td>
</tr>
<tr>
<td>Skills</td>
<td>Can managers (at all hierarchical levels) independently plan, organize, manage and control? Can managers (at all hierarchical levels) build plans so that they complement each other and follow up on? Can managers and their subordinate staff employ a self-management method? Do the managers (at all hierarchical levels) use the control of the management and control feedback? Is the ability of managers and their subordinate staff enough for their job performance?</td>
</tr>
<tr>
<td>Strategy</td>
<td>Does the enterprise have properly and clearly articulated corporate strategy? Is the corporate strategy sufficiently and appropriately developed in shorter-term policies and activities? Does the enterprise have a business concept, how to reach the set strategy most easily and implement it? Does the enterprise have appropriately formulated and set its business objectives and elaborated the concept of how to achieve business goals? Are there developed business objectives, vision, and strategy realistic and feasible?</td>
</tr>
<tr>
<td>Shared values</td>
<td>Are the managers and their subordinate workers familiar enough with the policy, objectives, vision, mission, mission, and strategy of the company? Are managers and their subordinate staff adequately and timely informed about events in the company? Do the managers and their subordinate staff act in accordance with the established values and objectives of the company? Are there clear delimited competencies of all workers in the company and the workers know each other? Has the enterprise formed its corporate culture with which all employees are aware of?</td>
</tr>
</tbody>
</table>

Source: Authors
Data and Methodology

The 7S Model was modified based on responses from structured interviews with experts in the field of auditing with a specific focus on issues of management audits and of managers who personally processed management auditing in their companies. The research was conducted in the Czech Republic, 2015 – 2016, and was centered on small- and medium-sized enterprises (employing 11–250 employees). From the possible internal analyses of management audits, the 7S Model, IFE matrix, and SWOT analysis were the most convenient and most preferred methods of the respondents and hence considered the best methods to assess the current state of corporate governance.

The 7S Model was selected as a basis for a new evaluation model (Adaptation of 7S Model) of the present state of management from the above methods. The reason for choosing this approach was that it not only is used as the main tool for internal analysis of the company, but it simultaneously analyzes the influence of elements of greatest importance in business management.

The overall assessment of the current state of business management was based on point. The scale in the evaluation parameters of the individual evaluation factors was chosen according to the choice of Likert five-point scale.

Results and Discussion

The application of an ‘Adaptation of 7S Model’ involved separate factors (Table 1), emphasizing consistency and harmony. Among such factors in the ‘Adaptation of 7S Model’ were structure, systems, style, group skills, strategy, and shared values, that were contained in the original model. Furthermore, certain factors involved evaluation indicators as well as a set evaluation parameter.

Evaluation indicators were assigned based on the results of respondent surveys. The requirement of respondents was to assign a maximum of four evaluation indicators for each factor. The evaluation questions were prepared, based on the results of interviews with managers within the companies.

The evaluation parameters were chosen for efficiency and effectiveness, based on the work of the renowned management consultant, Drucker (1974), who considered any management activity to be viewed from these perspectives with effectiveness meaning performing requirements successful and efficiently means performing requirements successfully, in a way to avoid waste.

Evaluation questions were drawn for each factor to correspond to the evaluation indicator of each. The number of selected and assigned questions for every factor was five, and hence, five was the maximum score for each. The compiled questions are shown in Table 2.

The principle of the current state of governance evaluation based on the above model in Table 1 consisted of assessing replies to the set questions in Table 2 in terms of efficiency and effectiveness. Questions were constructed so that the answer was either yes or no. This evaluation system is shown in Figure 1.

<table>
<thead>
<tr>
<th>Figure 1: Evaluation system</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCORE</td>
</tr>
<tr>
<td>effectiveness</td>
</tr>
<tr>
<td>YES 1 b</td>
</tr>
<tr>
<td>efficiency</td>
</tr>
<tr>
<td>YES 1 b</td>
</tr>
<tr>
<td>NO 0 b</td>
</tr>
<tr>
<td>NO 0 b</td>
</tr>
<tr>
<td>Source: Authors</td>
</tr>
</tbody>
</table>

The principle of assessing the current state of management, corresponding to Figure 1, is as follows:

The system for evaluating the answers to the questions in Table 2 in terms of efficiency and effectiveness. The answer could be yes or no.
1. Setting of evaluation questions for each factor listed in Table 2
2. Obtaining answers to these set questions, first in terms of effectiveness, where
   a. Zero is assigned to a negative answer regarding the effectiveness and also means a
      negative response to the question relating to efficiency, which thus scores a zero
      (when the activity in the enterprise is not provided, it is not able to be evaluated).
   b. One is assigned to a positive answer regarding effectiveness and means that the
      company carries out the activity and can further proceed to evaluate the response to
      the question in terms of efficiency.
3. Answers to these set questions for efficiency, where
   a. Zero is assigned to a negative answer regarding efficiency, where the company carries
      out the activity effectively, but inefficiently.
   b. One is assigned to a positive answer to the question from the perspective of efficiency
      and means that the company carries out the activity effectively and efficiently.
4. The total assessment is a simple sum of points with a maximum of 10 points for each
   evaluated factor. The ranges of evaluation points achieved are shown in Table 3.

For ease of quantitation, the evaluation questions were the same for effectiveness and efficiency.

<table>
<thead>
<tr>
<th>Evaluations of Adaptation of 7 S Model</th>
<th>Level of Effectiveness and Efficiency</th>
<th>Total point (p) evaluation of each factor</th>
<th>Total point evaluation of Adaptation of 7 S Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>High</td>
<td>$\sum 10 - 9 p$</td>
<td>$(10 - 9 p)^7$</td>
</tr>
<tr>
<td>B</td>
<td>Appropriate</td>
<td>$\sum 8 - 7 p$</td>
<td>$(8 - 7 p)^7$</td>
</tr>
<tr>
<td>C</td>
<td>Average (partial)</td>
<td>$\sum 6 - 5 p$</td>
<td>$(6 - 5 p)^7$</td>
</tr>
<tr>
<td>D</td>
<td>Low</td>
<td>$\sum 4 - 1 p$</td>
<td>$(4 - 1 p)^7$</td>
</tr>
<tr>
<td>E</td>
<td>Zero</td>
<td>$\sum 0 p$</td>
<td>0</td>
</tr>
</tbody>
</table>

Source: Authors

Table 3 shows evaluations scale. The final rating for evaluation ‘A’ represents the best possible score obtained, and the overall final rating for ‘E’ the worst. The ‘A’ evaluation with a score ranging from 70 to 63 is when the company is managed fittingly, and the chosen management system is sophisticated and at a high of proficiency. The ‘E’ evaluation with zero score points to inadequacy and a poorly chosen management system.

**Conclusion**

Every company seeking to be robust and stable, not only in financial aspects but also in corporate organization and management must constantly analyze its management system. For evaluating the current state of business management, it is possible to use many of the already known and used management methods, such as internal benchmarking, internal control, balanced scorecard, and space, SWOT, and process analyses. This paper describes an entirely new and more detailed model, the ‘Adaptation of 7S model’ for managers of businesses. This model serves to assess the current state of corporate governance and can be used without further modification or with adaptation according to specific needs and requests of the company.

**References**

MEASURABLE PERFORMANCE INDICATORS OF BUSINESS PROCESSES AND PERFORMANCE OF SLOVAK AND FOREIGN BUSINESSES

Katarina Gašová,¹ Martina Kováčiková,² Katarína Repková Štofková³

Abstract: Business activities (managerial, administrative, commercial, manufacturing, etc.), which are focused on production or the services provision should be managed as a whole, containing the activities liable to certain logistic in their arrangement and interconnection. The business activities’ transformation on processes and management (identification, modelling, mapping, analysis, measurement and improvement) through the process management can be understood as a type of methodology suitable for the analysis, evaluation and improvement of key processes in the business.

An aim of the application of business process management is to create a process model consisting of managerial, core, transparency supporting, measurable, and possible improvement processes. The principles of business process management application can lead to continuous improvement of business processes and to the position improvement of the business in a constantly evolving competitive environment. During the evaluation process, it is important to focus on one of the most important factors – the measurability of process performance.

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UDC Classification: 658.6

Keywords: process, key performance indicators, critical success factors

Introduction

In the competitive business environment, the number of businesses applying principles of the business process management is currently increasing with an emphasis on the efficient management of processes to ensure the achievement of aims at the required quality and at a specified standard. An appropriate implementation of business process management also brings high productivity and profit. An effective process management requires the measurement of their performance. In the context of the business processes performance measurement – the efficiency of business processes – we mean the Key Performance Indicators (KPIs). KPIs quantify the performance of the monitored process in regard to the process output (added value of process).

Business processes

The process is characterized by the input, transformation, and output. At a closer look, it is possible to specify responsibility, owner, customer, sponsor, time parameters, boundaries, repeatability and the resources of process. Business processes can be classified by various criteria. The most common classification is to: management, core (main business, key) and support (service and section) processes. Internal and external processes can be specified in regard to the internal and external business environment i.e. to the orientation of process output on the internal or external customer (Soltés & Repkova Stořková, 2016).

The authors Dzubakova & Lichnerova (2012), Hromkova & Holociova (2005) cite Earl's classification of business processes:

- Core processes – relate directly to the external customer and are critical to functioning of the business.
- Support processes – are tasked to support core processes and create suitable conditions.
- Business network processes – transcend business boundaries and directly impact the competitiveness of the business. These processes focus on business partners, customers and suppliers.
- Management processes – impact the internal efficiency of the business. Represent the planning, organizing and managing resources.

Tucek & Zamecník (2007) cite the classification by Edwards and Peppard, who differentiate four types of business processes according to product and components of market oriented business strategy:

¹ Faculty of Operation and Economics, University of Žilina, Slovak Republic, katarina.gasova@fpedas.uniza.sk
² Faculty of Operation and Economics of Transport and Communications, University of Žilina, Univerzitná 1, 010 26, Žilina, Slovak Republic, martina.kovacicova@fpedas.uniza.sk
³ Faculty of Operation and Economics, University of Žilina, Slovak Republic, katarina.stofkova@fpedas.uniza.sk
Competitive processes – are focused on the competitors with the aim to improve the competitive position of the business. From an economic perspective, these processes ensure profit for the business.

Infrastructure processes – focus on human resources, processes and technology, i.e. they are crucial for the efficient future of the business.

Core processes – represents essential business processes important for remaining competitive. They are valued by process customers, i.e. customers, suppliers, employees and other stakeholders.

Support processes – are necessary to be carried out in a business however, are not appreciated by stakeholders.

Dzubakova & Lichnerova (2012) give a different view of the processes classification, which was brought by Kaplan and Norton (Kaplan & Norton, 1993). They categorize business processes to:

- Innovation processes – the main parts are research and development, which affect the competitive position of the business.
- Operations processes – run inside the business and are focused on production. These processes begin with the order and end with product delivery.
- Post-sales processes – services, following the sale, e.g. customer service.

In all mentioned classifications can be identified as major processes, which are crucial for the functioning of the process and also the processes, are used for the proper business functioning, and which support the performance of core processes.

**Business processes evaluation and measurement**

Each business performs process optimisation with regard to the Critical Success Factor (CSF) of business. Critical factors represent areas that businesses want to improve and by that increase their competitive advantage. Some authors claim that CSF are conditions which businesses must meet to be able to achieve their outlined strategic aims. CSF can be considered as business milestones. In compliance with the concept of CSF they represent the definition of the most important factors for business success. CSF are also referred to as key success factors so that these terms can be therefore be regarded as synonymous. The most common CSF which businesses seek to achieve are improvement on: customer satisfaction, quality, product delivery, employee satisfaction, productivity, financial performance, safety, environmental performance, social behaviour, price, the best suppliers, the best sellers etc. indicated by Zavadsky (2004) and Stofko et al (2016).

Changes in business process are carried out according to key success factors. However, it is necessary to obtain accurate and objective information about the progress of processes and sub-processes to be able to evaluate the made changes. This information is obtained by the process performance measurement. A term of the process measurement includes activities, which provide accurate and objective information about the process flow. This information is used mainly by process owners in operation management. According to this available information, process owners are able to meet all the requirements of the process (Triad, 2015).

It is necessary to secure the completeness, sufficient level of detail, and validity of the measurement to obtain the relevant results of the process performance measurement (input, flow, output). In the context of the measurement it is necessary to set the frequency and accuracy of the measurement and also to identify deviations from the different requirements in different locations of the process or to accept the seasonality of specific phenomena. The realisation of processes’ performance measurement requires the definition of the indicator, based on which it will be possible to quantify the business performance. The most commonly used quantification units are units of: time, percentages, currency or quantity (piece, volume, weight and length measures). The measurement results should be presented in an intelligible, clear and univocal manner, i.e. the key performance indicator have to be defined unambiguously.

The relationship between Critical Success Factors (CSF) and key performance indicators (KPI) is also defined in a set of ITIL book publications (ITIL, 2015) (Figure 1).
According to ITIL (set of book publications, containing a collection of the best practices from the discipline of management and information technology services and is owned by the British company AXELOS, Ltd.), each business should define appropriate CSF derived from the process purpose. A further level represents the determination of key performance indicator derived from the defined CSF. The determination and acceptance of KPI should be carefully considered, whether the KPI actually results from the CSF and corresponds to the level of business. Businesses should constantly monitor the determined KPI because it can signal a deterioration of process performance as well as identify opportunities for process improvement (OMNICOM, 2016).

**Key performance indicators**

KPI are defined as indicators or performance metrics associated with the process, the product, the service, and the whole business or part of it. KPI are tasked to quantify the performance of business as a whole, in regard to a determined top aim of the business i.e. the critical success factor. However, the business performance is a result of the performance of the individual parts and business processes. Therefore, it is necessary to correctly select the appropriate KPI, but also to choose a suitable activity to be linked with the KPI as equally indicated by Dzubakova & Lichnerova (2012) and others (Management Mania, 2016). KPI should be quantifiable and should enable business to determine measurable aims, monitor, identify and predict trends. In some cases, KPI should provide preventive, remedial, and improving measures. Top management of the business should establish KPI as a basis for strategic and tactical decisions. KPIs should be suitably selected and assigned to the relevant functions and levels of the business, depending on the processes structure and should thus support the monitoring of the achievement level of top aims (Martisovic, 2016).

A substantial part of process performance measurement is the process of determining the specific process performance indicator. The key is to correctly identify and define the process. Thereafter the predetermined team provide a substantial analysis of possible indicators, which result in the specification of the most appropriate indicators of inputs for the process performance measurement (Klbko, 2016).

**Types of measurable indicators**

Measurable performance indicators can be divided into several categories according to business focus and the nature of business products. In this regard, it is possible to specify universal performance indicators, production processes performances indicators, and performance indicators of non-production processes (Repa, 2006).

**Universal performance indicators** represent indicators which can be used to measure various processes and are not tied to a particular or specific process. There exist many universal indicators, but the most used are:

- Effective use of process time – it is a ratio of processing time to process continuous period.
- Ongoing process time – represents the time which elapses from the time of acceptance of the process input to final output of the process.
- Total process costs – are composed of the conformity and non-conformity costs.
- Effective use of costs – is a ratio of the conformity costs to the overall costs of the process.
- Mismatches ratio of process – is the ratio of the mismatches identified during the process to volume of matched output of the process.
- Number of registered deviations in the process (Loucanova et al., 2015).

**Production processes performances indicators** are mainly used for operational management of production. The most common and the well known performance indicators include: the value of production-in-progress, the percentage of downtime on the available machine capacity, worker productivity, machine productivity, capital productivity, overall efficiency of the device, the
proportion of defective products to total output, number of worked hours, elasticity in response to a change in production, the number of suggestions for improvement and many others (Klbko, 2016).

Non-production process represents each process, except production, which flow in businesses during the course of product realization. Non-production processes can take place before the start of production (development, marketing, etc.), during the course of production (repairs, maintenance, etc.) or after production (import, service, etc.). The best known and most widely used performance indicators of non-production processes are: the evaluation of suppliers, the reaction rate to mismatches notified by customers, the share of scheduled orders to realised contracts, the cost to retrieve suitable suppliers, the time of placing a new product on the market, the return on investment for design and development, the share of maintenance costs of the total costs, the share of new requirements for service to all the unmet needs etc. mentioned by Free ITIL training (ITIL, 2011).

In regard to other measurement elements is the process-oriented standard: STN EN ISO 9001 which complements the aforementioned key performance indicators of production, non-production and universal processes of performance measurement by variations (delays of supplied material and information input, defects of tools and equipment, unprepared or incompetent staff etc.) and by the index performance measurement (data recorded for evaluation: time of measurement, names of used indicators, weight of indicators etc.) referred to in ISO 9001 (ISO, 2011).

Another categorization of process performance measurement indicators can be focused on specific attributes or the characteristics of processes. In this regard, it is possible to specify the orientation to animate and inanimate attributes of a particular process.

Data and methodology

Authors used professional literature published in the field of process management during the literature review. Information from the statistical offices’ web pages were used during the research. This information represents secondary data sources. Authors focused mainly on the analysis of options for process improvement in context of process management i.e., the analysis of the process evaluation and performance measurement. The most attention was devoted to the comparison of the European Union countries based on the labor productivity per hour. The labor productivity per hour is an indicator considered as a coefficient of performance relating to operative processes in general, in regard to the comparison of countries.

Various methods were used during the research. Methods of professional literature selection, induction and deduction were used during the literature review. Authors carried out the analysis and synthesis necessary for the determination of mutual influence between the established facts. A method of comparison was used to compare the findings of the European Union member countries to the established performance indicator. The methods of induction and deduction were used during the whole contribution. Authors used MS Excel and PowerPoint as a basis for the graphic and image processing.

Comparison of the Slovak and foreign businesses performance

Labour productivity can be used for the comparison of the performance of businesses in different countries as described below. The contribution of Horvathova & Suhanyiova (2012) claims that there is a significant difference between the performance of Slovak and foreign businesses. However, this difference does not consist of differences in employees’ education or technology disparities of business equipment, because Slovak businesses are at the same or very similar level in these areas as businesses abroad. The difference consists mainly of the processes arrangement and their effective management and flow. This situation is a result of the fact that foreign businesses are currently dealing with issues of process management more than Slovak businesses. Foreign companies pay more attention to processes and the elimination of barriers for the most efficient process flow within the business. It is necessary to verify and prove that businesses abroad, particularly in developed countries, actually perform better than businesses in Slovakia. On the assumption that inputs, education and technological equipment are comparable in different countries and that conditions for businesses are approximately at the same level, then it is possible to compare the performance of businesses in different countries with the use of labor productivity per employee or labor productivity per hour worked. Labour productivity per hour worked provides objective information about
productivity because the assessment of labor productivity per employee does not take into account the types of employment contract and real worked time.

According to EUROSTAT (2016), the labor productivity per hour worked in Slovakia was 13.2 € in 2013. In France, Belgium, Sweden, Ireland and the Netherlands had a level of labor productivity per hour worked at the level from 45 € to 48 €. The highest labor productivity per hour worked reached Denmark. Lower productivity compared to Slovakia reached Bulgaria, the Czech Republic, Estonia, Latvia, Lithuania, Hungary, Poland, and Romania. The lowest labor productivity among the surveyed countries in 2013 was recorded in Bulgaria at the level of 4.9 €. We processed the statistical pages of PORDATA (2017) to give a different perspective on monitored issue. The following figure expresses a graphically processed comparison of the monitored indicator in 1995 and 2015 (“-“ represents unavailable information) (Figure 2).

Figure 2: Labour productivity per hour in euro

In the context of the trend formation, the statistical pages suggest that according to the measurable performance indicator – labor productivity per hour worked – that Ireland will be the leader in the future.
Conclusions

Processes are very important part of every business. The setting and types of processes in the business affects its functioning, but particularly its performance. However, not all businesses realize the importance of processes. They do not have processes explored and mapped and thus do not see opportunities for improvement. Business process improvement is currently considered as a prerequisite for a successful business. It should run continuously, with the acceptance of measurable indicators, setting KPI and CSF, to bring a change, which will have a positive impact on the business.

Prosperity, productivity, business flexibility is reflected in the prosperity of the country and also in the citizens’ standard of living. We used labor productivity per hour worked expressed in Euros as an indicator of the countries performance in the contribution. The growing trend of monitored labor productivity per hour worked was generally observed. Nevertheless, the Nordic countries still occupy leading positions in regard to the measure of labor productivity per hour, while Luxembourg dominates from all of the Western Europe countries. From the V4 member countries we see Slovakia and the Czech Republic to be almost equal.

Based on the findings we can partially confirm the above statement, that foreign businesses operating in the developed countries perform better than businesses operating in Slovakia. Therefore, it is possible to assume that the management oriented on business processes have a key importance.

Acknowledgements

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References


COMPETITIVENESS ANALYSIS OF KAZAKHSTAN CONFECTIONARY SECTOR USING FINANCIAL DISCRIMINANT MODELS

Petr Hájek,1 Gulnar Zhunissova,2 Tatjana Čábelová,3 Adilya Baidildina4

Abstract: Measuring competitiveness offers hundreds of analytical options. We have chosen to analyze and compare companies of confectionery sector in Kazakhstan. We opted to use bankruptcy and creditworthiness models and compare competitiveness through the financial situation of main competitors on that market. Companies analyzed comprise of two Ukrainian companies (Konti and Roshen), Russian companies (Nestlé Russian branch serving also Central Asian markets and KDV - Yaskino) and three local corporations Rakhat, Bayan Sulu and Konfety Karagandy. Models used for analysis are Altman z-score model, Taffler z-score model, IN099, IN01, IN05, and creditworthiness model. The IN models were created in the Czech Republic based on companies' data from the 1990s which was the period of higher inflation, small currency an big banking crisis, massive imports, developing competition and infrequent political turmoil. These models have comparably much greater benefits for analyzing companies in Kazakhstan because they are based on hundreds of companies in contrast to tens of companies on which Altman or Taffler based their famous and highly predictive models. We present an analysis of models in 2007 – 2016 period based on publicly accessible data. We show the IN models have valuable benefits for comparison compared with other older models and that they can disclose certain events or corporate situations in a clearer way than other Altman or Taffler z-score models and should be used in Kazakhstan and improved to suit better the local market environment.

JEL Classification Numbers: G32, G33; DOI: http://dx.doi.org/10.12955/cbup.v5.916

Keywords: bankruptcy, valuation, sweets, creditworthiness, IN models, Altman, competitiveness, Taffler, z-score model.

Introduction

Kazakhstan is a large country, very rich in many resources and home to 138 nationalities. What all these nationalities love are sweets. Confectionery business in Kazakhstan is famous and produces great quality products. Unfortunately, in last ten years had to adapt to many changes, including cocoa prices significant changes multiplied by the depreciation of tenge, and growth and recession periods of the Kazakhstan's economy. Regardless, citizens never stopped buying the sweets.

The financial analysis offers many models to analyze the likelihood of bankruptcy or solvency conditions that usually serve only to company financial director or investment companies for their decision-making about buying or selling shares. Analyses comparing companies from almost any whole sector in Kazakhstan are nonexistent.

We have decided to change this situation and analyze companies that cover a significant portion of confectionery business in Kazakhstan altogether (see data chapter for individual companies analyzed). That includes companies from Kazakhstan, Russian Federation, and Ukraine.

To proceed with such an analysis, we have selected models used in the EU and USA, but also frequently used models in the Czech Republic, which were developed using data from thousands of companies compared to tens of the Altman or Taffler models.

The objective of this research paper is to compare and comment results of various financial analysis models using publicly accessible accounting data since 2007, recommend changes to some models while analyzing usefulness (positives and negatives) of such models under Kazakhstan economy conditions.

Economic environment

Ten years ago, in 2007, started a subprime banking crisis in the USA. It sparked global recession and crises on various asset markets around the world during next 2-3 years including Kazakhstan. The banking sector in Kazakhstan was hit and credit market froze. That resulted in a Government intervention. During the great recession the price of the main export product of Kazakhstan, the oil, plummeted. Its price has a significant influence on the exchange rate of tenge to USD.

Since then it is hard and expensive to get any credit. Banks are very risk-averse, and interest expenses of companies are high when compared to the EU countries, or countries in the Eastern Europe. Table 1 shows the situation: inflation is increasing with the depreciation of tenge. To limit the inflation, the
The central bank decided to increase target interest rate, which led to skyrocketing interest expenses of all indebted companies. Consumer expenditures (where spending on sweets belongs) show slow growth in last two years as GDP growth does. Therefore, we can expect citizens to be buying relatively smaller amounts of sweets and thus production and sales of the confectionery industry cannot be expected to rise significantly.

Main import commodity and unreplaceable production input for confectionery industry is cocoa. See Figure 1 for price fluctuations in KZT and USD on world markets. We can see that cocoa prices started to significantly increase during fall of 2014 to reach multiples of prices that were common between 2007 and 2013. The same chart also shows a significant increase of USDKZT exchange rate affecting negatively (concerning costs) other imported commodities for whole industry as well. Besides mentioned expenses on cocoa, the sector also faces other import tariffs and price fluctuations for sugar, nuts and other ingredients not produced in Kazakhstan, or in the countries of the Customs Union.

Table 1: Selected indicators of Kazakhstan economy

|------------------------------------------|------|------|------|------|------|------|------|------|------|------|---------- \\
| CPI [% YoY change]                       | 10.8 | 17.2 | 7.3  | 7.1  | 8.3  | 5.1  | 5.8  | 6.7  | 6.6  | 14.5 | WB       \\
| CPI (2010=100)                           | 74.3 | 87.0 | 93.4 | 100.0| 108.3| 113.9| 120.5| 128.6| 133.2| 157.1| IFS      \\
| Central Bank Policy Rate [% p.a.]        | 11.0 | 10.5 | 7.0  | 7.0  | 7.5  | 5.5  | 5.5  | 5.5  | 16.0 | 12.0 | IFS      \\
| USDKZT [Period Average]                  | 122.6| 120.3| 147.5| 147.4| 146.6| 149.1| 152.1| 179.2| 221.7| 342.2| IFS      \\
| GDP growth [% p.a.]                      | 8.9  | 3.3  | 1.2  | 7.3  | 7.4  | 4.8  | 6.0  | 4.2  | 1.2  | 1.0  | WB       \\
| Household final consumption, [% YoY change, constant KZT] | 10.8 | 6.9  | 0.7  | 11.2 | 11.9 | 10.3 | 10.4 | 1.5  | 1.8  | n/a  | WB, Authors \\


Figure 1: Cocoa prices in USD and KZT

According to (Euromonitor, 2016) the import duty on the cocoa product has been reduced by Eurasian Economic Commission at the start of 2017 from 3-5% to 0% of the customs value. The 0% will apply to non-defatted cocoa paste, cocoa butter, and cocoa fat. The new tariff will not affect Rakhat, Bayan Sulu and Konfety Karagandy (further referred as KK) because they have their own cocoa beans
processing mostly Helva and other cheap products. However, other local companies, such as Hamle (bought in 2017 by Ulker Biskuvi Sanayi for 3 mil. USD) and Almatinskiy Produkt (producing mostly Helva and other cheap products that are less popular), do not have the equipment for roasting and processing cocoa beans.

**Data and Market Description**

We have decided to analyze companies covering a significant portion of the market for confectionery products in Kazakhstan. Selected companies originate from three countries: Kazakhstan (Rakhat, Bayan Sulu, Konfety Karagandy), Russian Federation (Nestle Russia, KDV - Yaskino) and Ukraine (Roshen, Konti). Analysed data were downloaded from publicly available sites: for Rakhat from (Rakhat reporting, 2017), for Bayan Sulu from (Bayan Sulu reporting, 2017), for Konfety Karagandy from (Konfety Karagandy reporting, 2017), for KDV Yaskino from (KDV - Yaskino reporting, 2017), for Roshen from (Roshen reporting, 2017), for Konti from (Konti reporting, 2017), and for Nestle Russia from (Nestle reporting, 2017). Due to data availability and for easier comparison we have limited data used for ten years between years 2007 and 2016.

**Table 2: Market share in terms of Sales [%]**

<table>
<thead>
<tr>
<th>Market share</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rakhat</td>
<td>38.6</td>
<td>40.2</td>
<td>41.1</td>
<td>40.5</td>
<td>38.6</td>
</tr>
<tr>
<td>Bayan Sulu</td>
<td>17.9</td>
<td>21.6</td>
<td>21.8</td>
<td>19.1</td>
<td>21.7</td>
</tr>
<tr>
<td>Konfety Karagandy</td>
<td>4.4</td>
<td>3.1</td>
<td>3.4</td>
<td>4.3</td>
<td>2.2</td>
</tr>
<tr>
<td>Russian producers</td>
<td>27.81</td>
<td>24.89</td>
<td>23.96</td>
<td>22.63</td>
<td>25.15</td>
</tr>
<tr>
<td>Ukrainians producers</td>
<td>9.16</td>
<td>7.00</td>
<td>7.28</td>
<td>11.77</td>
<td>7.95</td>
</tr>
<tr>
<td>Other CIS producers</td>
<td>0.32</td>
<td>0.28</td>
<td>0.20</td>
<td>0.22</td>
<td>0.75</td>
</tr>
<tr>
<td>Other foreign producers</td>
<td>1.98</td>
<td>2.24</td>
<td>2.29</td>
<td>1.52</td>
<td>2.71</td>
</tr>
</tbody>
</table>

Source: (Rakhat, 2017)

According to (Rakhat, 2017) the market for sweets is close to saturation. The trend of sweets consumption growth rate is decreasing in last few years. Because of the significant weakening of the national currency, a reduction in income and a decrease in the purchasing power of the population led to the concentration of sales moving to a cheaper segment of the market: consumers turned from more expensive chocolate to cheaper confectionery products as cookies, waffles, and caramels. The market has the capacity of 227 000 tons with domestic companies producing 183 000 tons of which 68 800 tons is exported, and another 112 800 tons imported (mostly Russia and Ukraine as seen from Table 2).

**Results and Discussion**

To analyze financial trends of individual companies, we have selected (considering the availability of indicators) the following bankruptcy and creditworthiness models: Altman z-score model, Taffler z-score model, IN99, IN01, IN05, and Creditworthiness index.

Certain peculiarity making hard any such analysis in Kazakhstan is sometimes unclear accounting terminology resulting in problematic “translation” of certain indicators used in various models in other countries. It would be impossible to do such an analysis without consultations with local accounting experts knowing the specific terminology of indicators in each Czech, English and Kazakh environment. Our experience is that research based on a plain translation of indicators from local websites would be unusable. For the purpose to clear doubt for anybody, who would like to replicate our analysis, we present a three-language terminology table of indicators used (see Annex).

These models belong to the group of indicator systems, which are supposed to assess the financial situation of the company. Since the values of these indicators are very important for banking institutions, when deciding about granting or rejecting a credit. Their purpose is to eliminate limitations and potentially missing information discovered by the ratios. (Kislingerová, 2008)

Creditworthiness models examine the financial health of a company based on macroeconomic and microeconomic principles and also on an experience and knowledge of the financial analyst. Creditworthiness models assess the financial health of the company in comparison with other companies, or they use a point system, in which the companies are classified according to their financial situation. (Grünwald, 2007)

As (Kislingerová, 2008) points out: the purpose of the bankruptcy models is to predict a threat to the financial health of the analyzed company and the likelihood of bankruptcy. The term financial distress
represents a state of the company in which it is not capable of settling its debts, or the value of its debts exceeds the value of its assets. In other words when a company becomes illiquid or insolvent.

Altman Z-score

According to (Vochozka, 2011) the Altman Z-score belongs to the group of bankruptcy models. This model is named after Prof. Edward Altman who on the grounds of several ratios and statistical analysis managed to evaluate the bankruptcy likelihood of the company or the probability of decline two years in advance and with up to 70% success rate five years in advance. According to (CRF, 2017), the z-score is known to be about 90% accurate in forecasting business failure one year into the future and about 80% accurate in forecasting it two years into the future.

Prof. Altman constructed it by using discriminant analysis with five ratios used in the equation, according to which is possible to identify a bankrupting company. (Vochozka, 2011)

\[
Z = 1.2 \times X(1) + 1.4 \times X(2) + 3.3 \times X(3) + 0.6 \times X(4) + 1.0 \times X(5)
\]

Where:
- \( X(1) = \frac{(\text{working capital} \times \text{current assets} - \text{short-term liabilities})}{\text{total assets}} \)
- \( X(2) = \frac{\text{retained earnings}}{\text{total assets}} \)
- \( X(3) = \frac{\text{EBIT}}{\text{total assets}} \)
- \( X(4) = \frac{\text{market value of equity} }{\text{book value of debt}} \)
- \( X(5) = \frac{\text{sales}}{\text{total assets}} \)

**Table 3: Results of Altman z-score model**

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<thead>
<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Rakhat</td>
<td>4.21</td>
<td>4.54</td>
<td>5.53</td>
<td>7.01</td>
<td>7.92</td>
<td>7.54</td>
<td>6.72</td>
<td>6.73</td>
<td>6.46</td>
<td>6.68</td>
</tr>
<tr>
<td>Bayan Sula</td>
<td>1.31</td>
<td>1.83</td>
<td>2.07</td>
<td>3.28</td>
<td>2.83</td>
<td>3.27</td>
<td>3.18</td>
<td>2.90</td>
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<td>4.91</td>
</tr>
<tr>
<td>Konfety K.</td>
<td>2.54</td>
<td>2.38</td>
<td>2.73</td>
<td>1.86</td>
<td>2.26</td>
<td>2.68</td>
<td>3.28</td>
<td>1.96</td>
<td>1.08</td>
<td>1.34</td>
</tr>
<tr>
<td>Nestlé</td>
<td>2.80</td>
<td>2.61</td>
<td>2.72</td>
<td>1.94</td>
<td>2.85</td>
<td>2.15</td>
<td>2.13</td>
<td>2.01</td>
<td>2.09</td>
<td>1.89</td>
</tr>
<tr>
<td>Roshen</td>
<td>1.83</td>
<td>1.25</td>
<td>1.76</td>
<td>1.33</td>
<td>5.13</td>
<td>4.61</td>
<td>3.98</td>
<td>2.56</td>
<td>3.09</td>
<td>3.18</td>
</tr>
<tr>
<td>KDV-Yaskino</td>
<td>2.92</td>
<td>2.71</td>
<td>3.87</td>
<td>4.26</td>
<td>2.79</td>
<td>2.20</td>
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<td>1.43</td>
<td>1.71</td>
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<td>1.77</td>
<td>2.79</td>
<td>2.91</td>
<td>2.94</td>
<td>2.22</td>
<td>2.06</td>
</tr>
</tbody>
</table>

Source: Authors

We can see Konfety Karagandy faced several important events in 2014. First 24 Jan 2014 the main shareholder of the Apex's way (Kazakhstan) sold 90% of shares (all they owned) to Centis International Ltd. (British Virgin Islands). Apex way owned the shares only since December 2013 when they bought them from British UIG Ltd. According to the decision of the Novosibirsk region, Arbitration court the KK owed 221,045,487 RUB past due to trading company Armatele LLC. The debt has to be paid by the end of the year 2017 (Konfety Karagandy, 2015). Then on February 11, tenge devalued by 20% against US dollar, which significantly increased the dollar value of KK foreign debt. After the change of ownership, the KK went through a restructuring in 2014, changed management, and with decreasing sales since then through early summer of 2016 they decided to shut the production completely down to buy new equipment. (NovoeTV, 2016). Date of production reopening is unknown.

We can see several companies struggled to survive during the Great Recession and frozen credit market. Nestlé managed to survive with support from the holding company in Switzerland. Bayan Sula struggled through the whole recession because of a significant increase in the volume of receivables. Also, the company received new credit and sold owned shares to increase its financial situation. Roshen faced a similar environment in Ukraine and got out from it with a significant increase in liabilities and bank credit in 2008, and 2009 respectively. Bank credits increased until 2011 and in 2012 started to decrease. In 2007 Nestlé had almost ten-fold volume of Short-term financial investments (probably shares to improve financial stability) compared to other years. KDV-Yaskino took in 2015 lots of bank credit to survive the long-term liabilities that skyrocketed in 2014.

In 2010 Roshen started to invest into the construction of a new factory in Lipetsk region of Central Russia which finished in 2013 and cost 250 mil. USD. (Focus, 2010). In 2013 Roshen after the approval of the annual accounts for the 2011-2012 revealed the fact of overstating net costs and understating the profit for 2011 and 2012. The identified error led to the increase in taxable profits in 2011 and 2012, and the additional payment of 1,307,789.79 RUB profit tax. (Roshen, 2014). The factory in Lipetsk was
closed in March 2014 due to problems that emerged during the Russian annexation of Crimea which happened 20 Feb 2014 – 19 Mar 2014. (BBC, 2014)

Taffler’s model (Růčková modification)

It is a bankruptcy model that indicates the probability of bankruptcy of the company. The model was published in 1977. (Atlantis, 2017) Taffler’s z-score model discrimination function has the form of modification of (Růčková, 2011) with four ratios.

\[
TZ = 0.53 * R1 + 0.13 * R2 + 0.18 * R3 + 0.16 * R4
\]

Where:  
- \( R1 = \frac{\text{Earnings before taxes}}{\text{short-term liabilities}} \)  
- \( R2 = \frac{\text{current assets}}{\text{liabilities}} \)  
- \( R3 = \frac{\text{short-term liabilities}}{\text{total assets}} \)  
- \( R4 = \frac{\text{sales}}{\text{total assets}} \)

TZ> 0.3  low probability of bankruptcy of the company
0.2 <TZ <0.3  gray zone of unmatched results
TZ <0.2  increased probability of bankruptcy of the company

The original version of Taffler’s model uses the share of financial assets net of current liabilities to operating costs instead of sales to total assets and does not use gray zone. When evaluating the original Taffler’s Model, the gray zone is not used. Enterprises are classified according to the index outcome only on bankruptcy and credibility: zero is the critical value for the determining the category. A positive index corresponds with credit business and vice versa. (Vochozka, 2011)

Růčková (2011) used the same breakdown of enterprises according to the established value of the Taffler’s Model. Rather than evaluating enterprises as creditworthy, she states that the company has a small probability of bankruptcy and instead of bankruptcy enterprises says that the company has a high probability of bankruptcy.

The [Taffler] model is shown to have the clear predictive ability over time period [of 25 years] and dominates more naïve prediction approaches. [This] study also illustrates the economic value to a bank of using such methodologies for default risk assessment purposes. (Agarwal & Taffler, 2007)

| Table 4: Results of Taffler z-score model |
|-------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Rakhat                        | 0.91            | 0.71            | 1.32            | 1.98            | 3.06            | 3.05            | 2.92            | 3.26            | 2.21            | 2.47            |
| Bayan Sulu                    | 0.38            | 0.39            | 0.35            | 0.66            | 0.75            | 0.70            | 0.63            | 0.59            | 0.59            | 0.53            |
| Konfety K.                    | 0.43            | 0.51            | 1.98            | 1.43            | 2.06            | 1.68            | 0.73            | -0.60           | -0.66           | -2.68           |
| Nestle                        | 0.46            | 0.52            | 0.53            | 0.55            | 0.50            | 0.54            | 0.55            | 0.53            | 0.53            | 0.52            |
| Roshen                        | 0.68            | 0.84            | 0.55            | 0.46            | 1.51            | 0.38            | 0.51            | 1.13            | -0.24           | 0.16            |
| KDV-Yaskino                   | 0.79            | 0.81            | 1.27            | 1.25            | 0.56            | 0.46            | 0.35            | 0.40            | 0.33            | 0.47            |
| Konti                         | 0.62            | 0.60            | 0.60            | 0.47            | 0.47            | 0.47            | 0.67            | 0.70            | 0.70            | 0.58            | 0.59            |

Source: Authors

We have already described the KK situation. The Roshen company became a victim of war in Ukraine and shut down newly built Russian factory. The loss of rich Donbas to pro-Russian separatists caused a significant loss in 2015 for many Ukrainian firms, causing an increase in debt and interest expenses.

**IN Models - Credibility indexes**

According to (Neumaier & Neumaierová, 2002) the IN models belong to the group of bankruptcy models and were created for the conditions of the restructuring Czech market during the 1990s. The authors using discriminant analysis, ratios and weighted mean values created a function for identification of bankrupting companies. IN models have gone through several phases of evolution, the first being the IN95 index, which focused on the company from the creditor’s point of view and included Past due liabilities, an indicator not being published by companies in Kazakhstan (so we cannot use it in our analysis). Then the IN99 index followed, which assessed the company from the perspective of the owner. These two resulted in bankruptcy index IN01, which connects both of the previous indexes and also includes the economic added value. The last version emerged in 2005 when IN01 was updated into the bankruptcy index IN05 (Neumaierová & Neumaier, 2005).

**IN99 Index**

\[
IN99 = -0.017 * A + 4.573 * C + 0.481 * D + 0.015 * E
\]
The IN index may be an appropriate indicator of value creation, especially if it is not possible to work with market prices for a company’s shares due to their low ability to provide information or if no equity cost can be determined. With the success rate of 86.4%, the index proves the value creation and with an even higher rate of success 98.9% has been able to identify that there is no value creation. (Atlantis, 2017)

According to (Atlantis, 2017) the construction was based on a discriminatory analysis and was based on the data of 1915 enterprises from the Czech Republic that were divided into three groups: 583 were in the group of enterprises creating value, 503 enterprises in bankruptcy or just before bankruptcy, and 829 other enterprises.

<table>
<thead>
<tr>
<th>Table 5: Results of IN99</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rakhat</td>
</tr>
<tr>
<td>2007: 1.13</td>
</tr>
<tr>
<td>2008: 0.97</td>
</tr>
<tr>
<td>2009: 1.03</td>
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<tr>
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</tr>
<tr>
<td>2011: 1.42</td>
</tr>
<tr>
<td>2012: 1.16</td>
</tr>
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<td>2013: 0.75</td>
</tr>
<tr>
<td>2014: 0.40</td>
</tr>
<tr>
<td>2015: 1.19</td>
</tr>
<tr>
<td>2016: 1.43</td>
</tr>
<tr>
<td>Bayan Sulu</td>
</tr>
<tr>
<td>2007: 0.66</td>
</tr>
<tr>
<td>2008: 0.96</td>
</tr>
<tr>
<td>2009: 0.88</td>
</tr>
<tr>
<td>2010: 0.73</td>
</tr>
<tr>
<td>2011: 0.65</td>
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<tr>
<td>2012: 0.62</td>
</tr>
<tr>
<td>2013: 0.62</td>
</tr>
<tr>
<td>2014: 0.68</td>
</tr>
<tr>
<td>2015: 0.79</td>
</tr>
<tr>
<td>2016: 1.27</td>
</tr>
<tr>
<td>Konfety K.</td>
</tr>
<tr>
<td>2007: 1.04</td>
</tr>
<tr>
<td>2008: 0.78</td>
</tr>
<tr>
<td>2009: 1.12</td>
</tr>
<tr>
<td>2010: 0.70</td>
</tr>
<tr>
<td>2011: 0.75</td>
</tr>
<tr>
<td>2012: 0.79</td>
</tr>
<tr>
<td>2013: 1.27</td>
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</tr>
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<td>2015: 12.66</td>
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<tr>
<td>2016: -3.45</td>
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<tr>
<td>Nestle</td>
</tr>
<tr>
<td>2007: 0.62</td>
</tr>
<tr>
<td>2008: 0.58</td>
</tr>
<tr>
<td>2009: 0.70</td>
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<tr>
<td>2010: 0.71</td>
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<tr>
<td>2011: 0.81</td>
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<tr>
<td>2012: 0.77</td>
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<tr>
<td>2013: 0.80</td>
</tr>
<tr>
<td>2014: 0.70</td>
</tr>
<tr>
<td>2015: 0.75</td>
</tr>
<tr>
<td>2016: 0.73</td>
</tr>
<tr>
<td>Roshen</td>
</tr>
<tr>
<td>2007: 1.20</td>
</tr>
<tr>
<td>2008: 0.53</td>
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<tr>
<td>2009: 1.54</td>
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<tr>
<td>2010: 0.87</td>
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<tr>
<td>2011: 0.84</td>
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<td>2012: 0.94</td>
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<td>2013: 0.73</td>
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<tr>
<td>2014: 0.43</td>
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<tr>
<td>2015: 0.08</td>
</tr>
<tr>
<td>2016: 0.20</td>
</tr>
<tr>
<td>KDV-Yashkino</td>
</tr>
<tr>
<td>2007: 1.63</td>
</tr>
<tr>
<td>2008: 1.48</td>
</tr>
<tr>
<td>2009: 1.89</td>
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<td>2010: 1.32</td>
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<td>2012: 0.82</td>
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<td>2013: 0.88</td>
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<td>2014: 0.70</td>
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</tr>
<tr>
<td>2016: 0.97</td>
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<tr>
<td>Konti</td>
</tr>
<tr>
<td>2007: 1.27</td>
</tr>
<tr>
<td>2008: 1.26</td>
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<tr>
<td>2009: 1.26</td>
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<td>2013: 1.59</td>
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<tr>
<td>2014: 1.68</td>
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<tr>
<td>2015: 1.59</td>
</tr>
<tr>
<td>2016: 1.55</td>
</tr>
</tbody>
</table>

Source: Authors

IN99 focuses on the company through lenses of the owner. The greener the fields, the happier the owner. We can see that almost all companies had to experience very tough times in last decade. Besides already commented situation of KK, Rakhat shows relative ability to get out of surpess or depression faster than its competitors. Konti results are a surprise as in the environment of recession, frozen credit markets, depreciation of UAH and war in Ukraine remains in relatively much healthier conditions compared to the competition. In 2010 and 2011 the profit and stocks increased as well as bank credits. Total liabilities increased in 2010 by 64 % from 2 568 139 to 4 227 610 UAH. Konti also did something the KK did not: converted all their debts in EUR and USD to UAH on September 9, 2009, so they evaded later depreciation of UAH that would hit them hard when the war with Russia-supported separatists started after the annexation of Crimea in 2014. Konti faced high Ukrainian interest rates between 2010 and 2011 (after the conversion of all debt to UAH the rates started to fall from around 26 % to 17 %). (Audit reports for 2009 and 2011 from Konti reporting, 2017) In our opinion, the IN99 describes the conditions of analyzed companies in the given environment in a more vivid way than Altman’s z-score, which also shows very useful and interesting results.

IN01 Index

The IN01 merges creditworthiness and bankruptcy models.

\[
IN01 = 0.13 \times A + 0.04 \times B + 3.92 \times C + 0.21 \times D + 0.09 \times E
\]

Where:

- \( A = \text{assets} / \text{liabilities} \)
- \( B = \text{EBIT} / \text{interest expenses} \)
- \( C = \text{EBIT} / \text{total assets} \)
- \( D = \text{sales} / \text{total assets} \)
- \( E = \text{current assets} / \text{short-term liabilities} \)

\( \text{IN01} > 1.77 \) Enterprise creates a value

\( 0.75 \leq \text{IN01} < 1.77 \) Creditworthy business not creating value

\( \text{IN01} < 0.75 \) Enterprise is on the way to bankruptcy

Together with IN05, the IN01 uses interest expenses which show especially in case of Konfety Karagandy serious problems with credit repayment. KK as mentioned went through a restructuring in 2014, in early summer of 2016 shut the production to buy new equipment. Date of production reopening is unknown. To be able to run analysis on KK, we had to limit the ceiling of the ratio EBIT / Interest expenses to 9 if the result was to be higher (in absolute value as well) to limit distortion of the z-score result. In fact (Neumaier & Neumaierová, 2002) note that in similar cases (when the ratio would skyrocket up to infinity – including cases of zero interest expenses) the 9 is maximum value to be used.
This ceiling we implemented affected results of IN01 and IN05 for Rakhat, KK, Nestle, Roshen, and KDV – Yaskino.

Table 6: Results of IN01

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Rakhat</td>
<td>1.99</td>
<td>2.37</td>
<td>2.75</td>
<td>3.73</td>
<td>4.27</td>
<td>4.74</td>
<td>5.11</td>
<td>6.49</td>
<td>3.59</td>
<td>3.91</td>
</tr>
<tr>
<td>Bayan Sulu</td>
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<td>0.94</td>
<td>0.82</td>
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<td>1.77</td>
<td>1.78</td>
<td>1.55</td>
<td>1.43</td>
<td>1.54</td>
<td>1.20</td>
</tr>
<tr>
<td>Konfety K.</td>
<td>1.27</td>
<td>1.12</td>
<td>3.87</td>
<td>2.20</td>
<td>3.31</td>
<td>3.02</td>
<td>1.70</td>
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<td>-10.59</td>
<td>-2.96</td>
</tr>
<tr>
<td>Nestle</td>
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<td>1.75</td>
<td>1.73</td>
<td>1.81</td>
<td>1.55</td>
<td>1.74</td>
<td>1.76</td>
<td>1.62</td>
<td>1.74</td>
<td>1.73</td>
</tr>
<tr>
<td>Roshen</td>
<td>2.52</td>
<td>0.76</td>
<td>2.24</td>
<td>1.32</td>
<td>5.88</td>
<td>1.11</td>
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<td>1.49</td>
<td>1.34</td>
<td>1.90</td>
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<tr>
<td>KDV-Yashkino</td>
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<td>1.09</td>
<td>0.92</td>
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<td>Konti</td>
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<td>1.30</td>
<td>1.29</td>
<td>1.04</td>
<td>1.07</td>
<td>1.80</td>
<td>1.82</td>
<td>1.81</td>
<td>1.66</td>
<td>1.66</td>
</tr>
</tbody>
</table>

Source: Authors

IN01 shows us a balanced view of the whole sector and points out just the financial distress of Konfety Karagandy.

**IN05 Index**

IN05 is the latest known index of Inka and Ivan Neumaier. This index is an update of the IN01 index of the Industrial Data Tests of 2004. The ratios are same with IN01. The index formula IN05 is:

\[ \text{IN05} = 0.13 \times A + 0.04 \times B + 3.97 \times C + 0.21 \times D + 0.09 \times E \]

<table>
<thead>
<tr>
<th>Where:</th>
<th>IN05&gt; 1.6</th>
<th>0.9 &lt; IN05 &lt; 1.6</th>
<th>IN05 &lt; 0.9</th>
</tr>
</thead>
<tbody>
<tr>
<td>A = assets / liabilities</td>
<td>The enterprise creates a value</td>
<td>Gray zone of unmatched results</td>
<td>The enterprise destroys value, threat of bankruptcy</td>
</tr>
<tr>
<td>B = EBIT / interest expenses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C = EBIT / total assets</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D = sales / total assets</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E = current assets / short-term liabilities</td>
<td>(Neumaierová &amp; Neumaier, 2005)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 7: Results of IN05

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Rakhat</td>
<td>2.00</td>
<td>2.37</td>
<td>2.75</td>
<td>3.74</td>
<td>4.28</td>
<td>4.75</td>
<td>5.12</td>
<td>6.49</td>
<td>3.60</td>
<td>3.92</td>
</tr>
<tr>
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<td>1.78</td>
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<td>1.43</td>
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<td>1.21</td>
</tr>
<tr>
<td>Konfety K.</td>
<td>1.28</td>
<td>1.12</td>
<td>3.88</td>
<td>2.20</td>
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<td>3.02</td>
<td>1.71</td>
<td>-1.09</td>
<td>-10.73</td>
<td>-3.00</td>
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<td>1.74</td>
<td>1.77</td>
<td>1.62</td>
<td>1.75</td>
<td>1.74</td>
</tr>
<tr>
<td>Roshen</td>
<td>2.52</td>
<td>0.76</td>
<td>2.25</td>
<td>1.33</td>
<td>5.89</td>
<td>1.11</td>
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<td>1.49</td>
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<td>1.90</td>
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<tr>
<td>KDV-Yashkino</td>
<td>2.12</td>
<td>2.23</td>
<td>2.69</td>
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<tr>
<td>Konti</td>
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<td>1.81</td>
<td>1.83</td>
<td>1.82</td>
<td>1.67</td>
<td>1.67</td>
</tr>
</tbody>
</table>

Source: Authors

IN05, on the other hand, shows more distressed periods of analyzed companies. KDV – Yaskino red field is caused by the significant increase in liabilities in 2014. Similarly, as KDV – Yaskino, Bayan Sulu, and Roshen red fields, just below the threshold, show period of depreciation and severe crisis in Ukraine (Roshen, compared with much more stable Konti). Bayan Sulu increased common capital in 2009 16-fold. Credits also increased significantly in 2009 while cash from operating activities was nearly non-existent.

**Creditworthiness index**

The creditworthiness index, also referred to as the creditworthiness indicator, is based on a multivariate discriminatory analysis based on a simplified method. It is mainly used in German-speaking countries. (Atlantis, 2017) The credit index (index) is calculated according to the formula:

\[ CI = 1.5 \times x1 + 0.08 \times x2 + 10 \times x3 + 5 \times x4 + 0.3 \times x5 + 0.1 \times x6 \]

We used the following ratios:

- \( x1 = \text{cash flow} / \text{liabilities} \)
- \( x2 = \text{total assets} / \text{liabilities} \)
- \( x3 = \text{earnings before taxes} / \text{total assets} \)
- \( x4 = \text{earnings before taxes} / \text{sales} \)
- \( x5 = \text{stocks} / \text{sales} \)
- \( x6 = \text{sales} / \text{total assets} \)

Evaluation:

- \( x1 < 0 \times <CI < 2 \) extremely bad
- \( x2 < 0 \times <CI < 1 \) very bad
- \( x3 < 0 \times <CI < 0 \) bad
- \( x4 < 0 \times <CI < 1 \) certain problems
- \( x5 > 0 \times <CI < 2 \) good
- \( x6 > 0 \times <CI < 3 \) very good
- \( x6 > 0 \times <CI < 3 \) extremely good
Table: Results of the Creditworthiness index

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Rakhat</td>
<td>3.13</td>
<td>1.72</td>
<td>2.68</td>
<td>4.52</td>
<td>2.78</td>
<td>3.76</td>
<td>3.03</td>
<td>10.35</td>
<td>14.43</td>
<td>8.37</td>
</tr>
<tr>
<td>Bayan Sulu</td>
<td>0.81</td>
<td>0.99</td>
<td>1.02</td>
<td>2.43</td>
<td>1.96</td>
<td>2.98</td>
<td>1.43</td>
<td>1.47</td>
<td>2.75</td>
<td>2.44</td>
</tr>
<tr>
<td>Konfety K.</td>
<td>0.33</td>
<td>0.82</td>
<td>1.95</td>
<td>-0.42</td>
<td>1.81</td>
<td>1.09</td>
<td>2.02</td>
<td>-7.59</td>
<td>-48.58</td>
<td>-19.65</td>
</tr>
<tr>
<td>Nestle</td>
<td>2.36</td>
<td>2.32</td>
<td>2.41</td>
<td>2.44</td>
<td>2.28</td>
<td>2.35</td>
<td>2.36</td>
<td>2.18</td>
<td>2.37</td>
<td>2.69</td>
</tr>
<tr>
<td>Roshen</td>
<td>3.19</td>
<td>3.02</td>
<td>3.91</td>
<td>2.78</td>
<td>5.46</td>
<td>1.34</td>
<td>1.96</td>
<td>2.18</td>
<td>0.22</td>
<td>0.59</td>
</tr>
<tr>
<td>KDV-Yashkino</td>
<td>3.17</td>
<td>3.44</td>
<td>4.11</td>
<td>2.61</td>
<td>2.37</td>
<td>0.99</td>
<td>0.64</td>
<td>1.06</td>
<td>0.55</td>
<td>0.93</td>
</tr>
<tr>
<td>Konti</td>
<td>1.37</td>
<td>1.32</td>
<td>1.31</td>
<td>1.02</td>
<td>1.04</td>
<td>2.42</td>
<td>2.54</td>
<td>2.87</td>
<td>2.68</td>
<td>2.66</td>
</tr>
</tbody>
</table>

Source: Authors

Per model rules, we would normally use seven colors between dark green and dark red, but since KK showed statistics worse than -3, which is outside statistics of the model, we marked the outside values with black color and white text. Otherwise, the model shows only Rakhat is truly creditworthy company while Konti, Nestle and recently also Bayan Sulu can also have relatively easy access to credit.

**Conclusion**

The IN models showed us certain “hand” intervention into the models is necessary because the market is very specific and offering one would say changing and significant permanent challenges. It is certainly not for beginners to operate in such a market. Another specific of the whole market is high interest rates causing fluctuating and hardly predictable interest expenses of all indebted companies. We see foreign exchange risk can cause even clinical death as in case of Konfety Karagandy. Depreciation linked to oil prices that plummeted during the Great Recession is a permanent threat because given current oil supply and demand trends it is unlikely the RUB and KZT currencies will strengthen in the near few years. Oil prices may even decrease a bit with next recession in the region, or with global problems that will sooner or later come, and companies will face distress conditions again. Such an environment cannot be called standard and regarding financial analysis methods and models certainly would appreciate similar approach as in the Czech Republic. In Prague, the Ministry of Industry and Trade through cooperation with the University of Economics in Prague operates a web portal where every company can enter their data and receive model results.

It is called Benchmarking Diagnostic System of INFA Financial Indicators. (MPO, 2007) This system serves businesses to verify their financial health and compare their results with the industry’s best businesses to verify their financial health and compare their results with the industry’s best practices. Using bankruptcy and creditworthy models. Retrieved from http://www.finanalysis.cz/pouzite-bankrotni-modely.html

**References**


Focus. (24. October 2010). Roshen postroiat yeshche odnu konditerskuyu fabriku v Rossii [Roshen will build another confectionary factory in Russia]. Retrieved from https://focus.ua/money/145303/


Annex 1: Translation table (Russian – Czech - English)

<table>
<thead>
<tr>
<th>ПОКАЗАТЕЛИ</th>
<th>UKAZATELE</th>
<th>INDICATORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Долгосрочные финансовые активы</td>
<td>Dlouhodobý finanční majetek</td>
<td>Long-term financial investments</td>
</tr>
<tr>
<td>Оборотные активы</td>
<td>Oběžná aktiva</td>
<td>Current assets</td>
</tr>
<tr>
<td>Дебиторская задолженность</td>
<td>Pohledávky</td>
<td>Accounts receivable</td>
</tr>
<tr>
<td>Долгосрочная дебиторская задолженность</td>
<td>Dlouhodobé pohledávky</td>
<td>Long-term receivables</td>
</tr>
<tr>
<td>Краткосрочная дебиторская задолженность</td>
<td>Krátkodobé pohledávky</td>
<td>Short-term receivables</td>
</tr>
<tr>
<td>Дебиторская задолженность после срока оплаты</td>
<td>Pohledávky po lhůtě splatnosti</td>
<td>Past due receivables</td>
</tr>
<tr>
<td>Краткосрочные финансовые активы</td>
<td>Krátkodobý finanční majetek</td>
<td>Short-term financial investments (does not include cash, only short term securities)</td>
</tr>
<tr>
<td>Запасы</td>
<td>Zásoby</td>
<td>Inventories</td>
</tr>
<tr>
<td>Итоги актива</td>
<td>Aktiva celkem</td>
<td>Total assets</td>
</tr>
<tr>
<td>Собственный капитал</td>
<td>Vlastní kapitál</td>
<td>Owner's Equity (used in Altman as Market value of Equity)</td>
</tr>
<tr>
<td>Уставный капитал</td>
<td>Základní kapitál</td>
<td>Common stock/Common capital/Share capital</td>
</tr>
<tr>
<td>Заемный капитал</td>
<td>Cizí kapitál</td>
<td>Liabilities</td>
</tr>
<tr>
<td>Нераспределенная прибыль</td>
<td>Nerozdělený zisk</td>
<td>Retained earnings</td>
</tr>
<tr>
<td>Долгосрочные обязательства</td>
<td>Dlouhodobé závazky</td>
<td>Long-term liabilities</td>
</tr>
<tr>
<td>Краткосрочные обязательства</td>
<td>Krátkodobé závazky</td>
<td>Short-term liabilities</td>
</tr>
<tr>
<td>Краткосрочные и долгосрочные обязательства</td>
<td>Celkové dluhy</td>
<td>Total liabilities</td>
</tr>
<tr>
<td>Обязательства после срока оплаты</td>
<td>Závazky po lhůtě splatnosti</td>
<td>Past due liabilities</td>
</tr>
<tr>
<td>Банковские кредиты и займы</td>
<td>Bankovní úvěry a výpomoci</td>
<td>Long term bank and other borrowings</td>
</tr>
<tr>
<td>Краткосрочные банковские кредиты и займы</td>
<td>Krátkodobé bankovní úvěry a výpomoci</td>
<td>Short term bank and other borrowings</td>
</tr>
<tr>
<td>Итоги пассива</td>
<td>Pasiva celkem</td>
<td>Total equity and liabilities</td>
</tr>
<tr>
<td>--------------</td>
<td>---------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>Отчет о прибылях и убытках</td>
<td>Výkaz zisku a ztrát</td>
<td>Income statement</td>
</tr>
<tr>
<td>Выручка</td>
<td>Tržby</td>
<td>Sales</td>
</tr>
<tr>
<td>Себестоимость товаров и услуг</td>
<td>Náklady na prodané výrobky a služby</td>
<td>Cost of goods and services</td>
</tr>
<tr>
<td>Валовый доход</td>
<td>Hrubá marže z prodeje, resp. Marže z prodeje</td>
<td>Gross profit (=Gross margin), difference between sales and cost of sales (cost of goods sold)</td>
</tr>
<tr>
<td>Доходы</td>
<td>Výnosy</td>
<td>Income</td>
</tr>
<tr>
<td>Операционный результат хозяйствования</td>
<td>Provozní hospodářský výsledek</td>
<td>Operating profit/loss</td>
</tr>
<tr>
<td>Результат хозяйствования за отчетный период</td>
<td>Hospodářský výsledek za běžné období</td>
<td>Profit/loss for the (current) period</td>
</tr>
<tr>
<td>Амортизация</td>
<td>Odpisy</td>
<td>Depreciation</td>
</tr>
<tr>
<td>Процентные расходы</td>
<td>Nákladové úroky</td>
<td>Interest expenses</td>
</tr>
<tr>
<td>Изменение статуса резерва</td>
<td>Změna stavu rezerv</td>
<td>Change in provisions</td>
</tr>
<tr>
<td>Прибыль до вычета процентов и налогов</td>
<td>Zisk před zdaněním a úroky = EBIT</td>
<td>Earnings before interest and taxes</td>
</tr>
<tr>
<td>Прибыль до налогообложения</td>
<td>Zisk před zdaněním = EBT</td>
<td>Earnings before taxes</td>
</tr>
<tr>
<td>Прибыль после уплаты налогов</td>
<td>Zisk po zdanění (čistý zisk) = EAT</td>
<td>Earnings after taxes</td>
</tr>
<tr>
<td>Добавленная стоимость</td>
<td>Přidaná hodnota</td>
<td>Value added</td>
</tr>
<tr>
<td>Денежный поток</td>
<td>Peněžní toky (cash flow)</td>
<td>cash flows</td>
</tr>
</tbody>
</table>

Source: Authors
IDENTIFICATION OF RELEVANT STAKEHOLDERS WITHIN A RESILIENT CITY IN THE SLOVAK REPUBLIC

Ján Havko,¹ Michal Titko,² Jana Kováčová³

Abstract: Apparently, there is a significant increase in the occurrence of disasters and their negative consequences. It is believed that the main reason for this problem is related to climate change. In recent years, several approaches and efforts related to the topic of climate changes have been researched and in some cases also implemented. One of them is the resilient city concept as a tool dedicated for enhancing resilience and decreasing the vulnerability of a city and its citizens in case of a disaster. In this article, the concept of the resilient city is briefly described. The very important role within the resilient city represents the stakeholders. The understanding of the stakeholders’ possible participation in city resilience building is important for city security. For that purpose, the relevant stakeholders’ identification is necessary. Our research was conducted with regard to the data from the Step Up project and takes into consideration recommendations from the resilient city concept.

JEL Classification Numbers: H12, H70, Q54; DOI: http://dx.doi.org/10.12955/cbup.v5.917

UDC Classification: 303.35.36

Keywords: disasters, resilient city, stakeholders

Introduction

In this article, we deal with the issue of resilience and the resilient city concept. Implementation of any project or concept requires cooperation between the wider community of actors who are more or less interested in the project objectives and also have different expectations of the project outcomes. Moreover, actors’ engagement offers cities several benefits as a broader knowledge base for the decision making process, improvement of the quality and effectiveness of projects, further opportunities for joint projects, long-term support for strategies and actions in the city, and more robust and transparent decision making (Step Up Project, 2015). Therefore, the focus is placed mainly on the identification of interested parties (actors) – “stakeholders”, who participate in building the resilient city. The term “stakeholder” refers to the person or group that has an interest in the success or performance of the system (subject, entity, project, concept, etc.), or can influence its success or performance (Grasseová, 2010). We can also identify stakeholders as interested groups. By consideration of the possible interest of actors in taking part in resilient city building it is possible to identify relevant stakeholders within the society and this is our intention to do so within this article.

Literature review

Based on the statistics and literature review (Groenemeijer et al., 2016; Bouwer, 2011; Guba-Sapir, Hargitt & Hoyois, 2004; Luskova, Dvorak & Leitner, 2015) it can be argued that there is an increasing trend of disasters occurrence. At the same time due to the higher intensity of disasters, more severe impacts can be observed. As a trigger of such events were identified mainly climate change aspects (Groenemeijer et al., 2016; Bouwer 2011; Guba-Sapir, Hargitt & Hoyois, 2004). In order to address the development of current disasters, several guidelines (directives) and measures have been adopted by the organizations of international crisis management. The topic of climate change was addressed in the Paris climate Agreement (2016) and in frameworks Sendai (2015), Hyogo (2005) and Yokohama (1994). These documents are focused mainly on the issues of society’s resilience as a concept of civil protection. Implementation of the resilient city concept also has specific areas which as well as having issues of risk management and crisis management, also do not provide direct and immediate outcomes for the actors in terms of profit (monetary or otherwise). Priorities and related outcomes within the resilient city concept are set as follows: (1) the understanding of disaster risks, (2) enhancing of risk governance in order to manage these risks, (3) investing in measures leading to disaster risk reduction in relation to resilience, (4) enhancing disaster preparedness and disaster response and recovery "Build Back Better" (UNISDR, 2015). Therefore, it is necessary to analyze the behavior (motivation, opportunities, interest, and responsibility) of stakeholders within society (system) in achieving these priorities and outcomes.

¹ Faculty of Security Engineering, University of Žilina, jan.havko@fbi.uniza.sk
² Faculty of Security Engineering, University of Žilina, michal.titko@fbi.uniza.sk
³ Faculty of Security Engineering, University of Žilina, jana.kovacova@fbi.uniza.sk
Behaviour, Interests and Responsibility of the Subjects within the Society

Every system’s subject (actor) has an interest to satisfy their needs within that system. Such a satisfaction can be reach at the expense of other system’s subjects. By decomposition of the system into components (interest areas) with several active subjects, there can be often recognized a contradiction between individual interests of every subject. As an example, a business environment can be assumed to be an inseparable part of each city, but our focus is a similar environment – the resilient city.

On the one hand, the primary interest of all business subjects is to maximize their profit. This effort is understandable and justified but makes us think about the way how that profit is achieved. On the other hand, the primary interest of the resilient city concept is not the economic profit of the subject (it can be seen as a secondary interest because prevention can save resources in the future), but it is a community-based interest. As it was stated, the profit or any interest are mainly achieved at the expense of the other subject in the system. This is one of the main reasons why it is necessary to consider certain restrictions on the personal interests of a subject within a system. The possible restrictions can be provided and explain by two concepts: (1) the social contract and (2) ethics of responsibility.

Enlightenment thinkers (e.g., Thomas Hobbes, John Locke and Jean-Jacques Rousseau) have introduced the concept of the social contract. Acceptation of that concept would release individuals (and subjects) out of the constant whole-society fight for wealth, and they voluntarily gave up part of their rights, freedoms, and profits. They would achieve a legal state that would guarantee the same rights and duties of all members of a system (society). The concept of the social contract is present in today’s society, and its justification is the basis of the current legal as well as social system.

Ethics of responsibility obliges the actors (subjects) to take a stand and be responsible for the (foreseeable) consequences of their actions (Machalová, 2008). Karl-Otto Apel (1922) as one of the founders of this approach to ethical issues, considered three levels within the responsibility structure. The first one is the subject of responsibility (the holder). It is the responsibility of a particular person (in our case it can be seen as representative of a social group or a stakeholder) who is able to correctly define his objectives given the current interests of the community to which it belongs and considering the direct and indirect consequences of their actions. The second level is formed by the object of an action - for what is the holder responsible. The last third level of responsibility creates the responsible action (behavior) itself, to whom we are actually responsible. Formulating of the responsible behavior and the definition of its scope is a collective issue because human responsible behavior is meaningful only in the context of collective choice (Machalová, 2008).

The idea of a subject’s responsibility to a worldwide population is a theoretical possibility whose practical use is almost unfeasible. In contrary, a feasible project is the responsibility of the local community and its individual subjects – stakeholders. Just the ethics of responsibility gives the community stakeholders a tutorial on how to act and enhance the living standards and resilience of community. Obviously, each stakeholder can be interested in the community through various ways. Therefore, it is important to identify and treat the stakeholders individually.

Resilient City’s Stakeholders Identification

There is no binding definition or strict interpretation of stakeholders within a city (neither in a resilient city). In order to identify relevant stakeholders within a resilient city we have conducted the basic literature study and we have also examined several reports mainly about implementation of the resilient city concept and about familiar concepts as well (e.g. the smart city concept). Within the mentioned sources, there have been identified mainly stakeholders as groups not stakeholders as individuals. These groups include academia, local and regional administrations, industry and commerce, finance, energy suppliers, ICT partners, communication companies, innovation bodies, international companies and citizens (Ielite et al., 2015; Rotterdam Resilience Strategy, 2016; Resilient San Francisco, 2016). Identification of specific stakeholders within the resilient city is missing or is performed only partially.

For the purpose of the further resilient city research and in particular for its more stable implementation, we have conducted the identification of specific relevant stakeholders. The first step was a selection of the relevant stakeholders who (Step Up Project, 2015):

- have interests and activities relating to the issue in question (resilience),
- can provide information, expertise and resources required for effective policy making.
are key players in ensuring successful implementation of disaster resilient city

We have been also considering two main aspects:

- the city aspect (stakeholder groups within each city by which every city’s resilience is built) - we assume three stakeholders groups:
  - the application of the resilient concept and the solution to strategic tasks is the responsibility of the city (or municipality), the city government and public administration, will be the first and main stakeholder group,
  - the resilient city concept is citizen-oriented and therefore, the citizens and societies (communities in the cities) will definitely one of the main stakeholders in the city as well,
  - a complementary position between communities and public administration (and government) is formed by the private sector (organizations, companies, institutions, agencies, etc.) which represent the third stakeholders group.

- the resilient city concept particularities aspect - the resilient city concept has defined seven basic components (UNISDR, 2012) of the city which should be addressed in order for successful implementation.

As an additional aspect for the identification of relevant stakeholders we used the Slovak Republic conditions where some stakeholders could differ due to specific differences in municipality and governance structure.

These aspects represent our starting point for stakeholders’ identification and they are illustrated in Figure 1. This figure also illustrates a close relationship between the mentioned aspects. These aspects and related components can be found in every city (municipality). However, in some cases we may encounter some specifics which are not taken into consideration. Each city can vary based on their size, population number, social structure, spatial structure, level of development, governance, etc. From that reason they can also differ in the structure of city stakeholders – some of the stakeholders could be missing within the city (e.g. city does not have an university) or new ones could occur. Every particularities could be included in further identification and analysis if needed.

![](attachment:Figure 1.png)

Based on the above mentioned aspects and components of the resilience city, the relevant stakeholders were identified as follows (Table 1). We assume that each of the stakeholder will be represented by a responsible representative (delegate) or by a group of representatives if needed. The leading position should be taken by representatives of city government and they should take part in all others interest areas as well. This is dictated by practical consideration because achieving a resilient city status is primarily the main task of the city leaders. City representatives, in some cases, may lack sufficient knowledge and experience in dealing with issues of crisis management, vulnerability reduction, disaster
preparedness enhancing, or resilience enhancing, we assume a close cooperation with rescue services, risk managers as well as experienced subject-matter experts.

<table>
<thead>
<tr>
<th>Table 1: Resilient city’s stakeholders and interest areas</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Government</strong></td>
</tr>
<tr>
<td>Local government</td>
</tr>
<tr>
<td>Regional and local administration active in all</td>
</tr>
<tr>
<td>other interest areas</td>
</tr>
<tr>
<td>International agencies and institutions</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Health</strong></td>
</tr>
<tr>
<td>Providers of healthcare (hospitals, clinics, health</td>
</tr>
<tr>
<td>centres, etc.)</td>
</tr>
<tr>
<td>Pharmaceutic companies</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Society and Culture</strong></td>
</tr>
<tr>
<td>Citizens</td>
</tr>
<tr>
<td>Relevant social groups (representatives of society -</td>
</tr>
<tr>
<td>civic associations: workers, students, ethnic group,</td>
</tr>
<tr>
<td>religion representatives, etc.)</td>
</tr>
<tr>
<td>Political parties</td>
</tr>
<tr>
<td>Social services centres</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Environment</strong></td>
</tr>
<tr>
<td>Companies with the potential of environmental pollution</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

Source: Authors

**Conclusion**

The resilient city is a concept by which a city adopts adequate measures to be able to minimize direct and indirect consequences of a disaster. It is also capable of a prompt and quick restoration of basic services, social, institutional and economic activities in the city after a disaster. We argue that the provided stakeholders’ identification method can serve as a basis for further research and for the implementation of the resilient city concept. Identification of the relevant stakeholders should also serve for their further analysis and this is our intention to do so. By understanding the stakeholders’ behaviour, interest, expectations, and responsibility within the process of building a resilient city it is possible to involve them and help them move towards a resilient city status. For explanation of these features the social contract concept and concept of ethics of responsibility can be used. On the one hand, we assume that there will be considerable similarities within the implementation of the resilient city concept and engagement of stakeholders into that process, but on the other hand, the particularities of each city (and stakeholders) should lead to an individual approach for each city and in particular to each stakeholder. Our intention is the analysis of relevant stakeholders of the practical example within the city Žilina in the Slovak Republic.

**Acknowledgements**

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References
A LOCAL BRAND AND “FMOT” OR FIRST MOMENT OF TRUTH
Aivars Helde1

Abstract: This study examines the nature of an advertisement with the focus on social discourse and First Moment of Truth (FMOT) in the context of this research. This paper aims at analyzing different commercial advertisements (product/non-product ads) to investigate the intentions and techniques of consumer product companies in reaching more consumers and selling more products. First Moment of Truth (FMOT) represents the “a-ha” moment when a consumer is confronted with a product and related alternatives, assumed to take place in everyday life. This is considered to be the point when a consumer decides to buy a specific brand or product. Although commonly the First Moment of Truth as a technique, is used as online or in-store selling, this technique has a crucial role in the perception of print advertising too. “Any time a customer comes into contact with a business, however remote, they have an opportunity to form an impression,” said Jan Carlzon, president of Scandinavian Airlines, defining the Moment of Truth in business. It has now crossed over into sales and marketing as others have embraced the term to describe different customer and consumer behavior (Shep Hyken). As soon as people in Latvia are going to trust to the national brand more, it is very important to focus on the visual manifestation of a local brand. The Norman Fairclough’s 3-D model, Kress Van Leeuwen’s grammar of visual design, and the French semiotician Roland Barthes (1977) suggested theoretical and semiotic tools for analyzing and understanding advertisements are used to analyzing the data. All materials are taken from the Latvian media.

JEL Classification Number: B41; DOI: http://dx.doi.org/10.12955/cbup.v5.918

Keywords: advertising, the photographic message, local brand

As the elements of a marketing program come together to create a complete offering, marketers must also consider how the marketing program will be used to create effective branding and positioning. While the concept of a brand may seem relatively simple to understand, branding strategy can be quite complex. From a technical point of view, a brand is a combination of name, symbol, term, or design that identifies a specific product. Brands have two aspects: the brand name and the brand mark (Ferrell & Hartline, 2014). The brand name is the part of a brand that can be spoken, including words, letters, and numbers.

The brand mark—which includes symbols, figures, or a design is the part of a brand that cannot be spoken (Nike’s swoosh). Jenni Romaniuk, a professor from The Ehrenberg-Bass Institute, says that distinctive assets are the elements that uniquely identify the brand across the clear majority of category buyers, such as the Nike swoosh or red and yellow M&Ms. The opportunity and challenge of distinctive assets is that potential assets can come from a wide source of possibilities, from colors, fonts, advertising style, celebrities, characters or logos, just to name of few. While these technical aspects of branding are important, branding strategy involves much more than developing a clever brand name or unique brand mark. Good brands are those that immediately come to mind when a customer has a problem to solve or a need to fulfill. So, branding strategy is “the battle for your mind” (Ries & Trout, 2001). However, for most people advertising is something to encourage or persuade them to buy a specific product. Advertisements not only serve this purpose, they “also amuse, inform, misinform, worry, though it may be argued that these functions are all in the service of the main function” (Cook 1992). By the other hand there are non-product advertisements as well that, without promoting any products, only advocate a change in behavior. Such non-product ads are used in different campaigns, and they show the effects of not adopting the advocated behavior. “Ads may not always be obliged to refer to a product, but they are still obliged to refer, however obliquely, to a change of behavior.” (Cook 1992). Today it is very common to use a third possibility—to combine these techniques and promote a product using different cultural and behavioral stereotypes. The aim of this type of advertisements is not to change habits of behavior but on the contrary—to maintain or strengthen these habits. Cook (1992) remarks that “Advertising is not a remote and specialized discourse, but a prominent discourse type in contemporary society.” In order to understand and study the images, one must be aware that they are created with social power and influenced by ideology. The term "ideology" in this case is an understood belief system, which exists in all cultures. Tuen van Dijk, founder of critical discourse, in terms of the concept of "ideology" gives us several of these important aspects. First, the ideology as a kind of "idea system" refers to the processes of cognition. Second, the ideology is social and is often associated with a group of interests, conflicts, and battles. Ideologies

1 RISEBA University, Riga, Latvia, awhelds1@inbox.lv
can be used to legitimize or, conversely, removing power and domination, often it symbolizes social problems or inconsistencies. Third, the ideology associated with the use of language or discourse, to indicate how it is expressed or reproduced in society. "If we want to know what are ideologies, how they work and how they are created, modified and reproduced, we need to carefully analyze the discursive manifestation" (Van Dijk, 1998). Sturken and Cartwright believe that ideology is an extensive and irreplaceable set of common values and views, one in which individuals survive their difficult relations with the large range of social structures (2001). Pictures are a major tool by which ideology is produced and to which ideology is projected. Visual culture is essential for power and ideological relations. Discourse is described by Gee (1989, 2005) as “language” (oral or written) in use with more socio-politically oriented meaning” Fairclough (1989, 1995) goes further and defines it as ‘just a particular form of social practice”. In other words, discourse constitutes social practice and is at that some time constituted by it. (Wodak, 1997). Inter-textuality has been described as text (which) is recognized in terms of their dependence on other relevant text. Essentially, it amounts to the relationship between text and the various languages or signifying practices of that culture. Therefore, one reason for the success of an advertisement or commercial may well be the underlying relationship between its presentation and a literary association familiar to the target audience. “Standard and messaging and conventional creative executions and placement are rapidly becoming outdated. To win a consumer’s attention and trust, marketers must think less about what advertising says to its target and more about what it does for them” (Rayport, 2013). In respect of connotative mechanisms it would be good to use Roland Barthes “Rhetoric of Image and the photographic Message”, his essays gets us tools for semiotic understanding of advertisements. In “Rhetoric of image” he separates one ad into three messages: the “linguistic message” that includes all the textual information, the ‘symbolic message’ -the connoted image and the 'literal message’ that refers to non-coded meanings that derive from the denoted image, all non-verbal elements in the image that do not have any cultural code. For Barthes, ‘the common domain of the signifies of connotation is that of ideology, which cannot be single for a given society and history, no matter what signifiers of connotation it may use (1977) Through a semiotic analysis, we can argue that these ideological representations in advertisements are assigned meanings to products or services.

In this case, Moment marketing or FMOT (pronounced EFF-mot), is a technique that can help marketers realize their idea about design communication. FMOT is the 3-7 seconds after a shopper first encounters a product on a store shelf or outdoor ad. It is these precious few seconds that advertisers have the best chance of converting buyers mind or create new understanding for a product by appealing to their senses, values, and emotions. Communication design focused around these life-changing messages can alter the whole perception towards the communication design field, from being a decorative aesthetically driven expenditure to becoming a significant investment that makes lives possible, easier and better.

"The public good must be the most important objective of design activity, and it should be sought with the best resources, being understood as an investment with high returns affecting hidden dimensions of the economy." (Frascara, 2002, p.35). Visual culture, of course, does not depend on pictures only, but visualization of different situations and meanings play very important role in our society. Researcher Mirzoeff (1998) believes that visual culture is a kind of crisis information and that everyday life is filled with visualization. He believes that post-modernity in which we live is the ocular centrist. This happens because we are becoming more and more operate and interact with fully constructed visual manifestations. Mirzoeff stresses that the first step towards the visual culture is the understanding that the visual image is not stable, but varies depending on relations with the external reality of modernity in certain moments (1999). Rogoff (1995) believes that visual culture as a transdisciplinary and between methodological approaches to development provides an opportunity to reflect on the culture’s most complex problems in another aspect. This approach allows you to look at some of the problems that are updated visual culture, such as the presence and the absence, shortage, invisibility, stereotyping, wishes, reflection, and objectification (Zitmane, 2015).

Talking about advertising the situation for the local brand is more favorable. Local manufacturers know their consumer behavior much better because they themselves are part of this behavioral model implementers. However, in the reality faced there are situations where a vendor claims to be socially responsible, even though actually it is only a marketing trick.
Ideological meanings are often idealistic, mythical significations assigned through connotative verbal and non-verbal elements of the advertisements. So, the nature of the experience is what needs to be considered – what does the consumer require when making this purchase decision? In his book – “Paid attention” Faris Yakob wrote: “Consumers need different brands to do different things. The clear majority of purchases do not adhere to a purchase funnel at all- they are made impulsively. Since there is, or there is perceived to be, functional parity among the primary competitors, we need to have only a very slight preference for a brand to aid the decision. Other purchases have different contextual needs that brands help to fulfills. There are always is combinations of rational and emotional needs that brands satisfy. The needs of consumers and the drivers of their behavior are variable. By looking at some of the veiled aspects of attention and cognition, we can begin to understand better people and brands, and how they interact. (Faris, 2015).

Statement of the problem and Purpose

The nature and importance of brand identity and brand image has been highlighted by many leading scientists on brand management and strategy. This has typically been done in the context of products, services or product and non-product advertising. Many studies of advertising, separate out components of ads, concentrating on one or a few and ignoring the others. There are some theories that are traditionally used, such as Fairclough’s 3D model or Kress and Van Leeuwen's visual grammar or Roland Barthes semiotics and rhetoric of advertising for consumers. Before dealing with ads analysis, it is worthwhile to explain what is meant by successful ads. These are described in their three basic parameters: strategy, creativity, and fabrication. The strategy constitutes a specific target selection, the target audience’s choice, the report creation, and media planning. Describing advertising as discourse is both more complex and more difficult than any of these approaches. It must be taken into consideration then that there is a danger of dilution in the analysis which attempts to tackle too much. Professionals advise marketers to approach this medium as a landscape composed of four domains: the public sphere, where we move from one place or activity to another, the social sphere, where we interact with and relate to one another, the tribal sphere, where we affiliate with groups to define or express our identity, and the psychological sphere, where we connect language with specific thoughts and feelings (Rayport & Jarowski, 2004). The dominant approach in cultural studies for analyzing ads has without doubt been semiotics. Many key arguments about the way ads perpetuate and feed dominant ideologies, about the way they construct audiences as consumers, and about the impact they have on culture more generally, are grounded in semiotic analysis. The problem is that the theoretical basis for those analyses has been chipped away at (e.g., Corner, 1983, Pateman, 1990), and if we are to rescue a strong critical, textually informed approach to ads, we need to supplement semiotics with theories of the social. “Semiotic analysis – in stark contrast to discourse analysis – begins by theoretically separating out of the realm of the symbolic, including language, and other sign systems such as the meaning of images, from the realm of social. The kind of analysis has worked well with ads partly because they appear pure semiosis with few traces of actual social and communicative activity. Ads often have no obvious senders. They are designed for a large audience to make sense of rather than a specific group, providing positions for us to locate ourselves within consumer culture. They are also divorced from their co-text: an ad on a bus has nothing to do with the bus, and thus require consumers to invoke the semiotic system needed to interpret them by themselves.” (Matheson, 2005) "Media discourses”

This study will focus on Latvian ads with effect of social discourse as a principle of a brand communication with the customer and FMOT based on customer cultural habits and expectations.

Scope and research Questions

This study employs quantitative and qualitative analyses, based on a content analysis and Kress and Van Luween’s visual grammars interpretation of advertisements. Taking into consideration that advertisements targeting local consumers are associated with national affiliations, the current study aims to answer the following questions:

(1) Which categories that conceptualized national identity are evident and significantly present in the advertisements of a local brands of Latvia

(2) What cultural meanings are assigned to the national affiliation categories in respect of verbal and non-verbal components in the visual corpus?
(3) Do FMOT induce a brand mark or a brand name to the national affiliation categories in the visual corpus?

“If human experience is a medium for advertising, how can marketers engage consumers there in a way they will welcome?” (Rayport, 2013). Rather than focusing first on a communication strategy and marketing mix, they should begin by considering how consumers live their lives and under what circumstances they will prove receptive to messages in this domain. For analyzing different advertisements, product ads and non-product ads have been selected. The answers of researched questions are not possible if we do not pull back the “ideological curtain” to see the power and ideology behind images, the chosen ads are predominantly visual. In other words, they communicate through images and pictures.

**Methodology and corpus**

The advertisements are from Latvian media and include brand promotion through social discourse. The dimensions of discourse and discourse analysis can be described as follows:

1. Text description; representing, relating, identifying positions for text analysis;
2. Discursive practices (analysis/interpretation: position for processing);
3. Social practices-social analysis/explanation

So, we can call, the first dimension is text analysis or description, the second dimension is processing analysis or interpretation, and the third dimension, social analysis or explanation. All dimensions are interdependent, and therefore it does not matter which kind of analysis one starts with. The series variables common to similar investigations were selected to provide a coding scheme. More specifically, seven categories identifying nationhood in advertisements were defined in the coding frame, as follow:

1. Geographic references/locations: distinctive landscape and landmarks
2. Leisure practices: popular activities
3. Cultural heritage; historical and cultural icon figures
4. Social relationships and social values: family, friendship
5. Objects: distinctive objects
6. Food/ drinks
7. National symbols (Hogan 1999; Edensor 2002)

In addition to the semiotic approach, verbal and non-verbal signs were identified using Barthes’ theoretical model of depicting linguistic messages, coded and non-coded iconic messages of advertisements (1977). Denotation and connotation combine to construct ideology and, based on Barthes arguments, denotation refers to the first order of signification and reflects literal meaning. Connotation refers to the second order of signification and reflects cultural, ‘constructed’ values which are attached to a sign.

**Materials**

Four different advertisements -product ads and non-product ads have been selected for analysis. The chosen advertisements communicate through images and pictures. The chosen advertisements communicate through images and pictures.

![Figure 1: The advertisement “Help Bring Your Baby into the World”](image-url)
Results and semiotic analysis of advertisements

The study was relevant to seven chosen cultural meanings, the dimensions of discourse and discourse analysis.

The “Elvi” (Supermarket Chain) Campaign - “Help Bring Your Baby into the World” This is the picture of a happy smiling baby, (see Figure 1). The company “Elvis” the producer of this ad, (It...
seems that there is the text “Help! To make dreams come true, donate by calling or in the” Elvi” store at point of purchase.”

The colors in this advertisement are light; the accent is not on the baby but the first text phrase with ‘help’ written in green color. The viewer is almost too intimate with the baby who is next to the text. This ad is considered to be for charity. It is trying to solve a problem. Thus the result, the viewer has the power to be involved or not. There is no power above to force her/him. From the point of cultural meanings, this advertisement shows us “Our” proposes the idea of Collectiveness by suggesting an imaginary community, that shares and adopts the concept of mutuality. In the current example “we take care of “our” families.

The “Aldaris” (Beverage Manufacturer) The advertisement “Beer duel.”

We see a complex picture. In the first plan, we see two beer bottles, labels indicate that to the right is the “haze” but to the left the "ancient." Deliberately the bottles are presented from such point of view, so after "haze" - "ancient" followed by "ancient" - "haze". Visible in the background of two men in the face, both Latvian recognizable people. In addition, one of them with dark hair, while the other is bald headed. At the advertisement top we see inscription- “Aldaris,” below this is text- “Men vote for our own folks” and the texts, which are located in circles, and, as can be understood to say the men in the picture. On the right side is the wrestler Zelonijs, he says-haze because it looks like more interesting taste, as will to eat some fish or cheese, luge rider Prūsis, he says- certainly “ancient” bee, it tastes much better. The colors used in this ad are brown and beige. These two men faces attract the viewer’s attention and encourage her/him to read the ad. This ad gives the viewer a sense of rivalry. The eye-level angle shows that the power balance is on the side of the viewer and he is the real judge. Thus, the viewer feel inclined to obey the advertisement, preferring his idol. From the point of cultural meaning, we can observe that historic authenticity is another ideal that use local brands. Food/drink were found to have a significant effect on the representation of nationhood. More specifically, when beer is used, there was some evenly distributed preferences for traditional products.

The “Mama daba” (On the one hand, the task of “Latvijas valsts mezi” is plain and simple – to manage the forests belonging to the state of Latvia. On the other hand, we would like to contribute by bringing people closer to nature. Hence, “Mammadaba” – Mother Nature - a structural unit of “Latvijas valsts mezi”, which aims at acquainting local resident and foreign guests with the richness of nature here and helping everyone become one with its primeval beauty). The advertisement “Rush”

This is a non-product ad. about how to regain strength and emotion of our hectic everyday life (See figure 3). As a result, its discourse is social responsibility in highlighting a social problem. The colors in this advertisement are autumn, and soothing. In the background, it is dominated by saturated green tones. The picture is rich with the forest animals. At the top of the advertisement we see the logo by “Mammadaba” and slogan “Active leisure in LATVIAN State Forests” but at the right corner, we see an inscription which complements the center of the display where we see the word “Rush” successfully left Behind in Latvian State Forests. This ad aims to draw attention to a problem. As a result, the viewer feels inclined to obey the advertisement. From the point of cultural meaning we can observe wild nature, signifying an essence of ecology, that we, collectively, in Latvia love our clean and wild forests, the environment for our guests.

The sweets Manufacturer “Laima”

Here we have picture of a baby on a pale-pink cloud (see Figure 4). The colors used in this ad are blue, white, and pale pink. The color blue gives the viewer peace, the color white offers contrast, and color pale pink in middle of the picture of the baby attracts the viewer’s attention and invites her/him to buy the biscuits that lie below the picture of the baby. Above this picture the following is written in white:”

For a Real Childhood, Selga”. Below the biscuits is explanatory text: “Buying any biscuits “Selga” help 5 Latvian hospitals present special apparatus that controls the unborn baby’s heartbeats”. The company “Laima” is producer of this product (biscuit) ad, which aims to present the company as a socially responsible one that cares about children. The discourse of this “Laima” product could be considered as charity. Therefore, the viewer has the power to choose the biscuit or not. There is no force. From the point of cultural meaning-the pronoun “our”, what mean a responsibility and collectiveness. Specifically, in the current example, 'we are taking care of ‘our’ baby, which provides the moral center of this narrative.
From the point of the first moment of truth

Figure 5: Scheme of the FMOT

Text and picture make coherent sense by the ways they instantiate structures of meaning. “Though these may seem like fine distinctions, they are crucial. They suggest that we may be able to talk about what happened in the images and texts in a specifically textual way, without having recourse to hypotheses about what their sender may have intended them to mean, or without having to guess about their effects on a single given receiver. In short, the separation of addresser from sender and addresser from receiver is what lets us do semiotics rather than psychology (Thwaites, Lloyd, Warwick, 2002).

In addition, from the point of FMOT - it is important to mention that these findings show us how FMOT may work for print ads. For example, in the first and fourth situation “Help Bring Your Baby into the World”, “For a real childhood” - Our attention is attracted by the call to help (in the first case it is found in the second to understand the unconscious level that we have to protect, care for children), along with the child’s picture, acting as a stimulus, followed by empathy and understanding of the nature of the (internal reaction force of human empathy, moral maturity, option) and the social experience. Incentive and experience are equally important moments in a determined man’s further action. The second example, the ad of the “Beer duel” - advertising legend and the image stops us even confuses us, while incentive arises in addressing the question of a visual puzzle on already incurred emotion-smile. The advertisement “Rush” works in otherwise, there is an incentive for even more specifics, it is connected with the desire to examine, explore.

Conclusions

“All living human beings communicate through sounds, speech, movements, gestures, and language. Communication involves many human activities, speaking, listening, reading, writing, viewing, and creating images. How people communicate is based on cultural conventions that are adhered to in interacting with other people, in producing and sending messages and interpreting messages” (de Mooji, 2014).

A content analysis of local brand advertisements has revealed that, in respect of nationhood. The purpose of this study was to analyze advertisements, product ads, and non-product ads, in order to see when the producers use their power to imply something to the viewer, while at the same time paying attention to the process called the First moment of truth. The analyses showed us that in modern days it is very common to use the focus on social discourse for commercial ads. This technique allows producers to cultivate better relations between the viewers (consumers) and the company. In this case, we should use power in discourse as a form of social practices which are themselves shaped and constituted by power relations. In analyzing these advertisements and defining the position of the viewers, the followings conclusions were made. The producers try to show that the viewer has the power to choose or not to choose something. All meanings were explored in respect of the Latvian sociopolitical context and portrayed through visual communication. These cultural meanings are very much related to the social characteristics of the people and their daily practices of every day. As Rogoff wrote in “Visual methodologies”: 

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Visual imagery is never innocent; it is always constructed through various practices, technologies, and knowledge.

The meaning of an image or set of images are made at the three sites: the site of production, the image itself, and its audience.

There are three modalities to reach of sites: technological, compositional, and social.

Theoretical debates about how to interpret images can be understood as debates over which of these sites and modalities is most important for understanding an image.

A local brand has a great advantage because they are able to reach their potential audience, based on national identity. This is very important especially in times when there is increasing competition in the market, and in the local market too. The current research would provide additional and useful results about image identity from the viewers’ perspective in local brand advertisements.

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SURVIVING THE BUSINESS IN THE LONG RUN: A STUDY OF FAMILY ORIENTED SMEs IN DEVELOPING ECONOMIES

Ravindra Hewa Kuruppuge,¹ Aleš Gregar²

Abstract: Whilst the majority of family oriented SMEs are suffering from survival problems in the long term, some businesses perform successfully over generations. This article explores the emerging themes which are related to the business longevity of family oriented SMEs in Sri Lanka. Addressing a lack of knowledge in the area, our strategy of enquiry used a qualitative approach coupled with semi-structured interviews; 17 owner-managers of family-oriented SMEs were interviewed and the results were subsequently transcribed for the analyses. The results indicated that the founders’ tacit knowledge of producing goods or services, consequently transferred to heirs in family oriented SMEs, drive the survival of businesses for longer periods in Sri Lanka.

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Introduction

Sri Lanka is a South Asian country whose indigenous management and business practices have been developing in a rich cultural heritage for the past 2500 years, and also have been influenced by the teachings of Buddhism (Ranasinghe, 2011). As a result, teamwork and a long tradition of strong family ties in business have been common for Sri Lankan businesses, especially in the case of Small and Medium-sized Enterprises (SMEs). In Sri Lanka, a family business is ideally limited to members of a single, extended, multi-generational family. Consequently, these businesses are relatively small in terms of capital and number of employees. Sharing of social, psychological, economic and security values among family members is a typically observed facet of Sri Lankan family culture (Jayawardena, 2000). Most SMEs in Sri Lanka are rooted in a family firm context, and owners of these businesses expect family involvement in business activities, as well as sharing economic values with family members. In these small businesses, the managerial positions are largely reserved for family members, with each individual’s behavior influenced by having family. Due to this, in the Sri Lankan business culture, the enterprises are family-based and small in scale.

From the literature which concerns family businesses, it seems that all over the world these businesses outperform non-family businesses in the short term. The same literature proposes that these businesses rarely continue to the second generation from the founder. However, contrasting, there are some studies which conclude that some family businesses are progressing effectively over generations and overcoming burdens which are unique to SMEs (De Alwis, 2015). In literature, there is only a limited amount of studies which address how some of these family firms are progressing effectively, and as a result, any emerging themes and concepts of the long-term survival of family owned SMEs in Sri Lanka are unknown. This present study focuses on understanding the emerging themes behind the longevity of family businesses, and it explores the current business strategies of owner-managers of family oriented SMEs in Sri Lanka. It seems that to understand the success of family-owned SMEs, more emphasis should be given to intangible resources, like the tacit knowledge which is handed down through the generations. Accordingly, utilizing the resource-based view model as the theoretical lens for the study, the main goal of this study is to understand the themes behind survival of family firms in the long-term. Following the introduction of the study, the remainder of the article is structured into four sections, namely theoretical and literature review, the methodology of the study, results & discussion, and finally the conclusion.

Theoretical and Literature Review

The literature review in this article is comprised of two parts. The first part discusses the theoretical lens (Resource-based View) of this study. The second part discusses family-oriented SMEs and business longevity.

¹ Faculty of Management and Economics, Tomas Bata University in Zlin, Czech Republic, kuruppuge@yahoo.com
² Faculty of Management and Economics, Tomas Bata University in Zlin, Czech Republic, gregar@fame.utb.cz
Resource-based View (RBV) of the business

The RBV of a business suggests that a business’s internal resources, which are accumulated through a period of time, are viewed as tangible and intangible drives in the sustainability and continuity of the business. The knowledge, skills and methods specific to any industry play a huge role in the survival of a business (Barney, 1991). However, the RBV is based on two specific assumptions. Firstly, this theory presupposes that an individual business possesses unique resources, which cannot be imitated or copied. This indicates the uniqueness of the individual business in the case of its resources (Barney, 1991). Secondly, RBV assumes that there is a difficulty in resource mobility due to higher cost of transacting. Such resources cannot be separated from the business and could not be bought in the market (Barney, 1991).

Family-oriented SMEs and business longevity

Throughout the world, in previous studies family businesses have been defined in a multitude of varying ways. This study treats family businesses as unique, inseparable, synergistic resources with capabilities arising from the family involvement and their interactions (Kellelarmms et al, 2012). At the current time The Ministry of Industry and Commerce of Sri Lanka (2014) recognizes SMEs as enterprises or business entities with less than 300 employees, coupled with an annual turnover of less than Rs. 750 million. According to this definition, almost all micro-scale businesses are also identified as SMEs. Moreover, most SMEs in Sri Lanka are family-orientated. The business longevity of SMEs has been addressed by many researchers earlier.

Studies regarding Entrepreneurship have extensively discussed the longevity of SMEs. De Clercq and Voronov (2011) highlighted the importance of legitimacy and profitability in sustaining SMEs, as well as the entrepreneurial abilities of SMEs. They recommended balancing business profit and sustainable growth. Analyzing SME performance grounded in RBV, Terziovski (2010) found intangible resources to be a main factor for business sustainability in the 21st Century. This was in addition to identifying business culture and innovations as determinants in the performance of SMEs. Rangone et al. (1999) argued that RBV was a foundation to identify the potentials of SMEs in case of survival, and their study found out long-term competitiveness was a function of resources of the business. Knowledge has been identified as the prime resource for making innovations, which gives a business competitive advantage over similar businesses in the present economy of global knowledge. At the same time, all other physical resources, like land, labor and capital, have been gradually replaced by intangible resources such as human capital. In the global competition, even a very small business located in a rural area has been highly challenged by other businesses. Irrespective of the size of the business or the industry, almost all businesses in the global market have a high chance of continuing and surviving. In a study of 600 family businesses, Diaz Morlán studied succession in family businesses and concluded that the intergenerational knowledge transfer is a determinant of longevity. Researchers in this field have studied the positive and negative factors of business longevity and, in general, business longevity has been adequately examined by previous studies. However, there are only a few studies regarding family-oriented SMEs.

Methodology

This study was conducted by implementing a qualitative approach. Purposive sampling was used to select both cases and respondents. 10 family-oriented SMEs from Sri Lanka were selected as cases for this research, and 17 owner-managers were selected as respondents. The interviews were privately held and successfully conducted. The respondents and cases were chosen with regard to the history of the business and the business experience of the respondents. Data was collected mainly via semi-structured, in-depth interviews. Data collection consisted of 17 interviews and 10 business cases. Before the data analysis, coding and categorization of respondents’ views from interviews helped to identify common patterns and themes from both within-case and across-case analysis. Content analysis, the analytical tool selection and the analysis were carried out through the lens of RBV.

Results and discussion

The main goal of this analysis was to understand the concepts behind the survival of family-oriented SMEs over several generations in Sri Lanka. The coding of transcriptions of interviews ended up with three main categories, namely family involvement, intangible assets and tangible assets. When the detailed content of each category was analysed, some interesting themes emerged.
In the analysis, it was clear that family contribution to the development and survival of the business takes place through the tangible and intangible resources of SMEs. One of the key findings of this analysis was that the degree of contribution by each person depends on the business type and its family objectives. Both business and family objectives are prioritized in family businesses. In terms of development and survival, this analysis indicated that intangible resources are more powerful than tangible resources in family-oriented SMEs. Family members involved in the business have passed their business secrets and experiences as tacit knowledge to their successors or trustworthy business associates. Often, no one else can copy or imitate such knowledge, and it is only transferred among specific family members. This happens in the businesses over generations. Respective members of SMEs have preserved intangible resources like tacit knowledge more than other assets of the businesses. Interestingly, this may not be the case in non-family business where there is no family involvement and accordingly, intangible resources are identified as the main resource of family oriented SMEs in Sri Lanka. Another finding is that when a family business is sustained through successive generations, the founder’s legacy and culture has an important role to play. Most of the positive work manners, attitudes and practices have been created in the business and have become a part of its history. Such positive concepts in a business have been clearly supported by the legacy of the business founder in family-oriented SMEs in Sri Lanka. Following direct quotations from respondents of interviews provide enough evidence about this founder legacy and tacit knowledge sharing.

Case 04, Res: 02 “Our business is a result of founders’ effort. My fathers’ father has started this business and handed over to my father before his death. He has given all required knowledge including all business secrets to my father. My father did the same for us”

Case 08, Res: 01 “Nobody else, other than me, in this world knows how to mix all these ingredients together to make this a solid production. All the time, I do the process alone and manually. I do not need to make others to know about this mixture”

Case 09, Res: 02 “Business continues based on our handful experience. Once the knowledge goes to unwanted people, it is the end of the business”

Case 02, Res: 01 “I will give my all business secrets and experiences once a person, one of my sons, is ready to take the business. My experiences are more precious for them than the business assets”

Case 01, Res: 01 “my mother said, business is nothing. It is all about personal relationship with people”

In most cases, family involvement in SMEs is natural in developing countries. Accordingly, family involvement is one of the most common areas of analysis. In this study one interesting theme amongst all others stood out. In surviving businesses, it is the legacy of the founder which emerged as a strong concept in family-oriented SMEs. When the current management of family-oriented SMEs implement the concepts and practices introduced by the founder, those practices make the current management hard working, confident, trustworthy and committed to the business. In addition, the tacit knowledge of producing goods or business processes as an intangible resource contributes to the business surviving in the long term. Commonly, this tacit knowledge is transferred by owners to successors or very trustworthy business associates as business secrets. With this practice, family-oriented SMEs keep their products and services unique when compared to other similar businesses. This study is limited by neglecting the need for business innovations to be competitive and survive in the long term. Almost all of the previous studies into organizational learning, organizational development, entrepreneurship and family businesses have highlighted this factor.

**Conclusion**

The findings of this study indicated how family oriented SMEs survived over generations through their intangible resources. On the one hand, findings of this study give answers to the everlasting problem family-oriented SMEs, business survival in the long term. On the other hand, this analysis shows the benefits of family involvement which can result in longevity and sustainability of SMEs. This stresses the need of handling family matters in businesses effectively, so as to sustain the business for a longer period. At this stage, practitioners and policy makers in this field are well
facilitated by this finding. Further, the emerging theme of intangible resources has proved that intangible resources are more powerful than tangible resources in a family-oriented SMEs in terms of development and survival. The tacit knowledge of producing goods or business processes is identified as the strongest intangible resource which contributes to business continuation. Accordingly, the tacit knowledge of operating business activities, transferred among close family members, is called business secrets. This kind of business secrets are identified as the main intangible resource of family-oriented SMEs. These findings direct the owners of family-oriented SMEs to understand the potential of family orientation in their businesses.

**Acknowledgement**

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**References**


CUSTOMER ENGAGEMENT WITH A BRAND IN THE CONTEXT OF SOCIAL MEDIA

Magdalena Hofman-Kohlmeyer

Abstract: Nowadays, a strong brand is one of the most valuable assets of a company. In order to obtain this asset, the growing ranks of enterprises decide to include social media in their marketing strategy. Social media gives the possibility to have customers highly engaged with a brand. The present article is aimed to give an outlook on the process of building customer engagement in a brand throughout social media. The presented approach is based on a literature review.

INTRODUCTION: The meaning of social media in engaging customers is widely acknowledged. In order to building a strong brand and make current customers loyal, the growing ranks of managers decide to include social media in their marketing strategy.

OBJECTIVES: The present article is aimed to give a theoretical outlook on engaging a customer with a brand throughout social media.

METHODS: To achieve the assumed goals the author presents a literature review.

RESULTS: The literature review offers some directives on how to make customer engage with a brand, information on how this process should proceed and information about the profits which can the brand obtain.

CONCLUSION: Social media gives an opportunity to make customers highly engaged in a brand. The building of customer engagement throughout social media takes place through the following process: connection, interaction, satisfaction, retention, commitment, advocacy and customer engagement. Social media is also treated as a source of mass communication. One-to-one communication between stakeholders and firm-to-firm communication exert a positive impact on brand trust. In terms of customer-to-customer communication, there are some doubts. The authors also indicated the vital role of content quality and the occurrence of negative conversations on the fan page.

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Keywords: customer engagement, social media, brand

Introduction

Since the emergence of the commercial internet, spending on online advertising campaigns have been continuously growing. The internet has quickly become a strong competitor of other communication channels. Online advertisement makes users involved, enhance them to interact and increase their interest in a product or service (Dudzik-Lewicka & Hofman-Kohlmeyer, 2015). On the internet, the line between entertainment and advertising become blurred (An, Stern, 2011). Within the last couple of years, online promotion has undergone many changes. One of the developed means of communication is contextual advertisement. It allows to reach consumers at the exact time while they watch the contents substantially related to the product or service promoted (Dudzik-Lewicka & Hofman-Kohlmeyer, 2015). There is recognition of increase in use of social media among corporations. According to the University of Massachussets Dartmouth, in 2012, 73% of companies among Fortune 500 had an official profile on Twitter, and 66% had a page on Facebook. Furthermore, social media goes to mobile, mitigating the traditional time-location restrictions (Okazaki & Taylor, 2013). In a relatively short period of time, managers have included social media for a variety of marketing purposes, e. g. branding, research, customer relationship management, service, sales promotions. The most important purpose is using social media for branding, as an integrated component in marketing communications channel (Ashley & Tuten, 2015). The interactivity of social media enables users to establish conversations with individuals and firms in communities of sellers and customers. Customers are involved in the content generation, and value creation and practitioners have the possibility to serve customers better and meet their needs.

The evolution of the internet was timed to coincide with the increasing interest in customer engagement (Sashi, 2012). Some authors defined engagement in the context of a psychological state, while others focus on its behavioral manifestations toward a brand or a company (Cabiddu et al., 2014). There is an approach to customer engagement that assumes that engagement is a tendency to maintain a relationship with a partner, even when the delivered value does not meet expectations, and there is the small prospect of any change in the future (Mitrega, 2005). New ways to engage both firms and customers with each other in social media is a brand community with a large number of users (Gummerus et al., 2012). Although the importance of social media for customer engagement is acknowledged, a better

1 University of Economics in Katowice, Faculty of Informatics and Communication, magda-hofman@o2.pl
understanding of this phenomenon can help find the unique features of social media (Cabiddu et al., 2014).

This article is organized as follows. At first, the role of the brand is presented. The next part constitutes the characterization of customer engagement in a brand through the social media based on a literature review. In the final part, there are some suggestions for future research and the conclusion.

**The role of the brand**

Contemporary organizations develop a variety of methods to build a strong brand as part of their business strategy. The brand is often evaluated as a company’s most valuable asset (Wallström et al. 2008). A customer which is loyal to the brand may be willing to pay more for the product with the brand’s logotype because they perceive some unique value. The uniqueness may be caused by grater trust in the reliability of a brand (Chaudhuri & Holbrook, 2001).

Brand building activities are positively correlated with brand equity and lead to acquiring and retaining customers and increasing the value for a company. Brand equity is important in building long lasting relationships with customers (Samu et al., 2012). Brand equity is a set of brand assets and liabilities linked to a brand, its name and symbol that add or subtract from the value provided by a product or service to a firm and/or to that firm’s customer.

The brand effect and brand trust are positively related to brand commitment (Chaudhuri & Holbrook, 2001). Commitment is defined as the customer’s confidence that the functional and affective benefits from maintaining a relationship with the companies are greater than the benefits from ending them. Commitment is described as a core feature of customer relationship management and an inevitable factor in achieving a company’s goals. Customer committed to a brand is motivated by company to actively cooperate with customers and not to choose competitors’ offer (Hur et al., 2011).

The popularity of social media enabled companies to build close relationships between their customers and themselves (Cabiddu et al., 2014). Branded social campaigns can be utilized to increase brand awareness and brand liking, enhance customer engagement and loyalty, and evoke consumer word-of-mouth communication about the brand (Ashley & Tuten, 201). Nowadays, a vast number of Polish firms treat building the relationship with customers as the most important part of the marketing strategy (Mitrega, 2006).

**Customer engagement with a brand and social media**

In recent years, the emergence of new digital technologies and tools can be observed, especially social media like blogs, micro blogging sites like Twitter, video sites like YouTube, virtual worlds like Second Life and social networking sites like Facebook, MySpace or LinkedIn (Sashi, 2012). Cabiddu et al. (2014) reminded that social media are defined as a group of Internet based applications which build on the ideological and technological foundations of Web 2.0 and which allow the creation and exchange of user-generated content. Social media contain applications that allow users to create, edit and access content and communicate with other individuals (Cabiddu et al., 2014). The growing popularity of social media led to the necessity of better understanding these technologies and tools especially as an opportunity for creating customer engagement. Customer engagement focuses on satisfying customers by providing better value than competitors in order to gain customers’ trust and commitment in long-term relationships. The interactivity of social media enhances the process of creating relationships between sellers and buyers (Sashi, 2012).

Sashi (2012) examined customer engagement from the point of view of the practitioners. He formulated a customer engagement cycle with the following stages: connection, interaction, satisfaction, retention, commitment, advocacy and engagement. The cycle is presented in Figure 1.

Connection is the first step to establish emotional bonds between sellers and buyers. To connect with the buyers, a company can use simultaneously traditional offline methods (e.g. a salesperson) as well as new digital online methods (e.g. social networking). Social media expedites the establishment of connection with a large number and wide variety of individuals and firms.

Interaction is the second stage in the cycle. The growth of the internet mitigated the restrictions in communication like space and time
Worldwide interactions among people at real time have become possible through social networking, virtual worlds or instant messaging. Interactions between companies and their customers can improve the understanding of customer needs and help upgrade existing products or develop new products to better meet these needs. The Internet allows marketers to maintain a dialogue with customers. This dialogue can support research and development activities, involve customers in new product development and in market testing stages, and allow for the companies to understand customers’ needs. Customers can collaborate with marketers and participate in the value adding process.

Satisfaction is necessary to maintain connection between a company and its customer and to make progress towards engagement. Satisfaction is an intermediate step to achieve the goals of an organization. It is an inevitable but not sufficient condition for customer engagement. Satisfaction can be defined as an overall evaluation based on the total purchase and consumption experience of goods or services over time. Satisfaction is achieved at a high level when the company exceeds the customer's expectation and the customer's emotions are highly positive.

Customer retention is an expected result from satisfaction and positive emotions. Retention leads to repurchases and implies a long-term relationship between customers and a brand.

Commitment in a relationship can be considered in two dimensions: effective commitment and calculative commitment.

Calculative commitment is rather rational and often is caused by a lack of another choice or switching costs. Affective commitment is rather emotional and is the effect of the trust and reciprocity in a relationship. Affective commitment can build a higher level of emotional bond between the customer and seller.

Advocacy occurs when satisfied customers spread the word about their positive experiences with a product, brand or company using their Internet social networks. Customers offer some recommendations to another using word-of-mouth communication. Affective commitment is positively related to advocacy, and calculative commitment is not. Companies can play advocacy roles as well as customers by acting in the customers' best interest. Companies expect that they will look after each other with and the customers and the values will be exchanged.

Engagement can happen when customers are loyal and delighted, share their experiences with other's in their social networks and become advocates for a product, brand or company. To achieve customer engagement, a company need to create strong emotional bonds with customers. Customer engagement includes customers in the creation of value, enhances their satisfaction and turns customers into fans.

The customer in each stage of the cycle can be arrayed in a customer engagement matrix (Figure 2). Transactional customers are distinguished by low emotional bonds and low relational exchange. They are price sensitive and switching sellers from transaction to transaction. These customers are the source of customers for the other cells in the array. A company can potentially turn these customers into loyal, delighted customers or fans.

We have delighted customers when the relational exchange is low and emotional bonds are high.

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**Figure 1: Customer engagement process**

![Customer Engagement Process Diagram](image-url)

Source: Sashi (2012)
Delight does not cause long-term relationship. The company needs to enhance relational exchange.

![Customer engagement matrix](image)

Source: Sashi (2012)

Loyal customers are characterized by high relational exchange and low emotional bonds. Customers are loyal only for rational reasons. There is lack of emotional connections between the customers and the brand. According to future intentions, there is a need for developing effective commitment and turn loyal customers into fans.

When customers are fans, we have customer engagement. Relational exchange and emotional bonds are high. Fans trust companies and advocate for them. They connect with other fans and interact with them. Companies want to have many customers who are fans and also delighted, loyal and transactional customers who can be future fans. This process can be improved by using social media, especially when it comes to establishing connections, interactions, and the increasing likelihood of satisfaction. Social media enhance deriving of transactional customers, creating delighted and loyal customers and turning them into fans (Sashi, 2012).

Vohra & Bhardwaj (2016) carried out a research study in the field of social media and customer engagement in a brand. They focused on Twitter and Facebook because these two platforms were on the top of the list of social media channels being used by marketers for engagement. A questionnaire with open-ended questions was sent by e-mail to digital media managers of 25 firms in India. The survey reveals how firms view engagement in the context of social media.

According to the study, social media channels offer a wide range of features which the brands can use to engage with their customers. Managers indicate the potential of social media as a source of mass communication, one-to-one communication between stakeholders and also firm-to-firm and customer-to-customer communication. Marketers focus on behavioral dimensions of engagement, like some customers’ activities, for example sharing the company’s content and posts with the others participating in the conversations. Many customers are not active users, but they are engaged in brand passively. Customers may use information shared on social media in an active and frequently way, without taking part in any conversations. Customers must be attracted to a brand’s social media by the content. The content should invite customers to conversations and attract the passive customer. Content can take the form of a simple text, videos, audio clips, or images. Social media can be used as a social recommendation system (like and share buttons). Managers should take into consideration that conversations can be positive but can be negative too. Many customers use social media profiles to express their negative feelings towards the brand. These negative conversations can lead to negative engagement. It is important to marketers to manage positive as well as negative conversations that take place on social media (Vohra & Bhardwaj, 2016).

Habibi et al. (2014) investigated the process of building brand trust in social media, especially in brand communities. They conducted a survey of members of the brand community. Participants filled out a questionnaire. The findings provide information on how brand community and engagement in social media impact building brand trust.

The brand community relationship such as customer-brand, customer-product and customer-company positively influence brand trust. Surprisingly, the customer-other customer relationship exerts a negative
influence on brand trust. Perhaps some members have doubts about the credibility of the received informations from social media. Another explanation assumed that consumers’ connectivity and interactions increase customers’ expectations toward the brand. We can suspect that the brands have limited control of social media. On the top of that, the literature review offers mixed results in this issue. The research conducted by Habibi et al. also support the statement that community engagement matters in social media. Engaging consumers in brand communities creates a stronger relationship with the brand, the product, other consumers and the company. Conversely, consumers who trust the brand, more willingly participate in the brand community and building of the brand relationship (Habibi et al., 2014).

Although the importance of social media for customer engagement in a brand is acknowledged, there are some suggestions for further research in the literature review. In future research Laroche et al. (2013) recommended to utilize a brand type, culture, characteristics and facilities of the community on social media to examine how these variables affect customer relationships with brand elements (Laroche et al., 2013). Kim & Ko (2012) indicated that a future study should develop effective tools to measure appropriately the effect of social media marketing (Kim & Ko, 2012).

**Conclusion**

In recent years, the use of social media among corporations has significantly increased. Managers include social media for marketing purposes like research, customer relationship management, service, sales promotions and especially for branding. Companies have the opportunity to engage customers and maintain the relationship. The building of customer engagement throughout social media takes place according to the previously mentioned cycle. This process begins with the establishment of connection. Next there is interaction, then satisfaction, retention, commitment, advocacy and the final part constitutes customer engagement. This cycle delivers transactional customers, creating delighted and loyal customers and turning them into fans.

Managers indicate the potential of social media as a source of mass communication, one-to-one communication between stakeholders and also firm-to-firm and customer-to-customer communication. These relationships have a positive impact on brand trust, except the customer-to-customer communication. There are various different results present in the studied literature and because of this, additional research might be necessary.

The authors also indicated the vital role of content quality. The content should invite customers to conversations and attract the passive customer. Managers should also take into consideration the negative conversations on fan pages and mitigate the effects of these conversations.

Despite the progress made, there is still a need for further research in this field. A better understanding of the importance of social media for customer engagement can help identify unique features and create better tools to make customers loyal to the brand.

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INNOVATIVE APPROACHES AND THEIR APPLICATION IN MEASURING BUSINESS PERFORMANCE

Jarmila Horváthová,1 Martina Mokrišová2

Abstract: In the area of business performance evaluation, we should pay attention to innovative approaches to performance measurement. They include the application of a matrix model. This concept was initially used for addressing the efficiency of input and output transformations. However, the terms ‘efficiency’ and ‘performance’ are closely linked. Some authors even assign them the same meaning. Based on the above-mentioned, a linear programming model for addressing the problems of input and output transformations can also be applied for business performance measurement. The benefit of this paper is the measurement of business performance applying a matrix model. One of the significant outcomes of such matrix model is the formation of new indicators, which can be beneficial in business performance measurement. Another positive aspect of this approach is the creation of a network of indicators assessing business efficiency, effectiveness and performance. There are strong links between indicators in a network, which can be mathematically described. Based on the knowledge, the management of a business can focus on those functional areas, which are preconditioned for business performance and efficiency improvement.

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Keywords: business, efficiency, indicator, input, matrix, model, output, performance

Introduction

The measurement of business performance is nowadays a very actual problem. Recently there is a decrease in use of conventional profitability indicators as synthetic measures of business performance. Nowadays, due to the changes in the economic environment, new tendencies arise. These tendencies originate in the areas with the most developed capital markets and are linked to the shift of top indicators of performance measurement towards maximization of shareholder value. The result of this is the use of so-called value criteria for business performance measurement.

Literature review

Conventional financial indicators have a low predictive value in looking for ways to improve business performance, especially in the long-term. This is due to the fact that these indicators measure and evaluate special area of business financial health. “It is important to supplement conventional financial indicators with other more dynamic and more prospective indicators, which are adjusted to specific competitive conditions” (Gallo, 2013). The aim in performance measurement is to monitor and compare the implementation of performance results with the planned level of performance, to monitor strategy implementation, to identify accompanying fundamental problems and to perform measures to eliminate deviations (Dudoková, 2004).

From this point of view, it is necessary to implement modern indicators of performance measurement which are based on market principles, not on accounting, and proceed from the theory of value management and the acceptance of the internal and external risks and are applicable in business valuation (Mařík, Maříková, 2005; Suhányiová, Suhányi, 2011). “Therefore, basic financial fields of evaluation and measurement of business performance can be supplemented by more recent and modern indicators and methods” (Kislingerová et al., 2011). “Evaluation using modern methods with the application of market characteristics such as the EVA indicator (the EVA model has been known since 1980. Its authors are representatives of Stewart & Co., Americans Joel M. Stern and G. Bennett Stewart III.), INEVA, MVA, RONA, WACC or indicators based on FCF, CVA and others” (Stern, 2015).

In addition to measuring performance with the use of financial indicators, we focus on business performance measurement applying a set of non-financial indicators which are based on experiments from the early 80s, when Peters and Waterman (1982) proposed eight factors that lead to business success and Rockart (1981) and Chung (1987) suggested critical success factors. As the comprehensive approach to business performance measurement, the concept of a Balanced Scorecard (Kaplan, Norton, 2000) developed in the 1990s followed. Another business performance evaluation method which uses non-financial indicators is the method of Harry Pollak (2004). “Methods of

1 Faculty of Management, University of Prešov in Prešov, jarmila.horvathova@unipo.sk
2 Faculty of Management, University of Prešov in Prešov, martina.mokrisova@unipo.sk
performance evaluation based on non-financial indicators also include techniques of determining measures for business management - for example CMM (Capability Maturity Matrices), performance pyramid, EP²M (Effective Progress and Performance Measurement) and the management of performance processes” (Sink and Tuttle, 1989). “Modern techniques of performance management and measurement also include Total Quality Management, Six Sigma, Benchmarking, Kaizen, Business Processes Reengineering and others” (Horváthová et al., 2014). These approaches represent a multi-criteria evaluation of performance with the use of financial and non-financial performance indicators applicable in all areas of value added (Suhányi, Suhányiová, 2014).

An important benefit in the issue of performance measurement is the application of a matrix model processed in the contributions of Grell, Hyránek (2012, 2014). According to these authors conventional indicators are a very good basis for further examination of performance applying mathematical methods. They also criticize one-way orientation of performance measurement on output measures and point out the necessity of incorporating intensity indicators to performance measurement models. Based on above-mentioned, business performance can be examined by a matrix model, in which various combinations of inputs and outputs are applied. One of the important results of the matrix model is the definition of new indicators, which may be beneficial for business performance measurement and evaluation. In addition to the mentioned authors, efficiency of production systems with the use of a matrix model is also addressed by Cibulka (2007a); Cibulka (2007b); Kliešťik (2009), Huai et al. (2011). The positive aspect of this approach is that indicators measuring business efficiency, effectiveness and performance create a network with strong relations between them (Štefko, Gallo, 2015), which results in the synergic effect of indicators’ impact on business performance.

**Data and methodology**

The research problem of this paper was focused on the analysis of business performance. The EVA indicator and linear programming aimed at addressing the problem of input and output transformations were used to calculate business performance.

The formulation of the research problem: Is the EVA indicator a synthetic indicator of business performance measurement, the value of which reflects the impact of functional areas of business? Is business efficiency precondition for its performance? Is the matrix model suitable input for performance measurement? Is performance measurement based on the matrix model an adequate alternative to measuring performance by EVA?

The research objective was to calculate and analyze business performance with the use of the EVA indicator and the matrix model addressed as a linear programming model applying the simplex method.

In accordance with the research objective, we proposed the hypothesis:

H: We suppose that the results of the performance measured by the EVA indicator are identical with the results of efficiency measured with the use of model of input and output transformations.

The research was realized on a sample of 30 businesses operating in the Slovak heat industry. For this research sample, we processed a matrix model, which was an input for efficiency and performance analysis.

For the creation of the matrix model, which we used for the evaluation of efficiency and performance of businesses operating in Slovak heat industry, we selected these data: as inputs, we chose A – Assets, FA – Fixed Assets, MC – Material costs, E – Equity, C – Costs; as outputs, we chose R – Revenues, S – Sales, VA – Value added, EBIT - Earnings before interest and taxes and EAT – Earnings after taxes. With the use of mentioned inputs and outputs we created a matrix of input and of output transformations, which consists of a number of important indicators of business performance – Quadrant A in above-mentioned matrix model is formed by indicators of efficiency and effectiveness. Quadrant B consists of indicators of assets and capital structure. Quadrant C is formed by indicators designed as input/output. This group includes indicators of intensity. Quadrant D consists of indicators of output/output. This quadrant includes indicators of structure, but also indicators of output profitability. From the structure of this matrix, it is obvious, that performance was evaluated by a group of indicators from all areas determining it. The matrix consists of indicators of efficiency,
effectiveness, and intensity and in terms of financial indicators, there are indicators of profitability, activity, and capital structure.

Table 1: Matrix model with average values of selected businesses

<table>
<thead>
<tr>
<th></th>
<th>R</th>
<th>S</th>
<th>VA</th>
<th>EBIT</th>
<th>EAT</th>
<th>A</th>
<th>FA</th>
<th>MC</th>
<th>E</th>
<th>C</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>0.72</td>
<td>0.65</td>
<td>0.17</td>
<td>0.04</td>
<td>0.03</td>
<td>1</td>
<td>1.30</td>
<td>0.77</td>
<td>0.40</td>
<td>0.68</td>
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<tr>
<td>FA</td>
<td>0.93</td>
<td>0.84</td>
<td>0.23</td>
<td>0.06</td>
<td>0.03</td>
<td>1</td>
<td>1.30</td>
<td>0.52</td>
<td>0.57</td>
<td>0.89</td>
</tr>
<tr>
<td>MC</td>
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<td>1.62</td>
<td>0.44</td>
<td>0.11</td>
<td>0.06</td>
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<td>1</td>
<td>1.11</td>
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</tr>
<tr>
<td>E</td>
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<tr>
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<td>0.06</td>
<td>0.04</td>
<td>1.46</td>
<td>1.13</td>
<td>0.58</td>
<td>0.65</td>
<td>1</td>
</tr>
<tr>
<td>R</td>
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<td>0.90</td>
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<td>9.16</td>
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<td>17.48</td>
<td>27.06</td>
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</table>

Explanatory notes:

- Quadrant A
- Quadrant B
- Quadrant C
- Quadrant D

Source: Authors

Results and discussion

To evaluate the performance of businesses, we calculated the average value of the indicators EVA Equity and EVA Entity. From the 30 analyzed businesses, 14 businesses showed a positive value of the EVA indicator and 16 businesses had a negative value of this indicator. Based on these results we can say that the analyzed sample of businesses has difficulties in achieving optimum values of performance. Further analyses show that these problems are due to low liquidity and low profitability of the analyzed sample of businesses. Average values of EVA indicator are shown in Figure 1.

For the comparison of performance calculated by EVA indicator, we formulated a problem of linear programming (Table 2). The linear programming model consisted of 8 selected indicators - 4 indicators of intensity and 4 indicators of effectiveness.

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Based on the results of the problem of linear programming we can say that from the 30 analyzed businesses only 2 businesses reached a maximum value of efficiency at the level of 1 therefore, their performance is high. An efficiency less than 0.1 was achieved by 4 analyzed businesses.
Based on the detailed analyses and calculations, we found out that businesses which achieve low efficiency, also reach a negative value of the EVA indicator, so their performance is low. We also found out that from the border efficiency of 0.3 downwards, the performance of businesses is low and from the value 1 to the border efficiency of 0.5, the performance of businesses is high. In the efficiency range from 0.3 to 0.5, there is a gray area where we cannot definitely say whether performance of businesses is low or high. In this range, businesses achieved positive or negative values of the EVA indicator. Business HT27, which achieved the highest value of the EVA indicator at the level of 1 million, had an efficiency of 0.83. We can also mention business HT18, which reached the second place in the value of the EVA indicator as well as in the efficiency calculation.

**Conclusion**

Based on the research, we can conclude that business performance can be exactly measured by efficiency indicators. These measures are appropriate because they connect inputs and outputs. We proved that the results of performance measured by the EVA indicator are identical with the results of efficiency measured with the use of the model of input and output transformations. The hypothesis was confirmed. Based on the above-mentioned we can conclude that the EVA indicator is a synthetic indicator of business performance measurement. A synthetic measure is also the calculation of business performance applying the linear programming model because with its use we obtained one aggregate number which expresses business performance and takes into account all indicators of business performance evaluation.

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TRANSPORT OF DANGEROUS GOODS AS PART OF A FUNCTIONAL MODERN SOCIETY

Petya Vaskova Hristova1

Abstract: The European economy is dependent on transport. Electronics, fertilizer, medical items, metal paint, plastic, rubber and different modes of machinery are classified as dangerous goods when transported, as are pesticides and different products for agriculture and cosmetics. Within the transport context, dangerous goods are considered to be those goods which may cause harm to people, the environment or property. They are transported mainly by specialized companies, using special equipment. It is vitally important for the economy that dangerous goods are transported in a well-synchronized logistic chain that is both functioning and efficient. The transport often requires the use of different transport modes, intermediate storing or crossing of national borders. In order to ensure that the complex chain is efficiently functioning, the following article aims to summarize the harmonization and bridge the differences between the nation's legislations and those governing the various modes of transport. Innovative technical tools, methods, and systems are analyzed in cooperation with operators and infrastructure managers. The article describes how the economy is highly influenced by safety regulations and anti-terror actions.

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JEL Classification: L92
Keywords: dangerous, goods, environment, economy, safety, efficient

Introduction
The European transport policy is obligatory for all European countries and regulates important issues such as traffic jams, safety issues, security, prevention measures and environmental protection. Within that European transport policy, a strict finance framework for infrastructure projects has been developed. One of the most important ones is for transport.

In the past ten years, the European Union has witnessed a dramatic growth in the importance of advanced industrial societies, namely regulation and risk assessment, as well as innovations. The use of law to regulate economic activities has become a defining characteristic of the modern society. Managing the entire logistic chain well and efficiently is crucial for the transport of dangerous goods.

Transport of dangerous goods as a part of a modern society
Dangerous goods are considered as dangerous because during their transport they may cause harm to people, the environment or property through being explosive, flammable, radioactive, toxic, oxidative, corrosive or some other chemical property. The legislation in force has been extended, and currently, it covers the whole transport chain from sender to hauler till the receiver. They are prohibited to be transported but because we can’t live without products that are considered dangerous goods they are transported under strict regulations. Those regulations are precisely written into the Directive 2008/68/EO and its annexes as they are amended.

The dangerous goods are shipped as freight goods accompanied with strict safety and security regulations. In relation to that transport policy, the serious accidents on roads have been reduced by more than 50% in the last few years. The intelligent transport systems of dangerous goods and the usage of special equipment that allows following the goods during the whole transport time is an outcome of the modern society solutions.

The dangerous goods by themselves rarely cause accidents but, as a coincidence of an accident, they can cause extensive damage. Last year, on 10th December 2016 in the village of Hitrino, Bulgaria, a train of a private railway operator derailed and caused enormous damage to the infrastructure and the environment. 8 inhabitants of the village died, 29 were seriously injured and more than a 100 injured. All of the citizens of Hitrino were evacuated for 10 days due to the heavy air pollution as a result of the accident and the spill of the dangerous goods.

Crucial characteristics for the transport of dangerous goods as a part of the functional modern society is the mobility, petrol dependency, infrastructure, business competency and environmental protection.

According to the Finnish strategy for transport of dangerous goods (2005), the assessment of the transport of dangerous goods as a part of the modern society involves:

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1Faculty of Transport and Energy, University of National and World Economy, Sofia, Bulgaria, pettivass@aol.com
1. impact assessment which aims to promote the functionality of logistic chains;
2. safety of transport, the traffic, and environmental protection;
3. assurance that all national specific conditions are duly taken into account at the European and international level;
4. to improve the competitiveness and effectiveness of the field.

The administrative support shall process, plan and monitor the transport of dangerous goods. All personnel involved in such transport should promote safety, among the economic and profitable operators across the entire TDG sector.

One important issue which has been a practice in the last several years within Western European countries is a relevant working time for the people involved in the transport of dangerous goods. The time that the personnel involved in the loading, transport or unloading of dangerous goods, as well as all other related to the transport activities, should have a shortage of the working hours.

As stated into the Directive 2008/68/EO (2008), to improve the wellbeing and working ability of personnel, the expertise in the sector shall be guaranteed in a long term and the personnel to be accordingly trained.

Another example is the transport of medicines, petrol products, plastic, etc.; such products which the modern society can’t survive without. That is why from an economic point of view, in the transportation of dangerous goods it is vital that the entire transport chain to be designed in a way that these goods reach their destination on time, safely and profitably.

All regulations are amended in such a way to meet the needs of the industry and at the same time those of the private consumers. Due to social changes nowadays in the EU and the constant increase of the competitive transport market, the stock of kept materials for production has been minimized as much as possible. The success of the companies and operators depends on ensured logistic chains, which are functioning efficiently and safely.

The transport of dangerous goods (TDG) takes place on all roads within Europe and all over the world. Its transport often is international and even with different modes of transport; the TDG rules and regulations have been harmonized and synchronized. For example, the requirements for the road and rail transport and waterways for EU have been issued in one single directive: Directive 2008/68/EO. The Annexes ADR, RID and ADN contain all the important rules for those three modes of transport.

GO GREEN is another important transport policy which is old but at the same time still in its beginning. Go GREEN is an initiative which started several years ago stating that the current transport system comes along with a wide range of problems - such as global warming, environmental degradation, health implications and the emission of gases. It is considered that the transport sector can be attributed for 23% of the world’s gas emissions resulting from the burning of fossil fuels. To reduce the air pollution significantly, an efficient model of optimization for the transport of dangerous goods is required.

All participants in the transport of dangerous goods aim to reach a safe, secure and functional system.

Figure 1 represents a model for a safe and functional transport system within the modern European society.

Guidelines for safe, secure and modern transport of dangerous goods

According to Tzvetkova (2010), the functionality of the transport of dangerous goods shall be managed by the results. In order to increase the clients’ satisfaction from the transport and at the same time to meet the high levels of safety and security, the following guidelines may be summarized:

1. Reduce the quantity and unnecessary volume of paper; transport documentation shall be accurate and clear. The legal requirement and obligations for the participants shall be known and comprehended by all operators and authorities engaged in the surveillance or supervision. The legislation should be clear for everyone, effective and understandable.
2. Advance training and strengthening of the level of knowledge for the transport of dangerous goods. All TDG sector operators should be trained to the level of their responsibilities. This will improve the knowledge and the general safety attitude and improve the safety within the entire transport chain.

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3. Accessible sources of information, free of charge for the consumers and interested parties.
4. Safe and profitable transport through cooperation. In order to achieve the above mentioned goals, the cooperation and open communication between various authorities, administrations, infrastructure managers and operators is a crucial sector indicator. The cooperation should be promoted during the daily work of everyone.
5. Appropriate surveillance and supervision duties.
6. Removal of the level crossings especially on the routes with dangerous goods. TDG routes shall be functional and safe.

**Conclusion**
The transport of dangerous goods takes place on roads, railways, by water, and by air. The entire logistic chain is often international. The transport often requires the use of multiple transport modes and the crossing of national borders and well developed logistic chains. In order to ensure that the complex logistic chain is functional, it is believed that, where possible, legislation should be simplified and harmonized. The harmonization of the legislation applies to solve practical issues. Technology and telematics applications are increasingly utilized in TDG. The development and maintenance of the infrastructure and transport routes are ensured and particular attention has been put into the regulations and legislation norms.

The article summarizes the current transport of dangerous goods where the safety is priority number one. Cooperation between the different administrative authorities, the operators and consumers as well as all other relevant participants is essential for promoting safety and environmental protection, but at the same time ensuring an economic efficiency.

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THE IMPACT OF ADVERTISEMENT ON CONSUMER’S PERCEPTION

Martin Hudák,¹ Radovan Madleňák,² Veronika Brezániová³

Abstract: Marketing can be described as a tool for companies to influence the consumer’s perception to the desired direction. The current market situation is characterized by dynamism, growing consumer power, and intense competition. The consumer perception and behavior are changing and therefore need to be constantly monitored and measured. The aim of this article is to scan and measure consumer’s perception while watching a video advertisement. During this experiment, an eye-tracking technology was used, which allows capturing a consumer’s gaze. The central part of the research is to measure the brain activity of a consumer based on the EEG (Electroencephalography). EMOTIV EpoC+ is a 14-channel wireless EEG, designed for contextualized research and advanced brain computer interface applications. An advertising campaign from four different mobile operators was used for this purpose. In the conclusion of this article, consumer’s perception of different advertising campaigns are compared and evaluated.

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Introduction

Neuroscience is a branch of life sciences, which examines the workings of the nervous system of animals and humans, its development during life, and examines individual neurons, parts of the nervous system, their interconnections, methods of creating neural networks, their cooperation and their relationships to the surrounding (Hudak & Madlenak, 2016). The field of neuroscience also includes cognitive neuroscience, which examines the procedures in the human brain during cognitive processes. These processes include for example perception, thinking, remembering, recalling from memory, learning, etc.

Determining how a person processes various sensations is also a valuable knowledge for the field of marketing. It is of great benefit if entrepreneurs who are trying to offer their products to potential customers know how these customers will react to advertising stimuli and other marketing tools. The use of knowledge and methods of neurology in the field of marketing gave birth to a new discipline – neuromarketing.

Analysis of the problem

There are several definitions of marketing, and it can be characterized from various perspectives: it can be a system of activities of an entrepreneur, or it can be defined as a complex of elements of business activities, which are mutually interconnected, or a business philosophy (Corejova & Rostasova, 2015).

However, what all of these definitions have in common is the customer and satisfying his or her needs. Therefore, it is preferentially focused on the demand side and customers’ needs (Jankalova, 2014). This emphasis results in the mission of marketing in the business environment – it has a particular function, specifically to reconcile opportunities in the market and enterprise resources (Madlenakova et al., 2016). Certain tools are required in marketing so that its role in the business is fulfilled. The marketing theory speaks of four essential tools, so called 4P, which are product, price, place, and promotion.

Marketing communication is a permanent part of the marketing mix. It is defined as a targeted delivery of content and necessary information to potential customers/recipient (Kolarovszki et al., 2016). It is often understood in a very narrow view only as “advertising,” which is caused primarily by the fact that advertising is the most common tool used in marketing campaigns. Marketing communication can be understood as a marketing tool that comprises all means that serve to inform and convince customers and directly or indirectly points out the products they sell.

¹ The Faculty of Operation and Economics of Transport and Communications, University of Zilina, martin.hudak@fpedas.uniza.sk
² The Faculty of Operation and Economics of Transport and Communications, University of Zilina, radovan.madlenak@fpedas.uniza.sk
³ The Faculty of Operation and Economics of Transport and Communications, University of Zilina, veronika.b007@gmail.com
Advertising is one of the forms of marketing communication. With advertising, it is possible to efficiently share the necessary content to the target groups en masse. It can inform, convince, and remind the brand or increase the product awareness.

The goal of advertising is to influence the purchase decision making of the consumer. Psychology, which examines human behavior, emotions, and motivation to act, plays a significant role in advertising.

When designing advertising, regarding psychology, one needs to look at the environment, in which the product is promoted (for example the role of media) on the one hand, and the content of advertising itself on the other. How do the media affect the impact of advertising? By creating an environment, in which the product is offered – for example, a source, which is perceived as untrustworthy has the same impact on the information it provides, and in the end, the information also appears untrustworthy. In addition to its credibility, the attractiveness of the source, etc. are also important (Chynal et al. 2016).

It is also possible to encounter several types of advertising and advertising media (Madlenak & Hudak, 2016). The most visible and probably most popular medium is the TV. TV as a medium for advertising is especially suitable for an introducing of a product; it allows using picture, sound, music, and movement (Madudova & Kolarovszki, 2016). Thus, the marketing message can be made very emotional and impressive by means of TV. A TV spot can portray essentially any creative idea.

**Objectives and Methodology**

The goal of this article is to identify, measure, and compare the impact of visual advertising on potential customers. The research object was the advertisement of mobile network operators active in Slovakia. Currently, there are four mobile network operators in the Slovak market offering various service packages. These operators have their own frequencies assigned, and they are building their own networks. In addition to providing services under their own name, the operators are offering mobile services, which give the impression that there are other operators. These services, so called “children” of big operators, are Funfón of the Orange Corporation and Juro of the Telekom Corporation. In addition to these, there is also Tesco mobile – a virtual operator, who does not own a mobile network, but it has signed an agreement with a registered provider of services. Tesco mobile has a signed agreement with O2 – it uses its network, but offers services under its own name.

For research needs, advertising sets were selected, which were used by the four mobile operators for the Christmas season in 2016. The Orange Slovakia Corporation introduced a campaign, which should point out, jokingly, that older generations are not familiar with the modern technologies and also to introduce products the corporation is offering. This advertising presents a multi-generational family
and a situation, in which the grandson explains to his grandmother everything the corporation is offering. The campaign of the Telekom Corporation is in a futuristic style, and the main topic is “Christmas at Sagan’s in 2061.” Similarly as with Orange, it uses the presence of well-known celebrities in advertising – Peter Sagan and his wife. During the Christmas of 2016, O2 introduced a campaign to the audience, in which the main advertising message is “with us, you can choose yourself.” All of the spots have the same element – a family member buys a present he/she likes and puts it inconspicuously under the family tree. Advertising of the Swan Corporation (the mobile operator 4ka) are quite atypical for the Christmas period. The TV spots are shorter and do not have a story; they have only a central idea, e.g. product offer at half the price.

10 respondents participated in the test; 3 women and 7 men. The respondents were presented with the videos (advertising campaigns of individual operators) consecutively. While they were watching these spots, the respondents had an EEG neuro headset on their heads – a device with electrodes that captures their brain activity (Plochl et al., 2012). We have also tracked their eye movement using an eye camera (Soussou et al., 2012). EEG measurements were supplemented with the testing of the respondents using the eye camera to help us identify more easily, what the respondents were focused on (Figure 1).

The EEG neuro headset was the EMOTIV - Brainwear® - wireless devices, which hold electrodes measuring brain activity. Data collected from each electrode were transformed into cumulative characteristics using software – these are depicted with curves of various colors, whereby each color represents a certain emotion linked to current perception:

- Excitement (entertainment/fun) is divided into immediate and long-term. Short-term excitement (depicted by the orange curve) captures surprised reactions or reactions to specific events, ideas or proposals.
- Long-term excitement (black curve) measures the overall mood, as it accumulates over time.
- Engagement/boredom (red curve) measures the level of focus and immersion in the activity.
- Frustration (blue curve) measures negative emotions linked to the performed activity.
- Meditation/relaxation depicts the measure of how good (calm) the person feels, and it is depicted by the green curve.

Results and Discussion

In addition to the EEG measurements, we have also conducted a measurement using the ETG eye camera during the text, through which we were able to analyze where the tested respondent is looking at the moment, and what elements interested him or her in the spot. By combining the ETG measurements for individual campaigns into general statements, we can state, that the audience (respondents) are focusing mainly on persons, found on the screen, and especially on their face. If there is a significant element suddenly in the spot, then this element will get the most attention, although sometimes only for a short while. For very dynamic spots and with a great number of significant elements at the same time, watching the spot is slightly chaotic; as if the audience does not know where to look first. With a traditional setting the audience is accustomed to (like the environment in the Orange and O2 spot), this setting is almost ignored and the attention is focused on the story, the plot or an object, found in the foreground, and vice-versa, with an unconventional concept (Telekom) the environment itself captures the audience.

Elements, which had the greatest impact on respondents or entertained them or interested them the most have been identified in the EEG research. When all tested campaigns are evaluated, it can be said that the respondents were interested primarily in spots or elements, which are humorous, and which they have not seen before – i.e. they are optimal. However, at the same time it is necessary to be aware that these ideas need to be within certain bounds, and ultimately they have to “meet the taste” of their target customers.

The respondents appreciated verbal humor the most, which in the tested spots was found in the Orange Corporation spot. If the word play is accompanied by an interesting story (in this case the differences between the generations), it evokes an even better impression in the audience (potential customers). Futuristic elements in the campaign of the Telekom Corporation attracted most of the respondents, but not all of them were intrigued in a positive way.
Another element used in the campaigns was the presence of well-known celebrities in the spot – as already mentioned in the previous sections, in this case, the customer’s sympathies with given person play a major role here, but the author of the spot cannot influence them (Figure 2). A risk with the celebrities can also be the fact that oftentimes they do not act very naturally in the spots and interviews or scenes look unnatural and forced.

The plot of the advertisement, which should inspire the main idea, i.e. the operator’s offer, took attention away from it instead of drawing attention to the offer. In this case, a better linking of the story and the advertised information, or placing this information not at the very end, but in the middle of the advertising spot could be proposed. It would also be suitable if the offer would be presented or at least hinted several times during the spot – so that it would not be too distracting, but also to create an interest in offered products.

Conclusion
The analysis of the mobile network operator market covered four mobile operators operating in the Slovak market. Each of the operators introduced a Christmas advertising campaign in 2016, which had a particular theme and presented its current offer. Except for the Swan Corporation, all operators bet on traditional Christmas motifs, although each one interpreted them differently. The paper also states how the neuromarketing options were used in the world. Research carried out using EEG and supplemented by eye tracking using the ETG technology discovered that respondents had different impressions from the spots – they depended on the presented spots, but also on their current mood or taste. Elements were identified, which affected several respondents the same way (humor, faces, and story). A big negative of the presented TV spots was the fact that the respondents almost did not perceive the advertising information given operator shared using the campaign. Therefore, advertising
information should be shared in a more creative way, so that the story and elements of the spot would have a clear connection to the offer.

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**References**


THE DILEMMA OF KNOWLEDGE MANAGEMENT IN AN ORGANIZATION

Agnieszka Bieńkowska¹, Beata Ignacek-Kuźnicka²

Abstract: In scientific discourse, opinions exist about the passing of knowledge management. These voices are incompatible with an argument that, in the era of knowledge-based economies, organizations need to be moving towards this concept of knowledge management. Such divergence requires examination. Hence, this paper presents the findings of a thorough literature review aiming to examine how widespread knowledge management solutions have been adopted in organizations as well as to identify the traits that define a knowledge worker. Also, the paper identifies the relationship between knowledge management and human resource management in the context of supporting knowledge workers. A critical analysis of literature together with theoretical conclusions are the main research methods used. The article is the basis for further empirical verification of the problem. The results indicate that the implementation of knowledge management can be a trend without formal acknowledgment. Thus, without obvious intention, the organization implements a management method that fulfills the premises of knowledge management. This paper presents an interpretation of knowledge management that invalidates the passing of this knowledge field.

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Keywords: knowledge management (KM), knowledge workers (KW), human resource management (HRM)

Introduction

Knowledge workers benefit organizations because they directly participate in the research, creation, practical use, and extension of strategic resources of that organization, or in other words, knowledge. The extraordinary role played by knowledge workers (referred to as KW in this paper) implies a need for their special treatment so they can develop and use their competencies unhindered. It seems a natural progression to support the development of solutions that benefit KW by a system of knowledge management (referred to as KM in this paper). However, there are several dilemmas regarding this area. First, it is unknown how widespread KM solutions have been adopted by organizations since, although KW are identifiable, it is not possible to exclude situations in which KM solutions remain unimplemented. Second, the form of the specific KM solution dedicated to KW remains a dilemma. Third, one needs to fully study the relationship between KM and human resource management (HRM), especially in the context of support for the KW, who seem to lead the KM of the organization. In literature, theses have evaluated the assumptions of both concepts. It is clear that implementing the human resource function for KW needs to be specific (from recruitment to motivation).

The three problems mentioned above can be specified by the following research questions: Is KM common in an organization? Can the implementation of KM in an organization occur unconsciously? Are statements concerning the passing of issues related to KM definite? Is the traditional concept of a ‘brain-worker’ the same as the modern concept of the knowledge worker? What are the relationships between KM and other management concepts, notably those of HRM? How should an organization create KM and HRM solutions to support KW?

This study aims to answer these research questions by way of a thorough literature review to detail the categories relating to KM. Also, the considerations include whether the traditional concept of brain-worker is the same as the modern concept of KW.

Conscious and Unconscious Knowledge Management in an Organization

The origins of issues relating to knowledge management date back to the nineteen-fifties. However, today, in scientific discussions, voices are proclaiming their imminent passing. This opinion is controversial, especially when one considers that in the era of a knowledge-based economy organizations are needing to move towards the concept of KM. Possibly a reason for these controversial statements about the passing of KM is that when an organization adopts this concept, the process may seem semi-intentional. Specifically, this can relate to a situation where management supports the premise but fails to implement KM directly. This case raises the question of what constitutes the distinguishing features in such an organization.

¹ Wroclaw University of Technology, ziro@pwr.edu.pl
² A solicitor, bignacek@gmail.com
Regarding whether KM is a common phenomenon or not, one should first refer to Tabaszewska (2011, p. 64), who concluded that all organizations have managed knowledge in the past and will continue to manage such today. At the same time, Tabaszewska advocated diversity of professionalism regarding formal and, consequently, theoretical preparation and implementation. Tabaszewska used gradation to develop different categories of KM. Morawski (2011, p. 13) stated that the first category, ‘focus on knowledge’, can be defined as the continuous movement of knowledge within an organization. This claim is rational, since the focus on knowledge, according to Drucker (2011, p. 166), is the goal toward which the organization aims; it reorganizes the present to develop a better future. The continuous movement of an organization towards knowledge and reorganization (resulting from the need to seek knowledge), as discussed by Drucker, is maintained by perpetually stimulating the exchange of knowledge (Jashapara, 2014, p. 365). This case is implied among people within the organization as the constant transformation of explicit knowledge, combining innovation and ideas (Morawski, 2011, p. 15), that dynamically provide the organization with unique authority. A focus on knowledge is therefore somewhat intentional KM. Hence, regarding the original question of whether KM can be implemented unknowingly, the answer seems to be affirmative. This is concluded because the tendency for knowledge to circulate occurs, though purely from the rational management of the organization while there is a lack of awareness in the matter and lack of professionalism.

Stimulating knowledge exchange with its notorious transformation and constant updating to dynamically provide the organization with unique knowledge becomes routine with an advanced focus on its awareness in an organization. This outcome leads to the next category relating to the concept of KM, knowledge creation. The author of this category, Oleksyn (2014, pp. 559-560), claimed that organizations that use and also generate knowledge need to be defined as organizations created by knowledge. Oleksyn (2014, p. 126) also drew attention to another phenomenon: the absorption of knowledge management in the administration of professional development. In this phenomenon, an organization does not need to identify KM, as such tasks are implemented within the framework of professional development. Furthermore, Tabaszewska (2011) considered that KM had always existed and Drucker (2011, pp. 98–99, 119, 165–166, & 221–222) reiterated that the management of a brain-worker is a conscious projection of a habit to supersede the present. Hence, it would appear that KM does not require many commands or specific control, but only an entrenched habit to make it effective. The phenomenon of absorbing KM by other modes of managing an organization is evidenced by the multitude of categories relating to it. Tabaszewska (2011) indicated that the phenomenon gives rise to various forms of knowledge management systems and the following is a translated quotation about such forms: Some emphasize the use of information technology, which often focuses on information management rather than knowledge. The following are translated statements of Tabaszewska (2011, p. 60): Others establish the dominant role of sharing knowledge or building a system of continuous education; only a few organizations can create a knowledge management system that integrates all activities. The passing of issues related to KM does not occur, although terminology changes that result from the evolution of KM indeed take place. Thus, there is, no justification for the pessimistic visions concerning this field.

**Identifying the Knowledge Workers in an Organization**

When KM advances to the concept of strategic management of an organization, the importance of KW shifts into the foreground and thus, interpreting this concept becomes paramount. From a narrow traditional perspective, Kowalski (2011, pp. 315–316) developed a closed catalog of traits of KW, which are formal education, taxonomically listed professions, active participation in acquiring knowledge, autonomy, and performing under pain of bearing the consequences. According to Wellin (2013, p. 123), KW are experts in their field (law, accounting, and architecture) who share their knowledge with clients. Drucker (2011, p. 132) provided other examples: doctors, teachers, and preachers, along with lawyers, in the class termed ‘traditional professions’. Jashapara (2014, p. 300) gave a similar set of examples of KW, but at the same time reduced these to a common denominator, the culture of individuality. This culture consists of an individual’s autonomy with simultaneous collective cooperation, which provides the opportunity for fulfilling an individual’s passions. More precisely, this culture of individuality needed to be incorporated into the knowledge worker’s skills. The narrow definition presented above includes one additional major premise, namely, the professional ethos. This premise is found in Kowalski (2011) in the discussion about performance
under pain of bearing consequences. Thus, in this respect, a professional is a brain-worker combined with the ethos of their profession. It should be noted that a professional in the narrow sense of the word, is not necessarily a brain-worker, not according to the literal interpretation.

The traditional understanding of KW was ultimately evaluated by Drucker (2011, pp. 132-133) who wrote: “Knowledge workers today is used productively by an organization” and “business and state administration.” A skilled brain-worker in this structure holds highly specialized knowledge and tends to play an active and autonomous role in decisions while communicating with workers according to the logic of the situation rather than the formal structure of competence. At present, the professional ethos has been replaced by an individual system of values, prestige, and ethical codes. The popularity of the latter increased dramatically after the bankruptcy of the Lehman Brothers in 2008. In summary, based on the literature (Drucker 2011; Jashapara 2014; Kowalski, 2011; Wellin, 2013) the traditional understanding of the notion of KW is characterized by the following premises:

1. Erudition – which has formal education; expert in the given field;
2. Professionalism – taxonomically listed professions
3. Autonomous participation in knowledge processes – given examples are types of freelance;

It is necessary to create a contemporary catalog of the knowledge worker’s predispositions in a broad sense, taking into account the considerations mentioned above. Also, Drucker’s position and the view of Bogdziwicz (Juchnowicz, 2009, p. 144) consider the future of professionalism and the current trait of knowledge workers, as generally and commonly having a greater presence in the attitude of future generations of employees experiencing the development of the knowledge-based economy. Based on this in-depth literature study, specific traits of the knowledge worker were defined according to constitutive and descriptive values (Table 1). These descriptive characteristics were taken from detailed descriptions of scientists that help develop, define, and complete the image of the established KW.

<table>
<thead>
<tr>
<th>CONSTITUTIVE TRAITS OF KNOWLEDGE WORKERS</th>
<th>PERSPICACITY (innovative)</th>
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<tbody>
<tr>
<td>PERFECT REPUTATION (high position and responsibility as an entity who has impact on the success of the organization)</td>
<td>- productive (Kowalski, 2011, p. 315–316)</td>
</tr>
<tr>
<td>- take responsibility for their competence and standards of work (Drucker, 2011, p. 99)</td>
<td>- innovative (Staniewski, 2012, p. 347; Kowalski, 2011, pp. 315–316)</td>
</tr>
<tr>
<td>- tend to take risks and responsibility (Staniewski, 2012, p. 347)</td>
<td>- have unconventional ideas (Makowski 2012, p. 405)</td>
</tr>
<tr>
<td>- should know the needs, attitudes, limitations, and perception of others to enable them to use their own achievements (Drucker, 2011, p. 94)</td>
<td>- independent (Makowski, 2012, p. 408)</td>
</tr>
<tr>
<td>- responsible for creating innovations (Bieńkowska, 2009, pp. 245–254)</td>
<td>- critical (Makowski, 2012, p. 408)</td>
</tr>
<tr>
<td>- hold such a unique level of knowledge, that they decide about the success of the organization (Kowalski, 2011, p. 309)</td>
<td>- reflective (Makowski, 2012, p. 407)</td>
</tr>
<tr>
<td>- vibrant in shaping the added value of the organization (Kowalski 2011, pp. 315–316)</td>
<td>- hold the skill of abstract thinking (Łatuszek-Jurczak 2012, p. 376)</td>
</tr>
<tr>
<td>- active contributor to the success of the organization (Bailey, Bogdanowicz, 2001 cited Kowalski, 2011, p. 317)</td>
<td>- the reflective and analytic way of understanding reality (Jashapara, 2014, p. 303)</td>
</tr>
<tr>
<td>- ready to take responsibility for the achieved results (Bieńkowska, 2009, pp. 245–254)</td>
<td>- have intuition (Jashapara, 2014, p. 303)</td>
</tr>
<tr>
<td>- hold vast competence (Drucker, 2011, p. 118)</td>
<td>- have premonitions (Jashapara, 2014, p. 305)</td>
</tr>
<tr>
<td>- make decisions (Drucker, 2011, p. 221)</td>
<td>- specialists who can find a link between one’s own narrow field and the whole universe of knowledge, i.e. unmythified integrity (Drucker, 2011, p. 94)</td>
</tr>
<tr>
<td>- concentrated on the input for an entrenched habit (Drucker, 2011, p. 99)</td>
<td>INTELLECTUAL erudite</td>
</tr>
<tr>
<td>- people who have graduated universities in both soft skills and technology, and as a result, can already judge the usefulness of the project in the initial phase of the project” (Drucker, 2011 cited Kowalski, 2011, p. 310)</td>
<td>- open (Staniewski, 2012, p. 348)</td>
</tr>
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<td></td>
<td>- open to knowledge (Morawski, 2009 cited Kowalski, 2011, pp. 311, 316–317)</td>
</tr>
<tr>
<td></td>
<td>- constantly learning (Kowalski, 2011, pp. 315–316)</td>
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<tr>
<td></td>
<td>- specialized intellectual (Davenport, 2007 cited in Kowalski, 2011, pp. 311, 316)</td>
</tr>
<tr>
<td></td>
<td>- devote most of their time to seeking, creating, using practically and spreading knowledge (Bieńkowska, 2009, pp. 245–254)</td>
</tr>
<tr>
<td></td>
<td>- innovative and creative (Bieńkowska, 2009, pp. 245–254)</td>
</tr>
<tr>
<td></td>
<td>- open-minded (Staniewski, 2012, p. 348)</td>
</tr>
<tr>
<td></td>
<td>- find it easy to transfer and use knowledge (Staniewski 2012, p. 347)</td>
</tr>
<tr>
<td></td>
<td>- creative (Staniewski, 2012, p. 347)</td>
</tr>
<tr>
<td></td>
<td>- know the values and beliefs of an individual (Jashapara, 2014, p. 303)</td>
</tr>
<tr>
<td></td>
<td>- brain-workers who create knowledge, ideas, and information (Drucker, 2011, p. 18)</td>
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Knowledge Management and Human Resource Management

Knowledge management is a comprehensive approach that applies to every area of an organization. In this context, relating KM with other management concepts is unavoidable. The most frequently discussed relationships are between KM and total quality management (TQM; Zhao & Bryar 2001; Ručevičius, 2006), CRM (Stefanou, 2003; Porębska-Miąc, 2005; Liew, 2008), KM and enterprise resource planning (ERP; Chan et al., 2009; Metaxiotis, 2009), and KM and balanced scorecard (BSC; Wen & Lin, 2002; Darvish et al., 2012). Contemporary KM is increasingly becoming integrated with other management concepts given that many areas are common to each. The issue of co-occurrence of KM with other management methods has been partially discussed, e.g., by Biękowska, Walecka-Jankowska, and Zgryzwa-Ziemak (2013).

One concept that seems to coexist with KM naturally is HRM. This is supported by the following translated quotation: One can even speak about the tendency to use KM techniques to support staffing and retention efforts in an organization, as well as the acquisition and dissemination of knowledge hidden within the organization (Roberts-Witt, 2003 cited Staniewski, 2008, p. 358).

The interaction between KM and HRM is evident (see Armstrong, 2009, pp. 219 & 225). However, it has not been thoroughly recognized in the literature, especially in the context of developing solutions dedicated to knowledge workers. Wheelan and Carcary (2011) have rigorously analyzed the relationship between these methods and have emphasized that effective KM depends on successful management of those people of the organization who have key knowledge. On the one hand, management by competence should set the objectives for KM in areas relating to key competence, from both the perspective of the whole enterprise and that of its individual workers (who hold certain positions). On the other hand, KM should provide the necessary information for HRM, by using state metrics. Both methods should also provide motivation for workers.
Contemporary features that define KW have a direct impact on the formation of specific solutions for KM and HRM, which are dedicated to these entities. Solutions for knowledge workers are required, and they include those specific approaches that integrate system-wide solutions and specific HRM guidelines. The results of a study conducted by researchers from the Warsaw School of Economics (Staniewski, 2008, p. 31-32) imply that when implementing system-based KM, Polish managers expect a beneficial movement of the organization around knowledge, as shown in Figure 1.

Figure 1: The circulation of knowledge in an organization after implementing a knowledge management (KM) system

The benefits of implementing a KM system that the managers expect, are consolidated with their specific anticipations in the field of HRM, namely, as Fryczyńska (Fryczyńska, 2004, cited Staniewski, 2008, p. 31-32) lists in hierarchical order: “fuller satisfaction of the clients’ needs, growth of work efficiency, growth of workers’ motivation and satisfaction, gaining qualified workers”.

Integration of a KM system with specific HRM guidelines leads to the rational use of working time, which avoids time wasted on the chaotic circulation of knowledge. In contrast, regulated exchange of knowledge would minimize the time needed for decisions, as in when responding to market needs, since such a system could appropriately structure and then effortlessly deliver information about customers and competition. This approach directly affects the development of the workers’ competence. Ultimately, all such efforts result in a significant increase in the efficiency of the organization (Tomczak, 2007, p. 5).

Conclusion
The results of this study exclude the risks of absorption of KM in organizations. The scientific notions defining this issue are relevant in light of imminent economic transformations given the imperative progress of technology and information. Therefore, postponing this type of management is not recommended. However, the pace of knowledge evolution remains an open issue. One should expect the systematic expansion of KM, as well as its rapid progression, and eventual revolutionary transformations into knowledge-based organizations. In the premises of KM, the importance of the knowledge worker has shifted to the foreground. Therefore, studying and interpreting this notion thoroughly in line with the ultimate purpose of this article, of initiating exploration leading towards ways of motivating KW, is necessary.

References


Abstract: This article examines the environmental conditions forming the origin and development of clusters in the Slovak Republic. It focuses on the current information and financial support for clusters, the preferred legal form of these associations in the Slovak Republic, and the possible forms of cross-border cooperation. The aim of this article is to analyze the structure of clusters in the Slovak Republic. The paper features an overview of the possible number and focus of clusters, including the procedure for identifying clusters needed to create this list. Despite its stated limitations, this indicative list provides a basis for further research in this area.

JEL Classification Numbers: M21, R12; DOI: http://dx.doi.org/10.12955/cbup.v5.925

UDC Classification: 338.1

Keywords: cluster, small and medium-sized enterprises, risks

Introduction

According to Porter (1998), a cluster is a geographically close group of mutually interconnected companies, suppliers, and institutions in a particular branch. It is usual for companies as well as educational institutions, research centers, regional self-government, and agencies supporting the business development and the region itself to form clusters (Duman, Balog, Rehák, Zaušková & Loučanová, 2009). The value of clusters for companies entails increased productivity and competitiveness, both on the national and international level. For educational institutions, clusters allow the opportunity for dual education for practical needs as well as the applied research and transfer of technologies into practice. Their formation primarily benefits the economy but also helps in supporting infrastructure development for the regions or the regional self-governments.

Support of Clusters in the Slovak Republic

The emergence of the first Slovak Republic clusters was mainly an initiative of Slovak companies in a certain line of business or region. The legal form of such companies’ association depended especially on valid legislation of the particular country. The clusters in the Slovak Republic are mainly established as ‘interest associations of the legal entities’ and ‘citizens’ associations.’ These two preferred legal forms appear to be the most suitable since no legal basis exists for their founding. The official means of the government support for the clusters were provided for the first time in 2012 by the Ministry of Education, Research, and Sport of the Slovak Republic through subsidies aimed at scientific and technical services (Kaliňák, 2012). Further, the Ministry of Economy intend covering the support of clusters through the Scheme for Support of Industrial Cluster Organisations, from 2018. In 2016, seven applicants obtained subsidies to support industrial clusters while three were rejected (Zoznam, 2016). Only clusters with the legal form of ‘interest associations of the legal entities’ can obtain such subsidies (Schéma, 2014). However, a cluster with the legal form ‘citizens’ association’ can apply for a subsidy through the Ministry of Economy, based on legislation about providing subsidies (Law No. 71/2013 Coll.) issued by the Ministry of Economy. Based on this law, the purpose of a subsidy for clusters can be to support small and medium enterprises, research, development, and innovations, or development of the industrial production and services (Law No. 71/2013, Coll.). Regardless of the legal form of the tourism clusters, the subsidies are issued by the Ministry of Transport, Construction and Regional Development, according to the law concerning support of tourism (law No. 91/2010, Coll.). The regional budgets, university budgets, or European Union (EU) structural funds can be introduced as other possibilities of financing from public resources. Financing from the public resources is important, especially during the initial phases of the cluster life cycles. The financing of the clusters by the private sector is utilized to a smaller extent. The financial contributions of the cluster’s member companies through membership fees or sponsorships by persons other than cluster members belong here. Financing from the private resources is utilized during the later phases of the cluster life cycle; the membership fees are critical (Pavelková et al., 2009).

1 University of Žilina, denisa.janasova@fbi.uniza.sk
2 University of Žilina, stanislava.strelcova@fbi.uniza.sk
The Slovak Innovation and Energy Agency (SIEA) provides support in the form of information to the clusters. The Slovak Innovation and Energy Agency published an analytical study, Clusters for Support of Innovations in 2009 and is considered the first publication mapping the situation with clusters in the Slovak Republic (Duman et al., 2009). Another analytical study was published in 2015, Cluster Policy in the Conditions of Slovakia (Balog, 2015). The list of clusters operating in the Slovak Republic on the website of the agency SIEA was last updated in 2009, and that in the Cluster Policy in the Conditions of Slovakia in 2010. Nonetheless, the organization, European Cluster Observatory (ECO), provides a more up-to-date list of cluster and cluster policy analyses in Europe. The statistical data about clusters that are available is current to 2011. The Cluster Union of Slovakia deals with the activities for supporting the cluster policy development in the Slovak Republic as well as other activities. This union was established in 2010. Currently, there are 11 members (the clusters of different orientations) with the union participating in various international projects. The union currently cooperates in the framework of the project V4 Clusters Go International, which is aimed at building international cluster capacities and orientation in new markets (Únia, 2016).

Forms of Cross-Border Cooperation in Cluster Area

A cluster offers a space for establishing an internationally competitive business, and thus, needs to provide information about the international markets, trends, and innovations. Therefore, a necessary task faced by the cluster organization, and the companies involved, is to achieve international cooperation. The international cooperation from the perspective of clusters can be classified by the following groups:

- the international cluster initiative,
- the domestic cluster with foreign participation,
- the cross-border cluster, and
- the cross-border cooperation of clusters.

The cluster initiative is understood as an organized activity aimed at improving the level and competitiveness of the cluster organizations (Duman et al., 2009). The group of the international cooperation can involve establishing various supporting policies, strategies, projects, and institutions at the EU level, e.g., the European Cluster Alliance or European Cluster Policy Group.

A domestic cluster with foreign participation represents cooperation based on membership or collaboration with a foreign company as well as an educational or research institution. This group can be divided, according to the involvement of the foreign participant in the domestic cluster, into these sub-groups:

- a foreign subject is a member of the domestic cluster,
- a foreign subject is the founder member of the domestic cluster, and
- the collaboration of the domestic cluster with a foreign company.

The domestic cluster with foreign participation arises under a certain legal form. In the Slovak Republic, the legal forms are predominantly, 1) an interest association of legal entities and 2) citizens’ association. The domestic cluster with foreign participation is financed predominantly by the subsidies of the domestic country and membership fees.

A cross-border cluster arises based on requests of various programs aimed at cross-border cooperation. It is established where a project involves domestic and foreign participants delivering on common goals. Participants in the framework of a cross-border cluster cooperate to achieve the goals of the project, including building and strengthening foreign relations. An example of a cross-border cluster is the Hunting and Forestry Cluster of Economic Cooperation and Nature Protection in the border area of Hungary and the Slovak Republic. Another is the Czech-Slovak-Polish Cluster aimed at common projects in the area of the road, railway, and building construction, and another, the Czech and Slovak Industrial Cluster of Collaboration of East Moravia and West Slovakia. European Union funds, governmental co-financing, and, to a smaller extent, co-financing of involved participants and partners, help finance projects of the cross-border clusters, as compared to a domestic cluster with foreign participation, financed through subsidies and membership fees.

The cross-border cooperation of the clusters develops with the same orientation across particular economic activities of several countries. An example is the cooperation of the Automotive Cluster of
the Slovak Republic and Moravia-Silesian Automotive Cluster. Another involves the cooperation between the Slovak Plastic Cluster, Czech Plastic Cluster, and the Industrial Cluster Bydgoski. Hence, several examples exist of such a cluster collaboration between countries.

The activities aimed at improving the level of the cluster organizations by the government and the participants of both the public and private sector should be oriented towards creating particular measures according to the structure of the clusters in the Slovak Republic. The mapping activities of the clusters’ orientation in the Slovak Republic play a major role in such. The analytical study Cluster Policy in the Conditions of Slovakia (Balog, 2015) identifies a list of 16 clusters that have been active in the Slovak Republic up until 2010. This study aims to identify the current number of Slovak Republic clusters and their orientation.

**Data and Methodology**

The study examined a group of clusters active in the Slovak Republic. A list of these clusters was created to investigate their number and orientation and to analyze their structure. The exact name and orientation of individual clusters are excluded from publication. Particulars for the list were obtained from the registers of ‘the interest associations of the legal entities’ and ‘citizens’ associations,’ published by the Ministry of Interior of the Slovak Republic (Registre, 2016). For extraction, the keyword ‘cluster’ was entered into the search field of the registers (for each name). Then, the list was expanded by adding organizations other than those found under the keyword ‘cluster.’ First, these were the organizations, Biterap, IT Valley, Z@ict, and Celim Slovakia, which were shown on the websites of SIEA and ECO as clusters. Next, the interested associations that applied for subsidies to support industrial clusters and which had been approved by the Ministry of Economy of the Slovak Republic were added to the list. These applicants included the Association for Development of the Region Horná Nitra and the Slovak Centre of Productivity. Further, the list of clusters was completed by identifying the interest associations that contained the words ‘development of the region’ in their names, as in the case of the cluster Association for Development of the Region Horná Nitra (an applicant for subsidies for a cluster). Overall, 70 clusters were identified, out of which 23 had the legal form ‘citizens’ association.’

Each clusters was assigned as having a particular orientation using the orientations given in the abovementioned registers of the Ministry of Interior of the Slovak Republic. The representation of the identified clusters was compared to that of the companies by ranking the companies according to the more general classification based on the results of Malé (2016, p. 71).

In creating the list, the study had these main limitations. Firstly, it was not possible to identify all cluster organizations operating in the Slovak Republic using the above methods. Secondly, having a record in the register of interested or citizens’ associations did not guarantee that the cluster was active. Thirdly, the cluster organization could have had another legal form that inevitably introduces a word other than ‘cluster’ in its name. Finally, it was not possible to identify an exact definition, or a border when it meant designating a given association of the companies or other cooperating participants without a closer specification or as a cluster. Nonetheless, it was considered that the list provided a general survey of clusters within the Slovak Republic and thus, a theoretical basis for deriving possibilities for developing a cluster initiative and policy in the area of the Slovak Republic.

**Results and Discussion**

Of the 70 clusters identified, approximately 19% were aimed at ‘tourism,’ 30% belonged to the classification ‘regional development’, and 51% were oriented towards a particular industry activity (Figure 1). The clusters classified under industry involved 10 areas (Figure 1). The scientific research and the development of various specializations were the major industrial area. This was followed by clusters of the engineering industry; energetics industry; information and communication technologies; electrical engineering and technics; agriculture and food industry; transport; and waste disposal and environmental protection. In contrast, the collaboration in the building industry and processing of plastic materials was not that common, with only one cluster in each.

The majority of clusters in the Slovak Republic arose during 2014. Of the 70 clusters included in the research, 12 were registered in that given year; a number that was three times that of the previous two years. These 2014 registrations were mainly clusters in tourism as well as associations that were not
previously present in the Slovak Republic at that time, e.g., transport (railway and air transport) and an agricultural and food cluster.

![Proportional distribution of clusters in the Slovak Republic by area of activity](image)

**Figure 1:** Proportional distribution of clusters in the Slovak Republic by area of activity

The abovementioned analytical studies (Duman et al., 2009; Balog, 2015) grouped cluster organizations into two classifications: technology and tourism. This study used three classifications: tourism, industry, and region development (Figure 1). The tourism clusters in the Slovak Republic involved participants in tourism from a certain region or in a popular tourist area. The second group, the regional development, comprised clusters with participants in various lines of business in the same region. Their aim was to increase the competitiveness of the region through activities oriented toward improving the economic activity, erudition, reducing unemployment, protecting the environment, and supporting tourism. The industrial clusters involved participants situated in another region, but with the same orientation in economic activity, i.e., in the same line of business.

The cluster initiative can be oriented toward either supporting the existing clusters or creating suitable conditions for building new cluster organizations. The support of the existing clusters could be oriented toward improving the cluster promotion and their advantages. This research found several cluster organizations had no website, which meant it was difficult to gather information about them. In this respect, the clusters could be losing potential members. A solution would be to create a common internet portal to record clusters and their basic information. Thus, the companies and other potential members would have an overview of the active clusters in their territory or with the same or similar orientation. A cluster initiative aimed at supporting the rise of new clusters needs to be concentrating especially on increasing areas that are currently lacking in the Slovak Republic and which will presumably attract interest from members of the public and private sector. These clusters especially correspond to those lines of business in which a large number of companies operate.

Figure 2 compares the percentage represented by each identified cluster with that of the companies operating in the Slovak territory. The economic activities of agriculture and food industry, scientific research and development, and information and communications technology in the clusters closely matched that represented by companies in the Slovak Republic (Figure 2). The building industry had the biggest discrepancy in the framework of comparing the cluster and company orientation (Figure 2). There were many companies in the building industry, but the cluster representation of such (only one) was minimal (Figure 2). In contrast, regarding the percent share, there were more clusters aimed at electrical engineering and technics than companies operating in this area (Figure 2).

The building industry had the largest representation of companies that were manufacturing enterprises (Figure 2). A comparison of the structure of the clusters and companies aimed at production showed a lack of clusters involved with wood and metal processing (Figure 2). There were few companies...
producing plastic (rubber) products, or in engineering or electrical engineering and technics (Figure 2). However, the clusters that associate with this specialization were identified.

**Figure 2: Clusters and companies according to their orientation toward economic activities**

![Figure 2: Clusters and companies according to their orientation toward economic activities](image)

*Source: Authors*

Figure 3 depicts the lines of business of the major active enterprises outside of a cluster. These enterprises especially include economic activities oriented towards services. The majority of legal entities in the Slovak Republic operate in the wholesale and retail business. The next largest is the sector of legal, accounting and consultancy activities, followed by administrative and support services, and then activities in the area of estates (Figure 3).

**Figure 3: Lines of business for clusters and companies (outside of a cluster)**

![Figure 3: Lines of business for clusters and companies (outside of a cluster)](image)

*Source: Authors*

It is noted that the companies operating in the lines of business shown in Figure 3 could overlap in cluster organizations, e.g., the companies aimed at accommodation and catering services could be members of a tourism cluster. As tourism is not an interdepartmental line of business, the tourism clusters can also be associated with companies of another orientation. The companies operating in these lines of business could be members in those clusters ranked in the group ‘region development’. These clusters are associated with companies of various lines of business that operate in a particular region.
Conclusion

A cluster initiative represents a set of activities aimed at improving the level and competitiveness of clusters. These activities are oriented especially towards financial support and providing information for the clusters. The type of state subsidy for financing a cluster depends on the legal form and orientation of the cluster. The Slovak Innovation and Energy Agency provides international support by way of information for the clusters or other institutions. This current analysis found that an updated list of clusters is needed for the cluster initiative of the Slovak Republic. An analysis of the cluster structure was based on a list of 70 clusters (exact names and orientations are not published). The information for creating a list of clusters operating in the Slovak Republic was obtained from records about ‘the interest associations of the legal entities’ and ‘citizens’ associations. This article compares the percentage of companies represented in a line of business with those of clusters identified in the study. Despite limitations in the compilation, the list provides a general overview of the clusters in the Slovak Republic and therefore, creates a basis for further research in this area.

Acknowledgements

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Zákon č. 91/2010 Z. z. o podpore cestovného ruchu

THE GUIDELINES FOR STRENGTHENING AGRICULTURAL COOPERATIVES IN THE ASEAN REGION

Narongsak Jukrkorn1

Abstract: The majority of the populations in the Association of Southeast Asian Nations (ASEAN), are small and consists of poverty farmers. The governments of almost all countries in the region employ agricultural cooperatives as a tool to tackle poverty and the problems of farmers. However, many cooperatives in this region have similar problems of how to manage their business in response to members’ needs and environmental changes. Data and insightful information were drawn from a series of training courses and workshops during 2013-2015. The main objective of this paper is to present the guidelines for enhancing cooperatives organizational capability. The series of learning intervention programs, study visits in both Thailand and Germany, strategic planning, business plan formulation, plan implementation, monitoring and supporting as well lesson learned summarization, have been integrated for building up organizational capability. The outcomes are emerging of new business and services of four pilot cooperatives in Vietnam. The model for strengthening Vietnam’s cooperatives can be applied to other countries in the ASEAN region.

JEL Classification Numbers: H25, M89, I01; DOI: http://dx.doi.org/10.12955/cbup.v5.926

UDC Classification: 334

Keywords: Agricultural Cooperatives, Strengthening Model, ASEAN.

Introduction

Countries in the ASEAN region are located in the same tropical climate zone, a majority of the population are small and consists of farmers (except for Singapore and Brunei). Farmers in each country often have similar problems, i.e., high production costs, low yield per rai (hectare), fluctuation of crop prices and being exploited by market forces. Moreover, they also face climate variability. The governments of almost all countries in the region employs agricultural cooperatives as a tool to tackle poverty and the problems of farmers mentioned above. Support is rendered to encourage farmers to unite in establishing agricultural cooperatives. The governments then support agricultural cooperatives to act as a coordinator with different agencies, to promote the development of production capacities of farmers by means of provision of loans, production factors and other agricultural services, as well as to act as an intermediary in the collection of member products for processing and distribution in order to help raise crop prices and prevent them from being exploited by the middlemen. Agricultural cooperatives are therefore an agricultural institution that plays a key role in the economic development and livelihood improvement of farmers.

For Thailand, His Majesty the King presented the concept of sufficiency economy as a guideline for the country’s economic development, which is consistent with the principles and values of cooperatives. In this context, cooperatives could be called the practical part of the sufficiency economy. They focus on promoting the carrying out of occupation and livelihood on the principle of self-reliance on the middle path, practicing reasonableness and moderation, being based on knowledge and capacities that are in line with existing economic and social conditions, and attaching importance on equitable allocation of resources and surpluses. The royal development projects are located all over the country, and all use cooperatives as a tool for development.

However, whether and how well cooperatives are able to serve the mentioned functions depends on their capacities in the management of businesses. Hence, capacity development of cooperatives to enhance business potential and competitiveness is an important action to be taken by cooperatives in every country on grounds of driving forces including change of circumstances, chance of survival of cooperatives themselves, as well as allocation of benefits to members based on each cooperative identity.

1 Phranakhon Rajbhat University, jukrkorn@hotmail.com
Research methodology

This paper is summarized lessons learned from the project “Strengthening Cooperatives in Central Vietnam” under the Vietnamese-Thai-German Trilateral Cooperation and the research project on the “Collaboration for Agricultural Cooperative Development in ASEAN Countries.” Data and insightful information were drawn from series of training courses and workshops, and captured through participatory learning and observation in 2013-2015. Case study research has been applied to as a research methodology. The 12 cooperatives in 4 provinces have become pilot models on strategic planning and management for further outreach. 4 cooperatives have successfully carried out new activities following strategic plan, their visions and missions. These model cooperatives are Hoa Thang 2 (in Phu Yen), Binh Thanh Dong Agricultural Cooperative (in Quangngai), Phu Dong Agricultural Cooperative (in Quangnam) and Phu Ho Cooperative (in Thua Thien Hue).

The conceptual framework for strengthening Cooperatives

Marquardt (1996) argued that organizations of all kinds in the world, are continuously facing changes due to rapidly changing economic, social and cultural circumstances, as well as advancement of science and technology. Cooperatives mostly are small and medium enterprise (SMEs), related to business operations, being part of the world’s economy. They need to adapt themselves for higher efficiency and effectiveness, as well as develop capabilities to learn and adapt in order to be competitive and survive under continuously changing circumstances.

Mazzarol et al. (2012) proposed guidelines for capacity development of cooperatives and applied to studied business capacity development of producer cooperatives in Australia and France with respect to their competitiveness. It was found that network building between cooperatives could help enhance the potential of access to external resources, exchange of knowledge and useful information and efficiency of business operations of cooperatives.

To develop cooperatives in developing country, the governments’ role is a key success factor (Changjian et al., 2011). For example, the Cooperative Promotion Department (CPD) of Thailand has formulated a strategy to strengthen cooperatives in Thailand in terms of cooperative management, building of business networks and cultivating of cooperative principles and values for all concerned.

Key components to be considered when strengthening cooperatives include: (shown in Figure 1)

1. Antecedents refers to internal and external basic components of an organization that have an impact on the success of cooperatives, comprising:
   a. Organization features of cooperatives are resources that represent potentials of cooperatives, such as capabilities of the board, the strength of team work, networking etc. Each cooperative has different existing resources. Cooperatives with good quality of existing resources can be easily strengthened.
   b. Government policy and support are considered as major supporting factors that have an effect on the strength of cooperatives in each country. Any country which has a policy, system and mechanism to support cooperatives fully is likely to be able to advance cooperative development quickly.
   c. The external environment has an effect on the operations of cooperatives, such as integration of the ASEAN Economic Community and competition condition.

2. The process refers to the management process that has an effect on the success of cooperatives. How successful a cooperative will be, depends on its efficiency in process management that is suitable for it and in line with the cooperative’s resources. As mentioned earlier, important processes that have an effect on the success of cooperatives include:
   a. Strategic planning process
   b. Emotional bond and trust building process
   c. Business management process of cooperatives

3. Outcome is a result of the combination between existing resources and management process that will determine how far members and cooperatives will be benefited.
   a. Tangible results, such as benefits of members, profits, dividends, and incomes of members
   b. Intangible results, such as confidence and trust in cooperatives
However, in order to facilitate the design of activities to strengthen and develop various components, criteria for each component have been set to enable co-operators to design a set of activities that create quality of different components for strengthening capacities of cooperatives and work well together in systematically, hereafter referred to as the model for strengthening cooperatives.

Figure 1: Conceptual Framework for Strengthening Cooperatives

<table>
<thead>
<tr>
<th>Antecedents</th>
<th>Processes</th>
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<td>Organizational features</td>
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<td>Board and Staff capacity</td>
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<td>Existing Staff</td>
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<td>Government Resources</td>
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<td>Government co-operators</td>
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<td>Environment</td>
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<td>Competition</td>
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<td>AEC</td>
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<td>Strategic Development &amp; Planning</td>
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<tr>
<td>• Common goal building</td>
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<td>• Strategic plans formulation</td>
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<td>Relationship Management</td>
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<td>• Team Building</td>
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<td>• Trust building</td>
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<td>Business management</td>
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<td>• Divers services response member need</td>
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<td>• Good Governance</td>
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Source: Author

The Model for strengthening cooperatives

The model for strengthening cooperatives is as “Organization Development” for cooperatives. It represents a continuous and dynamic cycle of learning and adaptation because strength of cooperatives is closely linked to steadily changing external factors. The ability to learn and adapt to the changing circumstances will enable cooperatives to survive and progress. Key components for project implementation are as follows:

Component 1: Project Design.

The project design involves the design of working group/staff structure, the allocation of budgets, the design of project activities, the design of coordination mechanism and system, as well as the design of regulatory mechanisms for the project management with a view to achieving the project objectives.

Component 2: Learning Intervention Programme consist of:

- Training and study visits on cooperative development in both Germany and Thailand
- Training on the environmentally-friendly green business concept
- Strategic planning workshop of pilot cooperatives
- Business planning workshop of pilot cooperatives

Component 3: Action Learning

Pilot cooperatives had the opportunity to use their knowledge and skills gained from the project learning processes to drive forward strategic and business plans of cooperatives, which led to a successful development or improvement of cooperatives to a certain extent.

Component 4: Monitoring, Support and Drawing of Lessons Learned

Activities to be carried out by the project working group consisting of Vietnamese, Thai and German sides involve monitoring, rendering of support and consultancy services, evaluation of project success and changes occurred to cooperatives, and summarizing of major lessons learned from the projects.
Information gained is used for the preparation of a manual on the guidelines for strengthening cooperatives. The model for strengthening cooperatives are shown in Figure 2.

**Figure 2: The model for Strengthening Cooperatives**

<table>
<thead>
<tr>
<th>1. Project Design</th>
<th>2. Learning Intervention Program</th>
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<tbody>
<tr>
<td>3. Action Learning</td>
<td>4. Monitoring, Support and Drawing of Lessons Learned</td>
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Source: Author

**Organizing the learning processes for cooperatives and the development of cooperatives in Vietnam**

In strengthening cooperatives in Vietnam, importance should be attached to the organizing of learning processes, both in terms of theory and learning from direct experiences. This includes study visits, learning from case studies, strategic planning and business planning workshops, translation of the plans into action, as well as the drawing of lessons learned from the project. The organizing of learning processes can be divided into 2 modules as follows:

**Module 1: Study visits in Germany and Thailand**

The purpose of the study visits was to provide the working group and participating cooperatives the opportunity to learn from cooperative models of both countries on how they were developed and made progress, what the management processes are like, what businesses and services they offer and how problems are solved. The knowledge gained has been applied for setting goals and procedures for the development of cooperatives in Vietnam.

**Module 2: Learning about the concepts, procedures and major tools for strengthening the cooperatives**

The project has organized workshops to provide knowledge and skills related to the management concepts and procedures, as well as major tools for developing businesses/services of cooperatives. The learning processes are shown in Table 1.

**Change of 4 Pilot Cooperatives**

Cooperatives in 4 provinces have become pilot models on strategic planning and management for further outreach. 4 cooperatives have successfully carried out new activities following a strategic plan, their visions and missions. These model cooperatives are Hoa Thang 2 Agricultural Cooperative (in Phu Yen), Binh Thanh Dong Agricultural Cooperative (in Quangngai), Phu Dong Agricultural Cooperative (in Quangnam) and Phu Ho Cooperative (in Thua Thien Hue). The change of the 4 cooperatives are as follow:
Hoa Thang 2 Agricultural Cooperative

A majority of members of the Hoa Thang 2 Cooperative are engaged in growing rice and producing handicrafts in an irrigated area where rice can be grown throughout the year. The cooperative has expanded its business to collect paddy so that its members can sell paddy at a good price and not be exploited by the middlemen. It will expand its business to process paddy in the future. At the same time, the cooperative also aims to encourage members to grow organic rice in the area of 10 hectares (60 rai). These new cultivation techniques help increase the income of participating members by 10%, which is in line with the regional and international trend of growing organic rice and doing organic farming to avoid the intense competition in the general paddy market. The businesses operated by the cooperative can therefore be considered as well responding to the problems of the farmers. At the same time, these represent a good strategy of the cooperative for their market positioning based on their potentials. However, in order to operate the paddy collection business effectively, the cooperative will need to educate its personnel about paddy collection, paddy and rice markets.

Table 1: Organizing the learning processes for the development of cooperatives in Vietnam

<table>
<thead>
<tr>
<th>Training Workshop</th>
<th>Objectives</th>
<th>Training Methodology</th>
</tr>
</thead>
</table>
| “Environment and Business” | 1) To create knowledge, understanding and awareness of environmental issues and their impacts on the members and the cooperatives  
2) To prompt the cooperatives to apply the knowledge gained for improving production of its members and improving businesses of the cooperatives that are environmentally-friendly | Training processes were designed to be a participatory learning, including brainstorming, sharing of experiences of the participants, provision of environmental concepts, practice of designing the guidelines for promoting the production of the members and business operations of the cooperatives that are environmentally-friendly. |
| “Strategic Planning and Management” | 1) To build a team of facilitators with skills at carrying out strategic planning of cooperatives in Vietnam  
2) To formulate strategic plans of pilot cooperatives | A participatory learning process is used to establish understanding about the concept and importance of strategic plans in cooperative management and to practice the actual process of strategic planning of each cooperative. |
| and business plans for Product/Service Marketing” | 1) To strengthen knowledge and skills of participants on business plan and marketing plan development in general  
2) To draft the product/service marketing plan and business plan using pilot cooperatives as case studies  
3) To enhance participants’ capacity in providing the consultancy service on business plan and marketing plan development for cooperatives | The training process is a participatory learning process with learning on principles and procedures and practice of business planning and of being a facilitator. The main content of the business planning process includes:  
1) Principle and procedure for business planning  
2) Practice of business planning for the four pilot cooperatives  
3) Principle and procedure for being a facilitator in the business planning |

Phu Ho Cooperative

The Phu Ho Cooperative has rice-growing members and rice mills. In the past, the cooperative collected paddy and sent it to private rice mills. After joining the project, the cooperative has developed its businesses to process and distribute rice under the brand “Phu Ho,” from which its members greatly benefit because this raises the price of paddy of the members and brings to the
consumers fairly-priced rice of the cooperative. At present, the first five tons of rice have been available for sales in the local market. In the future, the cooperative plans to produce 100 tons of Phu Ho rice per year, accounting for an income of 400 million VND. This demonstrates the effectiveness of creating brand identity of products, packaging design and efficient marketing planning. These factors will enable local products to be competitive in the upcoming ASEAN Economic Community.

Phu Dong Agricultural Cooperative

The Phu Dong Cooperative is located in a rural, semi-urban area where members are decreasingly employed in agriculture because they changed to another occupation. As a result, there is a shortage of agricultural labor. The cooperative has therefore developed businesses to offer agricultural services and supplementary occupations to its members, such as growing of Lingzhi mushroom etc. The cooperative also offers a new service in controlling the use of chemicals in rice fields, leading to a safe and cost-saving cultivation for the members. Within three months, the cooperative could generate an income of 8 million VND from this service while its members could reduce expenditure by 600,000 VND per hectare. Food safety and health is therefore a key factor for economic growth in agriculture in Vietnam and in this region.

Binh Thanh Dong Agricultural Cooperative

The Binh Thanh Dong Cooperative strives to increase the number of its members and its capital and has therefore organized a training program for its members on the cooperative principles and procedures. It has also developed agricultural services, such as preparing cultivated areas. From organizing the activity to develop cooperative membership system, the increase of the member base increased the amount of working capital for cooperative management. As a result, the cooperative's investment capital increased by 200 million VND. This is important in maintaining the cooperative values, as demonstrated in the examples of Thailand and Germany.

Although the four cooperative models aim at developing different businesses and services, the intention to strengthen their cooperatives is obvious. Activities towards this end include provision of knowledge and understanding about cooperatives to expand the member base and businesses and services of cooperatives with a view to better responding to the problems and needs of cooperative members and to concretely providing cooperative benefits to the members. This again builds confidence and trust and causes members to cooperate with their cooperatives. However, the cooperatives will need to develop the capacities of their personnel in the area of management of new businesses/services created by the cooperatives. In this way, they can be successful in the long term and thus be genuinely strengthened.

The four cooperative models are still in the initial stage of driving forward their business plans. Business success and tangible benefits for the cooperatives and members need to be further evaluated for another two to three years.

Conclusion

Strengthening cooperatives involves capacity building to learn, adapt and be competitive in order that cooperatives will be able to operate business in a way to respond to challenges and needs of the members.

Key components in strengthening cooperatives to be considered by co-operators are existing resources, design of the learning process and outcomes of the learning process. As regards the strengthening of cooperatives using the dynamic model, cooperatives will need to learn from the previous implementation and summarize lessons learned for use in the design of activities to continuously develop cooperatives.

Lessons learned and good practices could be drawn from the case studies of the "Strengthening Cooperatives and SMEs in Central Vietnam" project as follows:

1. The cooperative movement in central Vietnam, staff, and cooperative members benefit directly from the project while the partners from Thailand and Vietnam harness advantages in terms of cross-cultural knowledge and experience of developing cooperatives. For working across cultures, understanding the needs to be established about political, economic, social, cultural conditions and factors and belief of each country are important.
2. Working on the mentioned project involves an application of technical knowledge to develop cooperatives in practice. The project has generated knowledge in the development of cooperatives in the context of central Vietnam, which can be applied to other regions in the future. The project also attaches importance to the cycle of quality, based on which steps of analysis, development design, testing and evaluation of the change occurred to the target group in the short, medium, and long term take place.

3. The learning processes of the project are organized step-by-step. That is, the knowledge about sustainable and environmentally-friendly businesses is first provided, which is a major trend, followed by strategic planning, using the strategic plan for business planning, and extension of knowledge through study visits to cooperatives in Germany and Thailand in order to apply concepts and knowledge from abroad to cooperatives in Vietnam.

4. The process of developing knowledge and skills based on learning from hands-on practice (Action Learning) was in place so that knowledge gained can be applied in reality. For example, the process of strategic and business planning has provided the working teams of cooperatives in Vietnam with skills of a facilitator and a consultant for further outreach after completion of the project.

5. The four cooperative models, which focus on different development objects, are all based on the development of businesses and services that responds to the needs of their members. Other cooperatives may choose a development model that appropriately suits their context.

References
FORMATION OF A PETROCHEMICAL CLUSTER AND THE CREATION OF AN INTEGRATED PETROCHEMICAL COMPLEX IN KAZAKHSTAN

Assel Kadyrbergenova,1 Saule Yegemberdiyeva,2 Kulman Orazbayeva3

Abstract: The problems associated with the development of the petrochemical industry of the Republic of Kazakhstan are investigated by creating a petrochemical cluster in the western oil and gas region of the country. The issues of a forming petrochemical cluster in Kazakhstan and creating an integrated petrochemical complex in Atyrau region are considered. The essence of the cluster approach as the main factor for increasing the regional competitiveness of the Atyrau region is opened, the expediency and efficiency of the creation of the petrochemical cluster and an integrated petrochemical complex is substantiated. The stages of construction of an integrated petrochemical complex are described, depending on the sources of supply of the used raw materials. An integrated scheme of the petrochemical complex was created and investment petrochemical projects in the Atyrau region were considered. The main groups of factors substantiating the opportunities for the formation of a petrochemical cluster and the achievement of an economic effect in western Kazakhstan are defined.

JEL Classification Numbers: O14 Industrialization • Manufacturing and Service Industries • Choice of Technology;

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UDC 665.63-404(574)

Keywords: petrochemical industry, petrochemical cluster, integrated petrochemical complex, special economic zone, benzene, paraxylene.

Introduction

The globalization of production and capital in a modern economy will lead to an increase in the competitiveness of goods and services. The consequence of this is the emergence of a fundamentally new economic phenomenon that has been theoretically comprehended in the concept of the cluster, which is based on the combination of individual elements into a single whole for the performance of a certain function and the realization of a specific goal. Clustering in the economy is the main factor in increasing regional competitiveness (Kuandykova, 2009).

A cluster is a group of companies that belong to one sector and operate in close proximity to each other. An industrial cluster is a series of industries that interact as a buyer-supplier or supplier-buyer, as well as through common technologies, common procurement channels or distribution of general labor associations. Regional clusters are industrial clusters, in which the participating companies are territorially close to each other. Thanks to its huge reserves of hydrocarbon raw materials, the Republic of Kazakhstan has become, in the 21st century, one of the largest exporters of oil and gas. In the action program developed by the Government of the Republic of Kazakhstan for the coming years, providing for the accelerated development of all branches and spheres of the economy, it is centered on the diversification of processing industries, including the creation and development of a petrochemical cluster, an integrated petrochemical complex in Atyrau region (Orazbayeva 2009a).

Due to the introduction of innovative developments in the real sector of the economy through the formation of a petrochemical cluster, the development of resource and energy-saving technologies, it is planned to develop high-value-added industries, accompanying and adjacent production in the oil and gas sector, and a decrease in the energy intensity of domestic production. (Bopieva, 2007; Pervushina, 2015; Braginsky, 2009). Realization of these branches can save the economy of the country from raw dependence and to produce a strong multiplicative effect within the country. For the effective solutions to these important issues, it is necessary to conduct interdisciplinary research (economy, technology, ecology, etc.) and make a scientifically-based decision.

Purpose, statement of the problem.

The aim of the work is to research opportunities of developing petrochemical productions by creating and forming a petrochemical cluster, creating an integrated petrochemical complex in Western Kazakhstan. The main tasks are (Bopieva, 2007):

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1 Eurasian National University, Asel-k-80@mail.ru
2 Eurasian National University, saule_8@mail.ru
3 Kazakh University of Economics, kulman_o@mail.ru
studying of the problems of creating an integrated petrochemical complex in the Atyrau region;
studying of the main indicators on resources and expected results that are available in Western Kazakhstan for the creation of a petrochemical cluster;
justification of the feasibility and effectiveness of the establishment of a petrochemical cluster and an integrated petrochemical complex in the Atyrau region;
studying of the stages of construction of an integrated petrochemical complex, depending on the sources of supply of the raw materials used;
Creation of an integrated scheme of a petrochemical complex and the study of investment petrochemical projects in Western Kazakhstan.

Research methods
Let’s consider the methods for solving topical tasks for the formation of a petrochemical cluster and the creation of an integrated petrochemical complex in the Atyrau area. Analysis of the effectiveness of clusters can be carried out in various directions: institutional organization of clusters; internal motivation initiation and maintenance of clusters; comparing the competitiveness of participants in a cluster; and the strategic potential of clusters. Thanks to being focused on its territory reserves of oil and gas, the Atyrau region is one of the perspectives and attractive regions of the Republic for the formation of a petrochemical cluster. Research and classification of characteristic features of clusters show their distinction in different countries, but in general, you can select the following main indicators resource and expected results that are available in the Atyrau area to create a petrochemical cluster:

- sufficient opportunities and resources researched for construction of structures in and out of the cluster and prospects for their development;
- opportunity for the development of labor-buildings and a workforce inside the enterprise’s cluster;
- the proximity of suppliers of hydrocarbons and other material resources;
- the presence of equity participants cluster; - the presence of associated structure opportunities ready for joint action;
- the presence of opportunities for the intensive formation of networks - high potential for innovation and training staff.

The main purpose of the creation of a petrochemical cluster should be the development of the competitiveness of petrochemical complex Kazakhstan and its products out on the world market, increase the efficiency of its contribution to the competitiveness of the National Economy. In the Atyrau region it is possible to form a petrochemical cluster on the basis of new petrochemical objects of two companies for the production of plastics, which 50% of shares were purchased by JSC Investigation – Production “KazMunaiGaz” on the basis of which will be created a single petrochemical complex. A cluster includes a processing company: “JSC Polypropylene,” “Aktau plant plastics, JSC” Atyrau Oil Refinery "and new oil, gas processing plant under construction on Karabotan, etc. (Sarmurzina, 2007).

The proposed petrochemical cluster, provides Kazakhstan raw material, having not only the internal market, but also external markets (Iran, China, Russia), has every reason to become a real subject of the cluster development in the future.

Due to the growth of oil production in Kazakhstan, the capacity of existing GPP (Gas Processing Plant) is not enough for the full processing of gas, because it is necessary to utilize processed gas, which contains an ethane fraction from 13% to 16% and above, being a basic component of petrochemicals. The receipt of ethylene from ethane technologically and economically cost-beneficially. In comparison it should be noted that the consumption of gasoline to get one ton of ethylene is 3 tons and more, while the consumption same propane for the of purpose is 1.8-2.0 tons. Further the received ethylene can be used for the production of a wide range of petrochemical products, but the most cost-benefit of Kazakhstan will release of polyethylene low and high-density, polypropylene different brands, styrene and polystyrene, ethylene glycol and benzene, methanol and the other products more than 20 items.
The formation of clusters accelerates the process in individual industries, leading to a splash in innovation and strengthens the ability to compete in the world market (Espaev and Kireyeva, 2013). Moreover, integration into a cluster based on vertical integration will not form a spontaneous concentration of various technological inventions, but a certain system of dissemination of new knowledge and technologies (Zhekeev et al., 2007). At the same time, the most important condition for effective transformation of inventions into innovation, and innovation in competitive advantages, is the formation of a network of sustainable links between all cluster participants.

Kazakhstan is located in the center of the Eurasian continent and has no direct access to the markets for petrochemical products. In this regard, the transport component in the cost of petrochemical ready products, taking into account the indicators for transportation of raw materials inside the Republic, will have tangible indicators for its increase. Taking into account these facts, as well as ensuring the breakthrough development of the petrochemical industry for the economic niche in the international market for petrochemical products, the Ministry of Energy and Mineral Resources of the Republic of Kazakhstan, in conjunction with JSC NC “KazMunaiGaz”, is implementing a set of measures to create favourable economic conditions through the formation of a special economic zone (SEZ) (Sarmurzina, 2007). The terms and status of the SEZ will ensure the release of enterprises that are part of investors and executors of the construction sites of petrochemical complexes of SEZ, from customs duties on imported licensed technologies, equipment and materials, exemption from payment of corporate tax, land tax, VAT and other mandatory payments in the budget.

Results and discussion

Based on the analysis of the prerequisites and conditions for the development of the economy of the western region of Kazakhstan, the petrochemical industry is defined as the main competitive industry, for development of which it is necessary to direct domestic and foreign scientific potential, which will allow to raise innovative entrepreneurship to a new level. The development strategy for the Atyrau region has defined the need for creating facilities for deep processing of oil and gas for obtaining a wide range of science-intensive products with 5-6 redistribution, restoration and development of the petrochemical industry (Orazbayeva, 2008). Currently, in this priority area with the involvement of petrochemical specialists, proposals have been developed on the composition and structure of the regional petrochemical cluster. Within the realization of this cluster, the implementation of modern technologies for deep processing of hydrocarbon raw materials produced in the region is being implemented with the acquisition of science-intensive petrochemical products. (Serikov and Orazbayeva, 2009; Orazbayeva et al., 2013; Orazbayev et al., 2013; Orazbayev et al., 2014).

Step-by-step construction of an integrated petrochemical complex will be carried out in the areas of Karabatan, Kulsary and Atyrau stations, depending on the sources of supply of the used raw material:

Step-by-step construction of an integrated petrochemical complex will be carried out in the area of Karabatan, Kulsary and Atyrau stations, depending on the sources of supply of the used raw material: Construction of the polypropylene Complex is the first step to create a petrochemical cluster in the region followed by obtaining high-basic products of the industry.

The Project provides to use worldwide high technology on deep processing of the propane (Phase 1) and ethane (Phase 2) to obtain the following types of commercial product: polypropylene - 500 000 tons per year.

As a result of the project it is expected to create 30 000 jobs and produces more than 3000 types of final outputs within Technopark located in the Special Economic Zone in West Kazakhstan, development of small and medium business, expansion of the tax base, and development of related industries.

At present, the concept of its formation and construction of an integrated petrochemical complex in the industrial zones Karabatan, Kulsary and in the Tengiz area (optimal points for the umbrella principle for fractionation and deep processing of raw materials) has been developed in the Atyrau region to create the SEZ “National Industrial Petrochemical Science and Technology Park.” (Orazbayeva, 2009b; Orazbayeva, 2009c).

The goal of the project is the creation in Kazakhstan of petrochemical industries for deep processing of domestic hydrocarbon raw materials (oil and gas) and the release of basic and high added value petrochemical products.
Most of the activities of the first stage of the Program have been completed, the number and list of petrochemical complexes that are economically profitable in Kazakhstan have been determined. Specific indicators on the parameters of petrochemical complexes, sources and volumes of the necessary hydrocarbon raw materials have been obtained to ensure their uninterrupted processing. Natural and associated gases will be used in which the fraction containing ethane is between 13% and 16% or more of the total volume of gas, which is the main economic and technological advantage for the production of ethylene, the basic petrochemical product. Further, the ethylene produced can be used to produce a wide range of petrochemical products, but the most economically profitable for the Republic will be the production of low and high-density polyethylene, polypropylene of various grades, styrene and polystyrene, ethylene glycol and benzene, methanol and other products of more than 20 titles.

To create various petrochemical industries in Kazakhstan, it is necessary to create a product for the production of basic petrochemical products - an integrated petrochemical complex (Figure 1).

The creation of a domestic base of raw materials for petrochemical industries based on the above-mentioned deposits is based on the implementation of investment projects presented in Table 1.

Thus, in Kazakhstan, when implementing investment projects, it is planned to create real sources of raw materials for the petrochemical industry, which, through a chain of added value, will produce a wide range of petrochemical products.
Table 1: Investment petrochemical projects in Atyrau region.

<table>
<thead>
<tr>
<th>Project name</th>
<th>Raw material</th>
<th>Product</th>
</tr>
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<tbody>
<tr>
<td>Gas chemical complex in the Atyrau region</td>
<td>Gas field Tenguz</td>
<td>Polyethylene</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Polypropylene</td>
</tr>
<tr>
<td>Aromatic hydrocarbons production complex in the Atyrau Oil refinery</td>
<td>Gasoline fractions of the Atyrau refinery</td>
<td>Benzene</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Paraxylene</td>
</tr>
<tr>
<td>Petrochemical complex based on benzene and paraxylene</td>
<td>Benzen</td>
<td>Ethylbenzene</td>
</tr>
<tr>
<td></td>
<td>Paraxylene</td>
<td>Ethylene glycol</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PET (polyethylene terephthalate-lat)</td>
</tr>
<tr>
<td>Diversification of the Aktau plant of plastics</td>
<td>Ethylbenzene</td>
<td>Polystyrene</td>
</tr>
</tbody>
</table>

Source: Authors

The cost of production for complex processing of oil will be low, which will allow a fierce struggle in the market for the sale of petroleum products. The existing petrochemical enterprises in Kazakhstan cannot withstand competition. Therefore, it is necessary to create a scientific concept for reforming the petrochemical industry in Kazakhstan. It is necessary to focus on the world's advanced enterprises. (Braginsky, 2003; Qing, 2007; Alfaadala et al., 2009; Buzurtanova and Smirnova, 2010; World Intellectual Property Organization, WIP, 2011; Abu Dhabi UAE Petrochemical cluster, 2012; Dyrdonova, 2013; Melnik and Dyrdonova, 2014)

At present, there is no hydrogen production in Kazakhstan, and it is needed in large quantities for existing hydrotreatment processes, as well as future processes of hydrocracking, alkylation and others. Olefins (ethylene, propylene, butylene and isobutylene) can be used directly as a monomeric feedstock for petrochemistry. The absence of any of the above processes will lead to costs for the economy and ultimately will affect the cost of production. When processing oil according to the scheme of atmospheric distillation, existing in Kazakhstan, from each ton, the output is about $ 880. If all processing processes are implemented, all petrochemical syntheses that exist in the petrochemical complex, then about 2,2 thousand dollars of oil will be received from a ton of oil.

At the same time, fuel oil is mainly used as fuel at the CHP (combined heat and power) although it extracts the most expensive petroleum products, for example, lubricating oils, which are not produced in Kazakhstan. From this part of the oil, tar is obtained - raw materials for the production of bitumen, which is so much needed today for road construction, which is declared one of the government's priorities in the country. When burning fuel oil together with it, metals (vanadium, nickel, cobalt) contained in Kazakh oil and concentrated in heavy fractions are completely lost. If we add sulphur here, the content of which in fuel oil reaches 2%, and which is selected into the atmosphere in the form of sulphur dioxide, turning into acid rains, the advantages of burning fuel oil turn into negatives. In Kazakhstan, the entire gas part of oil and gas raw material is not processed. At best, the gas is supplied to the furnace, and in most cases, it is flared. At the same time, in addition to hydrocarbons, associated gas of oil production contains hydrogen sulphide and its incineration without purification is unacceptable.

It follows from the above that it is criminal negligence, which leads not only to the loss of additional cash receipts, but also creates unsolvable environmental problems to continue processing oil under a truncated scheme, without seeking the complex use of raw materials.

**Conclusion**

As a result of research into the formation of the petrochemical cluster in Kazakhstan, it is determined that there are numerous objective and subjective prerequisites for the accelerated creation and development of this cluster available in the Atyrau region. It is possible to single out the following...
groups of factors that justify the possibilities for forming a petrochemical cluster and achieving an economic effect.

The first group of factors is conditioned by the interconnection of potential resource and technological preconditions: for the petrochemical industry, Kazakhstan's heavy paraffin sulphurous oil is the best source of raw material; It is necessary to consider the technological interconnectedness of the petrochemical cluster; creation of new production facilities taking into account the existing infrastructure for the extraction and processing of hydrocarbon raw materials. All of the above will allow to help lay the foundation for the development of the petrochemical industry along the chain of subsequent complications of production to increase added value in the final product.

The second group of factors is predetermined by the reasons for the world demand for products and the need to provide an equivalent exchange in the international division of labor. Kazakhstan has large enterprises for the production of petrochemical products, which has a huge world demand. The demand for petrochemical products of the international market shows that the creation of basic petrochemical production facilities for the production of polyethylene, polypropylene, styrene and polystyrene, ethylene glycol and benzene will be very economically profitable for Kazakhstan.

The third group of factors is due to the possibility of activating the resumption of activities of petrochemical enterprises.

The fourth group of factors is predetermined by incentive motives to ensure high profitability of industries. The presence of an own hydrocarbon based requires the formation of a petrochemical complex that ensures deep processing of raw materials into final high-tech and science-intensive products to saturate the domestic market instead of imports and to expand the export potential of the final product.

The fifth group of factors is predetermined by the strategic platform for diversifying the country's economy in connection with the entry into the category of highly competitive countries. This dictates the expediency of forming a cycle of production of final products, which is the basis for creating a petrochemical cluster in the Republic of Kazakhstan. The development of an innovative cluster of petrochemicals can be a decisive factor in accelerating the diversification of the economy, promoting the activation of non-resource, high technology and high-tech industries.

The conclusion from the above is that the development of the production of petrochemical products in the Republic of Kazakhstan should become a priority not just as one of the fashionable strategies that will be forgotten immediately after the emergence, but as a plan for the development of one of the most important and strategic industries. Implementation of the cluster strategy and competitiveness of the economy can be facilitated by government policy aimed at solving the problem of transition from the import substitution stage to the stage of large-scale investments in the petrochemical industry and the creation of a petrochemical cluster. In the strategy for the development of the national economy of the Republic of Kazakhstan, it is necessary to add some changes, the basis of which should be based on the creation of a large petrochemical production, the source of raw materials should be oil, natural and associated gases extracted from the currently exploited deposits and concentrated on promising areas.

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FORECAST OF USING NEURAL NETWORKS IN THE TOURISM SECTOR

Miroslav Karahuta,1 Peter Gallo,2 Daniela Matušíková,3 Anna Šenková,4 Kristína Šambronská5

Abstract: The paper addresses the issue of management decision-making using artificial neural networks and their application in hotel management. Today, the development of tourism is of great importance and plays a very important role in the development of national economy. Balanced ranking and prediction model using financial and non-financial indicators with the application of artificial intelligence, allows us to reach a high level of effectiveness and accuracy in evaluation of the financial and non-financial health of companies operating in this segment. This approach improves the manager’s ability to understand complex contexts and make better decisions for further development. It also brings new managerial and scientific point of view of an in-depth analysis of the performance of these facilities. It can help the development of tourism in terms of the application of modern management techniques built on scientific principles and thereby better integrate science and practice.

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Keywords: Prediction models, financial health, neural networks, management, tourism.

Introduction

Tourism development has great importance and plays a significant role in the development of national economies (Šenková and Šambronská, 2014; Council, 2016). Therefore, the efforts of each country are heading to assist in the development of this industry effectively. Management, economics and application of modern methods of economics and management have very important role in this development and thus equally important is managerial decision making. The ability to decide optimally is one of the most crucial parts of hotel manager’s everyday job (O’Halloran, 2015). There are several methods that can be used in the field of managerial decision making. Many methods are based on an assessment of the performance of these businesses using the methods of financial analysis, prediction models, Economic Value Added or the methodology of the business performance analysis based on financial (Horváthová and Mokrišová, 2014) and non-financial indicators - Balanced Scorecard (Ivanickova et al., 2016). All these methods provide information to the optimal decision making by managers and to better controlling of these organizations. From modern economics models that can play a major role in the future, the management decision-making methods based on classification and prediction using artificial neural networks (ANN) are the most promising.

Artificial neural networks are one of the modern trends in assessment of the financial and non-financial health of the business. They are particularly suitable when part of the decision-making processes depends on coincidence and/or deterministic dependency. They are therefore suitable for modeling and exploration of complex, single, often irreversible strategic management decisions (Hanne, 1997).

During analytical phase of research, we have conducted many experiments with popular conventional models like Tafler model (Taffler and Tisshaw, 1977), Altman Z Score (Altman, 2013), Springate model (Springate et al, 1983) and many more (Beerman, 1976; Ohlson, 1980; Zmijewski, 1984; Kralicek and Spal, 1993; Hajdu and Virág, 2001; Neumaier and Neumaierová, 2005). Almost no commonly used model is optimal for tourism and specifically for hotel management.

Principal problems of conventional models were identified, such as their static nature and reliance on the principles of market behavior, which assumes a certain rational behavior of the consumer. Many models focus only on the financial side of the business, which is optimal for production type company, but not so for customer and service based businesses. Therefore, the presented model had to overcome these disadvantages and at the same time, be a convenient and efficient tool for managers.

1 Mgr. Miroslav Karahuta, Faculty of Management, Prešov University in Prešov, karahuta@gmail.com
2 doc. Ing. Peter Gallo, CSc., Faculty of Management, Prešov University in Prešov, peter.gallo@unipo.sk
3 PhDr. Daniela Matušíková, PhD., Faculty of Management, Prešov University in Prešov, daniela.matusikova@unipo.sk
4 Ing. Anna Šenková, PhD., Faculty of Management, Prešov University in Prešov, anna.senkova@unipo.sk
5 Ing. Kristína Šambronská, PhD., Faculty of Management, Prešov University in Prešov, kristina.sambronska@unipo.sk
Design of model
Designing of model based on the artificial neural network requires multiple steps and decisions to be made. The most important are input and output neurons and their number. Based on chosen topology, there are different types of hidden layers of neurons, their number and interconnections. Using appropriate configuration of ANN, activation functions and learning algorithm, we can create a network capable of analyzing and classifying health of companies in the accommodation sector in tourism.

However, technology is not enough. Deep analysis of accommodation sector was an essential part of this research. Without a deep understanding of the sector, there is a big probability of incorrect results - GIGO (Garbage In, Garbage Out). Learning system learns only from data provided.

The research samples
For this research, the basic research set of businesses operating in hotel services in Slovakia was created. Businesses were selected based on SK NACE, specifically Section I - Accommodation and food services, Division 55 - Accommodation and Group 551 - Hotels and similar accommodation. Time vector was 2009 – 2015. According to the portal “Index podnikateľa”, (www.indexpodnikateľa.sk) there were 1,652 businesses under the category SK-NACE 55.1. Subjects in this group consisted of business entities that are registered in the Commercial Register of the Slovak Republic and have submitted financial statements to the commercial register. This research group was separated into two groups. First one, labeled as ZS1, contained only healthy companies. The second group, marked as ZS2, contained companies in liquidation or companies which undergo the healing process. ZS1 group consisted of 1,514 companies, ZS2 group consisted of 138 companies. By using simple random sampling, the final research samples were created (S1 from ZS1 and S2 from ZS2). To optimize and maintain the objectivity of the results, companies that own more than one property were eliminated due to the unavailability of financial statements separately for each accommodation company.

For necessary verification of the functionality of the model, in addition to mechanisms that are part of the ANN, six companies were selected: two healthy companies of the group S1, two companies in bankruptcy/liquidation from the group S2 and two artificially created enterprises – one healthy and one problematic. Both artificially designed companies had been set up as real as possible to represent their category. These companies were not included in the data files intended for training, validation and testing ANN. It was applied only for final verification and comparison. An overview of all companies and their designations are shown in Table 1.

<table>
<thead>
<tr>
<th>ID</th>
<th>Category</th>
<th>Class</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>SZ1</td>
<td>Hotel</td>
<td>****</td>
<td>healthy</td>
</tr>
<tr>
<td>SZ2</td>
<td>Hotel</td>
<td>***</td>
<td>healthy</td>
</tr>
<tr>
<td>SK1</td>
<td>Pension</td>
<td>**</td>
<td>bankruptcy</td>
</tr>
<tr>
<td>SK2</td>
<td>Congress hotel</td>
<td>***</td>
<td>bankruptcy</td>
</tr>
<tr>
<td>SSZ</td>
<td>Hotel</td>
<td>***</td>
<td>simulated healthy</td>
</tr>
<tr>
<td>SSK</td>
<td>Hotel</td>
<td>***</td>
<td>simulated bankruptcy</td>
</tr>
</tbody>
</table>

Data sources and input variables
Hotel and tourism business can be characterized as a business in an unstable environment with some level of risk and uncertainty. Changes in the market are swift and quite frequent. The common problem is also the rationality of customer behavior and changing trends. Therefore, the replacement of staff in this process is difficult, despite the intensive development of advanced technologies and management practices. The proposed model is designed to be a helpful tool for the manager, not his replacement. It helps managers to focus on the core of the business. To fix issues with traditional models mentioned in the introduction and to create a practical and precise model, we had focused on financial but also non-financial data and selected most valuable for hotel analysis and benchmarking.
We gathered information from multiple sources separated into two main groups:
Non-financial data: Association of Hotels and Restaurants of the Slovak Republic, Association of Tourism of the SR, Hotrec, Booking.com, TripAdvisor, STB, UNWTO, WTTC, Eurostat, European Travel Commission, Eurobarometer and the hotel websites.
After analyzing of every type of information gathered, the input variables were selected. They were divided into three groups: Financial (standard and reliable indicators of financial analysis and prediction models), Non-financial (relevant information specifying property) and Organizational (information specifying company). Input variables, their category, type and defined ID for clarity of research are shown in Table 2.

<table>
<thead>
<tr>
<th>Category</th>
<th>ID</th>
<th>Name</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial</td>
<td>VF1</td>
<td>Receivables turnover period</td>
<td>R</td>
</tr>
<tr>
<td></td>
<td>VF2</td>
<td>Commitments turnover period</td>
<td>R</td>
</tr>
<tr>
<td></td>
<td>VF3</td>
<td>Inventory turnover period</td>
<td>R</td>
</tr>
<tr>
<td></td>
<td>VF4</td>
<td>Overcapitalisation degree</td>
<td>R</td>
</tr>
<tr>
<td></td>
<td>VF5</td>
<td>Total debt</td>
<td>R</td>
</tr>
<tr>
<td></td>
<td>VF6</td>
<td>Short-term debt</td>
<td>R</td>
</tr>
<tr>
<td></td>
<td>VF7</td>
<td>Return on equity</td>
<td>R</td>
</tr>
<tr>
<td></td>
<td>VF8</td>
<td>Return on sales</td>
<td>R</td>
</tr>
<tr>
<td></td>
<td>VF9</td>
<td>Total liquidity</td>
<td>R</td>
</tr>
<tr>
<td></td>
<td>VF10</td>
<td>Current liquidity</td>
<td>R</td>
</tr>
<tr>
<td></td>
<td>VF11</td>
<td>Year</td>
<td>I</td>
</tr>
<tr>
<td>Organizational</td>
<td>PO1</td>
<td>Year of foundation</td>
<td>I</td>
</tr>
<tr>
<td></td>
<td>PO2</td>
<td>Size of organization</td>
<td>C</td>
</tr>
<tr>
<td>Non-financial</td>
<td>PN1</td>
<td>Class</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>PN2</td>
<td>Category</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>PN3</td>
<td>Number of rooms</td>
<td>I</td>
</tr>
<tr>
<td></td>
<td>PN4</td>
<td>Price</td>
<td>R</td>
</tr>
<tr>
<td></td>
<td>PN5</td>
<td>Location type</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>PN6</td>
<td>Seasonality</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>PN7</td>
<td>Booking.com – score</td>
<td>R</td>
</tr>
<tr>
<td></td>
<td>PN8</td>
<td>Tripadvisor - score</td>
<td>R</td>
</tr>
</tbody>
</table>

Variable types: I – Integer, R – Real, B – Boolean, C – Categorical
Source: Authors

Model mechanics
Model mechanics can be simplified to the following basic steps: input of variables, variables processing, application of artificial neural networks and display output data. The main function of the proposed model is to classify health of the hotel. For this purpose, the MLP (Multi-Layer Perceptron) feedforward artificial neural network using backward propagation of errors training method was chosen. ANN model contains 21 input neurons. Each input neuron represents one variable. The model includes one hidden layer, and the output layer contains one neuron.

The model output
The output of proposed ANN is a real number in the range of <0;1> for each company per year. This one number provides immediate information about the state of business health. The 1 represents a healthy enterprise, 0 accounts for the troubled company. The turning point is in the middle - the value of 0.5.

The main output of the model is Hotel Report which processes and shows multiple financial and non-financial data in textual and multiple visual formats. The most important part is the result of ANN, its interpretation and multiple recommendations for the manager. Diagram of the model is shown in Figure 1.
Results

During experimental phase, we have analyzed multiple types and configuration of the artificial neural network. The final testing configurations consisted of 9-18 hidden neurons, 10%-20% of data separated for testing and 3 different training algorithms (Levenberg-Marquardt, Bayesian Regularization a Scaled conjugate gradient).

Final configuration consisted of 12 hidden neurons, 70% of data for training, 15% for validation and 15% for testing. Training algorithm was Levenberg-Marquardt. The progress of learning is shown in Figure 2. Deviations and regressions are listed in Table 3.

Table 3: Deviations and regressions of ANN model

<table>
<thead>
<tr>
<th>Phase</th>
<th>Number of samples</th>
<th>MSE</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training</td>
<td>621</td>
<td>0.0084</td>
<td>0.908</td>
</tr>
<tr>
<td>Validation</td>
<td>132</td>
<td>0.023</td>
<td>0.784</td>
</tr>
<tr>
<td>Testing</td>
<td>132</td>
<td>0.0242</td>
<td>0.761</td>
</tr>
</tbody>
</table>

Source: Authors

Figure 2: ANN learning progress

Source: Authors
We had selected six companies for separate testing and validation of network. To avoid overfitting, these companies were not included in data set for ANN. This verification of an ANN model brought satisfactory results. Comparison of expected results and actual results of ANN are shown in Table 4.

Table 4: Comparison of expected classification and ANN results.

<table>
<thead>
<tr>
<th>ID</th>
<th>Hypothesis</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>SZ1</td>
<td>healthy</td>
<td>healthy</td>
</tr>
<tr>
<td>SZ2</td>
<td>healthy</td>
<td>healthy</td>
</tr>
<tr>
<td>SK1</td>
<td>problematic</td>
<td>problematic</td>
</tr>
<tr>
<td>SK2</td>
<td>problematic</td>
<td>healthy</td>
</tr>
<tr>
<td>SSZ</td>
<td>healthy</td>
<td>healthy</td>
</tr>
<tr>
<td>SSK</td>
<td>problematic</td>
<td>problematic</td>
</tr>
</tbody>
</table>

Source: Authors

Neural network wrongly classified SK2 company as healthy, although it was twice in liquidation. However, a closer analysis of the company showed that the reasons for liquidation are questionable and it did not have to be caused by bad state or financial results of the hotel. Because, after liquidation, the property was taken over by another company with a very similar name and ownership structure.

Conclusion

In conclusion, we would like to point out the indicators that are relevant and applicable in models for classification and prediction of the state of the organization. There are many indicators that may be applicable in models evaluating the condition of the property. Controlling in tourism offers a whole group of quality indicators, but for their calculation, the non-public information is often needed. The most important variables characterizing the property are the class, category, price, customer satisfaction, service quality, promotion and portals like Trip advisor and Booking.com. These portals have brought one of the most significant changes in the approach to the client, so it is important to take them into account when analyzing the state of the property.

Despite highlighting the importance of the analysis of non-financial factors, we do not expect their direct impact on the financial health of the company. Their importance and significance are increasing in combination with financial indicators and other non-financial indicators. Each category and class of accommodation property have an existing target group of customers. Problems of inappropriate choice of category, class or other nonfinancial variable arise from their improper combinations (for example, 5* hotel in unattractive and economically less developed areas).

The research has shown that the model built upon the artificial neural network using a complex business analysis in the context of the internal and external factors is more accurate than conventional models. To confirm this hypothesis, we have chosen randomly selected companies that were previously labeled as healthy or unhealthy. These data were not included in the data set intended for the Artificial Neural Network training. Then, we have calculated the classification of companies using conventional methods as well as the proposed model. Results were statistically compared with real estate. For this purpose, the Pearson χ² test was used. Summary of the results is shown in Table 5. Assumptions and hypothesis were confirmed. All conventional models were significantly different from the real situation. In the case of the proposed model, the statistical discrepancy was not confirmed. This does not prove that conventional models are wrong or unusable. They are supposed to be used in sectors they were created for (mostly manufacturing companies). Despite this, many authors used them as universal models.

Table 5: χ² test results

<table>
<thead>
<tr>
<th>Model</th>
<th>Pearson χ²</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANN</td>
<td>.382114</td>
<td>.536474</td>
</tr>
<tr>
<td>Taffler</td>
<td>4.91860</td>
<td>.026569</td>
</tr>
<tr>
<td>Altman</td>
<td>18.4314</td>
<td>.000018</td>
</tr>
<tr>
<td>IN01</td>
<td>29.4185</td>
<td>.000000</td>
</tr>
<tr>
<td>Sprinage</td>
<td>46.3404</td>
<td>.000000</td>
</tr>
</tbody>
</table>

Source: Authors
We can conclude that not only in the future but already today, artificial neural networks can play a significant role in modern methods of management of accommodation properties in tourism.

Acknowledgements

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MODERN MANAGEMENT AND MARKETING OF THE FASHION INDUSTRY USING THE BRAND EXAMPLE OF YVES SAINT LAURENT.

Anastazja Magdalena Kasztalska¹

Abstract: The Brand Yves Saint Laurent is a company that represents a modern approach to management in the fashion industry. This article aims to answer the question of whether modern methods of marketing and management to generate profits for the company in the form of greater customer interest and increased sales. Research methods used in the article is a survey made with the cooperation with the buyers of luxury brand Yves Saint Laurent. Unquestionably, there is a strong link between marketing luxury brands and its results in sales. Further research can be focused on a bigger scale of this huge phenomenon.

UDC Classification: 005.3, 33; DOI: http://dx.doi.org/10.12955/cbup.v5.929

Keywords: Fashion, Industry, Luxury, Yves Saint Laurent, Management, Marketing.

Yves Saint Laurent Brand

The YSL (also known as Saint Laurent Paris) is a luxury fashion house founded by Yves Saint Laurent and his partner Pierre Bergé. The name founder of the brand, Yves Saint Laurent, died in 2008, while the fashion house produced its last line of haute couture in 2002.

The brand was founded in 1961 and is considered one of the most recognizable in the world. It known for its modern and very trendy designs, such as based on tuxedo jacket for women. Currently, YSL offers a wide range of models of clothes, leather goods, footwear and jewelry, while having large market shares in the cosmetic industry, amongst others, from the sale of perfumes. The current brand logo was designed in 1963 by A.M. Cassandre (Mouron, 1986).

In the 60s and 70s the firm popularized fashion trends such as a rebellious look, dress in safari style, very tight trousers for both women and men, adjacent and high boots (knee) and most famously its project tuxedo for women - Le Smoking Suit in 1966 (Drake, 2006). Some of the most memorable collections include inspiration from the Russian ballet, Pop Art, Picasso and the Far East among the muses and inspirations of Saint Laurent were Loulou de la Falaise (the daughter of a French marquis), Betty Catroux (English-Irish model), Talitha Pol Getty (the daughter of an American diplomat) and Catherine Deneuve - famous French actress. Brand ambassador in the 70s and early 80s was London millionaire Diane Vandelli (Née Princess Romanovsky), making the brand became increasingly popular among the European elite (Borrelli-Persson, 2017). The company YSL continues to grow with the introduction of a line of fragrances for men and women, that started a line in 1978. However, its share price began to fall after i. In 1993, Saint Laurent fashion house was sold to a pharmaceutical company Sanofi and Pierre Bergé appointed Hedi Slimane as an artistic director in 1997, who along with it resumed YSL Rive Gauche Homme. Hedi Slimane decided to leave the fashion house two years later and was the general manager of the sewing luxury men's suits - Ermenegildo Zegna (Porter, 2016).

In the 1999 Gucci bought the YSL brand and referred the proposal to Tom Ford who designed the casual collection, while Saint Laurent designed the haute couture collection. Saint Laurent did not hide his disapproval of Tom Ford during their collaboration, it is still criticized and publicly ridiculed. In 2002 Saint Laurent closed the production of haute couture fashion house YSL, due to his poor health, drug and alcohol addiction, severe depression and ever sharper criticism of his projects. The creator of the brand often said ‘‘Chanel liberated women, and I gave them the strength’’, he also claimed that he “created the contemporary woman's wardrobe” (Rawsthorn, 1996). Tom Ford left the fashion house in 2004, and was replaced by Stefano Pilati, whose designs were much more French than the emanating erotic visions of Ford. In 2009 after the death of Yves Saint Laurent and a few turbulent years of design by Stefano Pilati, some key boutiques of YSL were closed in San Francisco and New York. It was also announced that the design studio will have its headquarters in Los Angeles, California. In 2012 KERING Group announced that Hedi Slimane will replace Stefano Pilati as Creative Director. Slimane previously designed for Dior until 2007 (Cowles, 2012). Unfortunately, Hedi Slimane left YSL brand on 31st March 2016 his replacement is Anthony Vaccarello (Socha, 2016).

¹ Faculty of Management, University of Economics, Katowice, anastazja.kasztalska@gmail.com
Management and Marketing of the Yves Saint Laurent brand

The reinstatement of people who manage the company well and make the necessary innovation helped the brand very much. Hedi Slimane has worked previously for YSL, his return had raised a lot of controversy, especially after the announcement of the new collection and switch of brand names to “Saint Laurent” instead of the full Yves Saint Laurent or YSL. However, the name Yves Saint Laurent and the YSL initials still remain on accessories such as handbags and shoes, and cosmetics like perfumes (Winckel, 2013).

Figure 1: “Ain’t Laurent Without Yves” sweatshirt.

Source: Authors

The suspension of cooperation with a sales partner like Parisian boutique Colette, destroyed the image of the brand. Decisions by Hedi Slimane circulated worldwide and accounted for the largest newspaper headlines devoted to the fashion industry. These decisions became even more controversial when famous Parisian boutique Colette, started selling shirts with the inscription “Is not Laurent Without Yves”. The YSL company asked the store to stop selling the shirts, and when that did not work, on the October 2013 Colette received a letter accusing them of the sale of counterfeit goods, which however instead seriously damaged the reputation of the brand itself. Then Saint Laurent announced that it will not execute orders for the new Spring 2014 collection for the boutique Colette, despite the fact that the store has sold collections from YSL since 1998 (Sowray, 2013).

Figure 2: Saint Laurent store features a marble staircase encased by rods of nickel-plated brass.

Source: Authors

The modern interior design shops improves the brand

Slimane designed the brand's flagship boutique in Paris which opened in 2013. The colors of deep red and gold, were replaced by a monochrome interior (mainly in shades of gray), created from various materials, including marble and nickel rods. This concept of interior design was also used in the boutique in Beverly Hills, the newly opened boutique in London and several new stores in the United States. Slimane officially plans to continue to develop a network of YSL boutiques in the United

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**Choosing the right store locations**

Locations are the international points of sale and instill a strong brand in Europe as they are in key cities, such as Barcelona, Munich, Berlin, Warsaw, Kiev, Rome, Moscow and Cannes. Locations in the Middle East and in Africa are Casablanca, Abu Dhabi, Beirut and Jeddah. Asian YSL boutiques are Jakarta, Bangkok, Seoul, Macau and Hong Kong. The company strongly marked its presence in Japan by opening stores in Kyoto, Tokyo and Osaka, and many brand outlets located throughout the country. In China, individual boutiques are located in Wuhan, Shanghai and Beijing. Saint Laurent brand can also be found in many upscale stores worldwide (Official Yves Saint Laurent page, Retrieved: 27.02.2016).

**Methodology**

The survey is focused on selecting by interviewer, persons that represent interesting and tested qualities. The survey omits persons that do not have features which are being studied. An example is the study of the phenomenon of the luxury fashion industry, while respondents are the only owners of the items with label YSL or observers of the brand or the supporters of this company who have a certain opinion about this market. Individuals who for various reasons are not interested in luxury fashion industry, were excluded from the study because they do not have the relevant experience and a clear opinion about the exclusive fashion designers and luxury fashion brands (Lynn, 2014).

The survey was sent by email to people who are actively participating in the life of luxury fashion industry, as well as fans of the YSL brand. In the survey, 130 people participated. The survey was conducted in December 2016 and January 2017. Respondents had a very high degree of freedom of expression, because they could modify the questions and add their own observations and comments. Subjects were men and women, diverse in age, as the youngest tested person was 19 years old and the oldest 84. Age and gender had little significance as a major determinant. The main factor was the wealth of a person who can afford to be an owner of luxury clothes for example the items made by YSL brand.

<table>
<thead>
<tr>
<th>Table 1: Results of the survey and data analysis.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>What is the determinant impact of choosing YSL brand?</strong></td>
</tr>
<tr>
<td>Tradition and history of this brand.</td>
</tr>
<tr>
<td>The value and lifestyle represented by the YSL.</td>
</tr>
<tr>
<td>The prestige of the YSL.</td>
</tr>
<tr>
<td>Other</td>
</tr>
<tr>
<td>7%</td>
</tr>
<tr>
<td>Source: Author.</td>
</tr>
</tbody>
</table>

Most respondents indicated the value and lifestyle represented by the brand YSL (25 %), this may be associated with the ideas that managers of the brand believe and many people can identify with. Another very large group is a group of people who decided to buy luxury clothes made by YSL because of the convenient localization and interior of the shops (23 %). Respondents indicated that a major determinant was when they travel and want to relax, they visit places that are suitable for their expectations of the interior of a shop. Another group almost as large as the previous two is a group of people who buy items made by YSL because of the prestige of this brand (22 %). It can be connected with the caring of the brand of its image, which is almost perfect. Some people were owners of the
luxury clothes made by YSL because they appreciate the tradition and the history of this company (17 %). It is affected by the long and very interesting history of this brand and also the tradition that started many years ago and is still alive and in practice. Few people decided that the most important factor for them was the unique design of clothes (7 %). It can be the result of the very classical style of the YSL, that has not changed a lot over the years. Customers buy products of this company not because of the influence of the fashion but for the company that is well known and very respected in the fashion industry. The smallest group were those who choose YSL because of its quality of products (6 %). These customers prefer the quality of the product rather than the history of the brand, that for them doesn’t have any significant influence during making the decision of a purchase.

Conclusion

With a doubt, marketing of luxury brands can significantly increase a company's revenue. Marketing of luxury brands significantly increases the demand for them. This is because for the customers the most important factor is the prestige of a luxury brand, which is created by the marketing of a company. Another factor is the value and lifestyle represented by the brand, which is also created by the appropriate marketing for a specific group of customers.

Managers through proper sales techniques can enhance the prestige of the brand, because for the respondents the most important features of the luxury brand are the features that company can create freely by the proper sales techniques. The need to express one's character by the purchase of luxury goods demonstrates the ability to customize brand products to the tastes and preferences of the target customers. Creating a person of the founder or the brand's chief designer significantly increases the prestige of the brand, because it makes the brand it in the eyes of customers more exclusive and luxurious. Managers can effectively create prestige luxury brands through the appropriate sales techniques based on emphasizing the nature of the purchaser by the company's products, the creation of the legend of the charismatic founder or designer and by controlling the image of the brand buyer in the eyes of themselves, and in the eyes of other people.

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RISKS OF REGULATION IN NETWORK INDUSTRY – CASE OF THE SLOVAK REPUBLIC

Jozef Klučka¹

Abstract: Historically, the Slovak Republic infrastructure involved monopolies, with the State operating sectors of electricity, telecommunications, postal services, gas, and water supply through state enterprises. The electric energy sector has since become privatized in the Slovak Republic. Because of insufficient competition (oligopoly), a regulatory office formed with the role of price regulation. In this pricing area, the electricity supply sector suffered turmoil in the Slovak Republic. This paper addresses some practicalities of regulation and proposes measures to minimize risks relating to decisions of the regulating authority. The current issues reflect problems of price regulation of electricity in the Slovak Republic that have resulted in political disputes. This paper describes the regulatory framework of network industries in the Slovak Republic and general assumptions for transparent and efficient regulatory process. It includes an analysis of certain aspects of price regulation and the role and responsibilities of a chairman and other stakeholders in this process. Some measures are proposed to minimize the future risks of price regulation. These measures cover internal subjects and processes as well as the external environment involving stakeholders and their influence on negotiating prices.

JEL Classification Numbers: H25, K23; DOI: http://dx.doi.org/10.12955/cbup.v5.930

UDC Classification: 338.2

Keywords: regulation, electricity, price regulation

Introduction
Historically, sectors of infrastructure in the Slovak Republic were monopolies (electricity, telecommunications, postal services, gas, and water supply). The state was the operator of these areas through state enterprises. A trend of liberalization started the transformation of these corporations. Because of the imperfect market environment, however, these became subject to regulation. For this purpose, the Regulatory Office for Network Industries (URSO) was established to regulate prices. In regulating prices, electricity supply suffered turmoil in the Slovak Republic, and this was accompanied with political turbulence. As a result, the chairman of the regulatory office resigned.

Liberalization is a trend promoted by European Union (EU). It originates from the assumption that markets and competitions increase the competitive position of a country and, thereafter, market prices will decline. With monopolies transforming into entities in a market economy, competition becomes active. Moreover, monopolies that transform from state enterprises to private corporations operating in a market find the market restrictive (because of various reasons). The limited competition (oligopoly) results in a regulatory office forming with an objective of monitoring privatized corporations and their market behavior.

Current problems reflect issues within the price regulation of electricity in the Slovak Republic and which have resulted in political disputes. Hence, the objective of this paper is to address some practicalities of regulation and propose measures that could minimize risks in decisions of the regulating authority.

Methods
To identify the core problems and propose measures, the study analyzed the competencies and processes within the office responsible for the regulation of network industries, the URSO. It also identified stakeholders, their objectives, and potential problems that stem from their contradictory objectives.

The problem of price regulation (expanded to include heating prices) was assessed using a systematic approach to analyzing the following processes:

- appointment of an office chairman,
- chairman communication with other stakeholders,
- professional and ethical status of a chairman,

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¹ Faculty of Security Engineering, University of Žilina, jozef.klucka@fbi.uniza.sk
▪ chairman’s responsibility taking into account:
  ▪ transparency of proposed or approved decisions,
  ▪ functions of regulatory council and fulfillment of control within the regulatory office.
▪ the requirement for explicit risk formulation related to the specific proposal of measures to minimize identified risks or the written expression to identified risks and their impacts on society and the customer segment.

Regulatory Framework – Case of the Slovak Republic
The theoretical background of regulation is straightforward: where there is no fully competitive market, there exists either an oligopoly or a monopoly. This market structure creates potential imbalances and economic and social disturbances. Therefore, regulation becomes necessary. The fundamental role of regulation (and an established regulatory body) is to build a regulatory framework. There are three theories (Shleifer, 2005) that explain economic regulation: public interest theory, contracting theory, and capture theory. Shleifer (2005, p. 446) identifies the key problem as being, “risk of public abuse of market participants by an official who is either pursuing his own political interests or is captured by a particular group, including the regulated industry itself.”

Tirole (2014) declares two problems of regulation:
▪ many markets are dominated by a few firms that together influence the process in volume and quality, and
▪ a regulatory authority’s lack of information about firm’s costs and the quality of goods and services it delivers.

The main objectives of regulation can be summarized as follows:
▪ to keep a balance between customers’ and investors’ interests,
▪ to safeguard return on investment into regulated enterprises,
▪ to add stimuli for the proper functioning of regulated enterprises, and
▪ support and format a fully competitive market environment.

The profound requirements of the effective regulatory body can be formulated as:
▪ independence – its solutions are based on a professional evaluation of data and based on communications with stakeholders when decisions are approved; independence is linked to nonpolitical activities in decision processes;
▪ professionalism/expertise – decisions are strictly based on documented data and empirical evidence; the framework is limited to the bill (Nr. 250/2012 Coll.);
▪ openness – activities of the regulatory body, where decisions are published and monitored by public control; and
▪ control/evaluation – decisions of the URSO can be verified by a court, and a regulating entity has the possibility to appeal against decisions.

Case of the Slovak Republic -- Price Decision on Electricity
In January 2017, the URSO approved a price decision (price of electricity) that changed the tariffs for various categories of customers. Incorporating the growth of fixed charges into the electricity price was the reason given for a dramatic increase. The price decision was sent to distributed companies that started to print and distribute invoices with new price declarations. For many households, communities, and enterprises, the new price policy increased electricity prices by 300% (Zákazníkom, 2017; Fico, 2017).

The regulator’s decision had these consequences:
▪ incorporating the Prime Minister into the agenda for charges relating to electricity (price decision of regulator);
▪ resigning of the chairman of the regulatory office following a request from representatives of the political coalition for him to resign; the government would propose to the President a new candidate for the position of chairman of the URSO;
▪ declaring the price decision to be invalid, and declaring a new one; the sum of advanced payments will depend on a new price decision.

The economic problem had grown into a political one. People challenged the 300% increase in charges, since unofficially the price for electricity was meant to have decreased by 10%.

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A bill (Nr.250/2012 Coll.) controls the regulation of network industries in the Slovak Republic. As a member of the EU, the Slovak Republic also incorporates norms in regulating network industries within EU.

The scope of regulated activities covers several areas:

- generation, transmission, distribution, and supply of electricity;
- the performance of the short-term electricity market administrator’s activities;
- production, transport, storage, and supply of gas;
- production, distribution, and supply of heat;
- production, distribution, and supply of potable water;
- diversion and purification of the sewage system; and
- abstraction of surface water and energy water from water flows.

Transparency and non-discriminatory approaches of the regulatory body, URSO, are based on the law. Strategy and day-to-day activities are governed by a chairman and regulatory council. Regulatory Council approves strategic management of the office and concept of regulation in network industries. The head of the council is the chairman of the office. Employees are excluded from the membership in the council. Chairman of the office is appointed and recalled by the president - upon the proposal of the Government of the Slovak Republic (§5, sec.1 of the Act). The President recalls the chairman after fulfillment of conditions explicitly given in the Act (§5, sec.11 of the Act). Conditions for recall correspond to fundamental requirements of the objective and expert and independent activity of the chairman who governs the office and is representative of the regulatory office in the business and the nonbusiness environment.

The office also deals with operational activities. The strategic document determines the framework of regulation. The council approves the strategic policy that contains the performance of price regulation for a future period. The office is obligated by law to publish information related to its decisions on their website. This requirement guarantees openness and transparency of decisions and activities of the office.

**Problem of Price Regulation**

The price proceeding for the regulated activities (covering a broad spectrum including electricity distribution for citizens, communities, and enterprise subjects) commences upon the initiative of the office (§14, sec.2 of the Act). Price regulation of the office activities imply the following requirements:

- professional competency and independence of the office;
- system approach to price decision for individual customers’ segments;
- the openness of the office to professionals and the general public; and
- risk identification arising from the regulatory policy.

In all the above-mentioned, potential motives exist for a similar status to that of the past that lead to approval of a price decision with remarkable social-political problems. For this reason, future measures are recommended to minimize the risks of repeating such a price decision in the process.

**Appointment of an Office Chairman**

The current system is based on political nomination. The proposal is submitted by the government; each government is aware of the seriousness and complexity of the regulatory body decisions, and therefore, a nominee is appointed from political parties that create a governmental coalition. It would be useful for the appointment of such a chairman to be based on negotiations with political coalitions and professional organizations. In practice, the weight of high ranking professional authority has the same value as personal integrity. The fundamental condition of application is the willingness of political parties to cooperate and communicate with professionals and the general public.

**A Comprehensive System of Communication Between a Chairman and Stakeholders**

This process is officially fulfilled with all decisions (ex-post) published on the website of the office. The decision, however, requires communication during preparation and submission of a price. Each decision should follow the regulation strategy, and therefore regulatory council should be aware of such; Council in the case of identifying a discrepancy between strategy and price decision has the competency to disagree (to submit objection) towards price decision. Moreover, similar to a
consultation exercise, the price decision should be disseminated to representatives of customers, academics, and professionals to evaluate the proposal. The consultation exercise has to be formulated as an obligatory for specified organizations, whom the price decision (proposal) will be delivered. These institutions will be the regulatory council, departments of the regulatory office, customer’s, and non-profit, academic, and professional institutions.

Professional and Ethical Status of a Chairman

The scope and heterogeneity of problems place a high demand on the expertise of the chairman. It is essential to create experienced and professional staffing within the office. The prescribed standards of conduct for the chairman, high-level management, and the regulatory council need to be written as an internal norm of URSO. It is also proposed that a change in status occurs where the URSO chairman is also the chairman of the council so that the council is entirely independent of the URSO (i.e., with no personal relationships with representatives).

Chairman’s Responsibility

This component pertains to the transparency of proposed decisions and functions of the regulatory council and providing a control function in processes of the regulatory authority. Regarding price decisions, the chairman communicates with departments within the office (internal communications) as well as stakeholders (external communications). Therefore, the chairman may propose, at ad hoc, the structure or platform that fulfills the dissemination of information to prepare a price decision and the risks related to such. An application of control function stresses the need for openness towards stakeholders and an obligation to evaluate the price decision before approving the regulatory policy. Where any discrepancies are found, the proposal is to be modified and communicated in the next cycle.

Conclusion

The case in the Slovak Republic for a regulatory framework dealing with the price of electricity indicates the importance and complexity of regulation. This paper addressed key fundamental preconditions for effective regulation. Based on this case, proposed activities include modifications to the current framework to minimize potential future turmoil for society. The complexity of the subject also indicates the need for transparency, independence, and a professional regulatory institution headed by a chairman.

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INFLATION SPIRALS AND SELF-REPLICATION OF INFLATION

Tatyana Kotcofana,1 Alexander Protasov,2 Polina Stazhikova St.3

Abstract: Inflation is a complex socio-economic phenomenon, whose formal sign is the depreciation of money. Most often it is expressed in the form of rising prices, although it also has other manifestations. The economic substance of this phenomenon lies in the area of public reproduction and the socio-economic relations about the distribution of public product and public wealth. In this article, the self-replicating nature of inflation is shown and genesis and evolution of inflationary process at all stages of public reproduction are analyzed. It is shown that each of the stages has the mechanisms capable of generating inflationary potential. The category of “inflationary spiral” is explained in more detail, because it cannot be presented only by a traditional “costs – prices” mechanism. Inflationary spirals can be observed at any stage of the reproduction process, making the task of managing inflation even more difficult. It causes the need for the complex accounting of all the variety of factors of the inflationary process and the inflation consequences in the formulation of an economic policy.

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Keywords: inflation; reproduction process; price; cost; inflationary spirals; economic policy.

Introduction

Economic development of virtually every country takes place against the background of inflation with various causes that manifest differently, depending on the circumstances of time and place. Inflation is complex and heterogeneous in its causes, mechanisms and consequences. It is a socio-economic phenomenon. It creates difficulties for the study of the apparent surface-level characteristics of the inflation process as well as its inner structure and qualitative characteristics. The interpretation of inflation as a multifactorial phenomenon focuses on a comprehensive study in order to identify the roles of all the factors that are constantly changing interactions with each other and creating different inflation “pulses” and “pushes.” This approach prevents hypertrophy in evaluating some aspects and underestimation or total disregard of others. The methodology is based on the idea that there are no disconnected processes of inflation of prices governed by different unconnected determinants. Price increase may be caused by factors of money circulation or factors of the goods supply side. In the course of this single process parameters are tightly intertwined and one or the other parameter can become a priority in any given moment.

In our view, analysis of the genesis of the inflation process in a modern economy begins with accepting the depreciation of money and the associated rise in prices as only formal signs of inflation, while its economic content lies in the deeper areas related to the reproduction process and social relations over the product produced. Inflation can be interpreted as a monetary manifestation of imbalances already existed and/or deliberately supported within the national economy and which leads to an excess in the money supply. Purely monetary factors of inflation only frame or strengthen existing imbalances, but in any case, they are not the main cause of inflation. The approach is commonly referred to as reproductive, since it allows you to look at any economic phenomenon and its causes through the prism of all stages of the reproductive process, while stages are analyzed in their relationship and interaction. This approach is suitable for analysis of the inflation process with its interconnectedness and interdependence thus revealing their deepest nature and patterns of development. Economic policies based on this extended analysis of the causes of inflation and its impact on the economy is potentially more effective (Kotcofana, 2007).

Methodology: reproduction approach

The reproductive approach to the analysis of inflation is based on the fact that all stages of the reproductive process are interrelated, and each of them contains a certain inflation potential. It is important to bear in mind the following points:

1. Inflation is so complex it is not rare for causes and effects to switch places. Sometimes the same phenomenon acts simultaneously as the cause of inflation and its consequence. This

1 St. Petersburg State University, t.kotsofana@spbu.ru
2 St. Petersburg State University, a.protasov@spbu.ru
3 St. Petersburg State University, p.stazhikova@spbu.ru
characteristic of the process is reflected in the term “inflationary spiral” that is often used by economists (Tsatsulin et al., 2016). Examples of inflationary spirals are shown below. They are not limited to the traditional scheme of “wages-prices” (Xiang Baolin, & Xiao Xiaoyong, 2009; Pressman & Holt, 2008) or the broader one “costs-prices.”

2. Although the use of the reproductive approach does not reject quantitative methods of analysis, the emphasis is on identifying qualitative relationships and patterns of economic development. Quantitative, functional relations play a subordinate role. Under the reproductive approach mathematical calculations and illustrations are applied primarily to provide greater reasoning and clarity of logical conclusions.

Production stage
The analysis of inflationary processes at the production stage is related to factors affecting the value of the commodity (so called primary price-forming factors). Such factors include a real rise in cost of production due to increased prices on raw materials, equipment and tools, decrease in labour productivity and decreased efficiency of resource use, as well as degradation of technology. The effects of the inflationary spiral can be most clearly demonstrated in the sphere of production. Inflation leads to the rise in costs of production factors; it leads to increased costs of final products; it then leads to the next circle of inflation and increased costs of production factors. Thus, the crucial condition of expanded reproduction is the availability of credit, real interest rates for the non-financial sector and the volume of loans for the non-financial sector (Domashchenko, 2016). During inflation, the dynamics of bank interest is divorced from the dynamics of the profitability of the real sector; it leads to sharp fluctuations in interest rates and the levels of profitability. Random combinations of such fluctuations can completely eliminate or substantially reduce the profitability of production, but it may also increase profitability, regardless of technical and economic and organizational shifts in production. In order for the creditor to preserve money and get the interest, the nominal interest rate should exceed the rate of price growth. Usually it is calculated according to the formula: 

\[ R = r + \pi + r\pi, \]

where \( R \) is nominal interest rate, \( r \) – real interest rate, and \( \pi \) – inflation rate. The result of nominal interest rate growth is an artificial but real money shortage in the economy. It is harmful for production processes and hence production shrinks. During high tempo of inflation, the opposite phenomenon occurs: real interest rate plummets to negative levels:

\[ r = \frac{R - \pi}{1 + \pi} < 0, \text{если } \pi > R \]

It seems negative interest rate should contribute to the recovery of production, but in fact this does not happen, since such rate is not profitable for banks. Moreover, the credit period is reduced to one or two months due to increasing risks. It does not fit into the technological terms of turnover of funds at enterprises. It is important to consider that current money reserves under inflationary conditions are going down in value; it increases the demand for loans. There is a spiral: inflation leads to slowing down of business activity and a reduction in production, and this, in turn, is one of the factors of inflation.

Distribution stage
At the stage of distribution, our attention is focused primarily on secondary price-forming factors that deflect the price from value. This stage is of key importance for the analysis of inflation processes, because, in our opinion, the very nature of inflation is rooted in the social conflict over the distribution of the results of production between different social groups and the strata of society. More detailed can be found in Protasov (2011). Such conflicts are present in any society under any socio-economic system. However, the condition for its realization is unequal possibilities of various economic agents, social groups and countries in relation to the results of production due to prevailing economic and institutional structures. As soon as at least one actor gets enough of the economic power to make an attempt to redistribute wealth to one’s own advantage this conflict transforms from potential tendency into real actions generating inflationary impulses.

The distribution stage plays an important role in spreading inflationary impulses generated at the production stage and, consequently, in the further unwinding of inflationary spirals. For example, if we consider the process of price growth as a result of increase in production costs, then in accordance with the equation of the input–output model, this process has to be fading rather than self-replicating,
since the costs are only a part of any price and their growth should influence the chain of counter-parties of exchange less and less. The formula for a sequential change in the costs for inter-industry exchange, for example, due to monopolistic increase of prices in the 1st sector, will look as follows: \( P_i = \frac{P_i}{K_i} \times (K_i - 1) \), where \( i \) is the industry number (\( i = 1, ..., m \), and \( m \) is the number of the last of the entire set of industries under consideration). For example, raw materials are supplied from every \( i \)-th industry to \((i + 1)\)-th. \( K_i \) is the rate of price growth in the 1st industry; \( \alpha_{i,1} \) – the share of costs in the price of the \( i \)-th industry for the purchase of raw materials in the \( i \)-th industry; \( P_1 \) and \( P_i \) – the base price of goods in the 1st and current price in the \( i \)-th industries respectively. If we assume \( P_1 = 1 \), \( m = 10 \), \( \alpha_1 = \alpha_2 = ... = \alpha_{i,1} = 0.5 \), \( K_i = 2 \), then we have \( P_i = 1.002 \). That is, the final increase in price at the tenth stage of the exchange of goods for money was, in fact, zero. An example is taken from (Nusratullin, 2010)

Meanwhile, as has already been mentioned, spiral-like self-reproducing effects of price increases are observed in practice. These effects occur due to the fact that the value formation chains usually are not strictly linear. Both economic agents-initiators of price increases and a certain number of consumer subjects buy the same goods from the same suppliers in one link of the technological chain of inter-industry exchange. The example of economic agents-initiators of price increases is the monopolist, which raised the price of electricity supplied. However, they lose part of their “normal” value added, and in order to compensate losses they overestimate their own prices or request state subsidies and preferential loans, or get stuck in non-payments. Any of these actions, parallel to the actions of the initiating subject, gives rise to a new increase in their own prices, which again leads to the emergence and a new redistribution of costs growth for “parallel” consumers. It is launching the inflationary spiral.

**Exchange stage**

The exchange stage acts as a platform for the realization of the inflationary potential generated in the production and distribution of the social product. The exchange stage by itself can also generate and is generating a variety of inflationary impulses. The competition between manufacturers today is mainly based on the frequent changes in the range and quality of products, huge trade, and advertising costs. There is an increase in costs in general and distribution costs in particular. This is largely facilitated by the differentiation of the product in conditions of competitive adaptation of the producer to the needs of the consumer. The role of packaging, advertising, and marketing methods is growing, and it obviously entails increased costs. (Pashkus, 2016) If previously in economic theory costs were primarily associated with production and were interpreted as the “production costs” category in the past century it has transformed into the “production and marketing costs” category. The category of market transactions costs (or “marketing costs”) is one of the rapidly increasing components of production and marketing costs. According to American economists, the growth of these costs was the main reason for the rise in food prices. Already at the end of the twentieth century, they gave 90% of the total increase of final prices (Shershnev & Larionov, 1999), and we can assume that today this trend is not only preserved but is also becoming more prominent.

The development and strengthening of the market positions of intermediary structures plays an important role in the genesis of the inflationary process at the stage of exchange. Intensive distribution systems operate in a modern economy. Consumer properties of the goods include time, place, form and methods of delivery. Thus, the proportion of intermediary costs is increasing; it means that overall prices are rising.

The traditional price structure is as follows:

\[
PF = PC + M + B + ET + VAT + (CM + BM + VAT) + ... + (CM + BM + VAT) + CS + BS + VAT.
\]

Where PF is the final selling price (retail price of the product), PC – production costs, M – cost of marketing for the manufacturer, B – profit of the manufacturer, ET – excise tax, VAT is a value added tax paid by all participants in a supply chain, CM – costs of the intermediary (wholesale) organization, BM – profit of the intermediary organization, n is the number of intermediaries in the chain, CS – costs of the organization of retail trade, BS – profit of the retail organization.

Modern conditions drive up costs of the component M, as well as CM and BM, and VAT, paid by the intermediary link (in part due to increasing n). If the costs of the remaining components do not decrease, the price will increase. The inflationary spiral unwinds, because such a situation is observed
for the majority of products, including intermediates, the price of which is included in costs of other products.

It is important to understand that in itself the presence of inflation in the economy largely determines the propensity of economic entities to speculative and intermediary activities to the detriment of production, and this in turn leads to the further unwinding of the inflationary spiral.

Consumption stage

The role of the consumption stage in generating the inflation potential of the economy is more important than it may seem at first glance. First of all, let us trace the relationship between inflation and various forms of use of the produced social product. The following forms can be distinguished: personal consumption (C), industrial consumption (I), savings of the population and the accumulation of enterprises (S), exports (E), losses (L). It sums up as \[ GDP = C + I + S + E + L, \]

In the conditions of inflation, personal consumption becomes the main form of use of the created social product, since the productive use of it becomes much less profitable. The higher the inflation and the longer the production cycle are the fewer incentives entrepreneurs have for productive consumption. Devaluation of depreciation expenses leads to a reduction in opportunities to expand production and even maintain it at the same level. The nominal ratio of average propensities to save and to consume shifts in favor of consumption. If the nominal exchange rate remains at the same level, exports become less profitable, as domestic goods become more expensive relative to foreign-made goods. As a rule, losses increase during inflation. It can be caused both by objective reasons and by increased opportunities for dishonest statistical reports. As for Russia, the most important problem is the capital outflow from the country. According to Standard & Poor’s, capital outflow only in 2014 amounted to 152 billion dollars (Tuzova & Qayum, 2015). All of the above leads to a decrease in the productive capacity of the economy, and therefore, reduces the possibility of anti-inflation regulation.

It is also important to understand that consumption processes form the requirements for producers and the economy as a whole. If the country is characterized by a uniformly high rate of consumption, it will also stimulate production. By encouraging the development of effective demand, we stimulate industrial production, which means increase in employment, as well as in capacity utilization rate, etc., and the system begins to operate at full capacity. However, uneven consumption by different social groups can generate and is generating an inflationary potential. In Russia about 90% of the population uses only half of the consumer goods. The other half is consumed by a group with high income, it is accounting for only about 10% of the population. The basis of consumption is satisfaction of primary short-term needs; it allows drawing a conclusion about poor savings. The savings of high income group go mainly to the foreign market and do not exert demand pressure on the domestic market. Such a non-optimal structure of consumption reduces the production potential of the economy and increases inflationary pressures. In addition, an essential part of consumption is imported. This is a direct deduction from the income of domestic producers, as well as savings in cash, typical of the Russian population. Thus, producers do not receive the planned profit on produced products and as the result lack means of payment. This leads to a rise in the cost of credit, its inaccessibility and a reduction in the working capital of producers. It may result in the reduction of production and an increase of production costs.

So, at the stage of consumption, inflation manifests itself in sub-optimal proportions of forms of consumption, which, in turn, can contribute to the strengthening of the inflationary process, reducing the production potential of the economy.

Conclusion

Thus, the specificity of modern inflation lies in the fact that it is built into the reproduction process and cannot be considered outside the economic system as a whole. Therefore, a separate analysis of inflation, income generation and production is fundamentally insubstantial. All these three processes are not independent; they are only elements of a single reproduction mechanism. A thorough study of the real causes of inflation is necessary to improve the effectiveness of state policy, not only in preventing and containing the already inflated prices, but also in other aspects of economic policy. (Kirillovskaya, 2016) This requires a systematic approach to the analysis of inflation processes, taking into account that inflation in its inception and development covers all stages of the reproductive process. On the one hand, it exerts a certain influence on each of them, on the other hand it itself is
subjected to the reverse action from each stage of the reproductive process. Such an approach allows for the revealing of a variety of the factors generating inflation and influencing the character of its course. Many conflicting theories and concepts of inflation are brought into conformity. Within the framework of the approach, the most adequate mechanisms of anti-inflationary policy can be worked out, taking into account not only economic, but also social, and many other determinants.

References


PRACTICE OF PARALLEL IMPORTING: PROTECTION OF INTERNATIONAL COMPANIES' TRADEMARKS RIGHTS IN RUSSIAN FOREIGN TRADE

Victor Kovalev, 1 Oksana Falchenko, 2 Veronika Vyazovskaya, 3 Alexander Semin 4

Abstract: The paper is devoted to the problem of the exhaustion of international companies' trademarks and other intellectual property objects rights in the foreign trade practices of Russia and other countries of the Eurasian Economic Union (EEU). The paper focuses on the problems of trade integration through the intellectual property market, since any free movement of goods should always be correlated with respect for the interests of the trademark rights owners. The aim of this paper is to explore the process of parallel importing in the aspect of international companies trademarks intellectual property rights in the Russian Federation and EEU countries and the opportunities and challenges it provides for both manufacturers and importers. The problem of importing products labeled with trademarks through parallel import channels to Russia is being considered using the schemes for the importation of counterfeit goods into Russia through countries of the Eurasian Economic Union (EEU). The analysis shows that there are the problems with the application of the mechanisms of trademarks customs protection in practice. The main problem is the lack of unified legislation for intellectual property protection in EEU members.

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Keywords: parallel imports, intellectual property, trademark, international company

Introduction

With the creation of the Customs Union, the Common Economic Space, and then the Eurasian Economic Union (EEU), the issues of intellectual property protection in the member countries are becoming more urgent, as the development of integration processes intensifies the consolidated movement of goods between business entities located on the territory of the EEU member states. Any free movement of goods must always be correlated with observance of the interests of the trademark rights owners. This problem did not bypass the trade of the EEU countries, in the first place this problem affected the interests of international producers in the food, automotive and pharmaceutical industries. The purpose of this paper is to explore the process of parallel importing in the aspect of international companies trademarks intellectual property rights in the Russian Federation and EEU countries and the opportunities and challenges it provides for both manufacturers and importers.

Parallel importing: literature review

This section offers a short summary of the literature on parallel imports. Parallel importing (or gray marketing) has been a widespread international practice, and one of concern to international manufacturers, distributors and retailers since the mid 1980s up to the present time (e.g. Baldo, 1985; Barlass, 1988; Mitchell, 1998). When gray marketing occurs across markets, such as in an international setting, the term used most commonly is ‘parallel importing’. According to Duhan and Sheffet (1998), "gray" may imply an “almost black market.” These points of view are very important for us because they can help to present in this article some possible schemes for the importation of counterfeit goods into Russia through the countries of the Eurasian Economic Union (creation of a new "gray" or an "almost black market" in EEU).

According to Maskus (2001), parallel importing means that the trade situation which involve genuine products that are produced under patent, copyright or a trademark protection, which are imported into another market (the destination market), without appropriate authorization of the intellectual property owner in the destination market. Parallel trade refers to the resale of goods between countries without the authorization of the intellectual property rights owner associated with those goods (Kyle, 2009). Parallel importing involves the selling of trademarked goods through channels of distribution that are not authorized by the trademark holders (Duhan & Sheffet, 1988). Mathur (1995) estimated the size of international parallel markets - from $US7 billion to $US10 billion. Parallel imports affect a wide range of industries, spreading from traditional luxury and brand name consumer products to industrial ones.

1 Ural State University of Economics, kovalev@usue.ru
2 Ural State University of Economics, falchenko@usue.ru
3 Ural State University of Economics, veronika.vyazovskaya@gmail.com
4 Global Economy Institute, Ural State Mountain University, aleks_ural_55@mail.ru
In the academic literature, we can find different points of view on parallel importing. The literature debates centre on whether parallel importing is a legitimate response to discriminatory pricing strategies or a market failure that occurs when business entities take advantage of being able to use a common resource, or collective good, without paying for it (see, e.g. Malueg & Schwartz, 1994; Kitchen et al., 2003).

In this paper, it is very important to use the opinions of foreign researchers about parallel importing issues. In Russia and the EEU this problem is quite new and the justification of our conclusions in this article will be quite weak without reference to the above authors.

Parallel trade deals with topics in three related fields: intellectual property law, international trade, and competition law (Kyle, 2009). The economics of parallel import can be viewed from the pricing and legislative perspectives. The first driving force for parallel imports is legislation. According to World Trade Organization (WTO) Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS Agreement) there are three forms of exhaustion of intellectual property rights (see also, Abbot, 2007; Semin et al., 2016):

1. national exhaustion principle (refers to exhaustion of the intellectual property owner’s rights on the first authorized sale in the specified national territory, while the patent owner may continue to enforce his rights in the region other than the defined national territory based on the legislation adopted by the other region);
2. regional exhaustion principle (refers to exhaustion of the intellectual property owner’s rights in a specific region, for instance the Eurasian Economic Union, etc., and its member states, while the intellectual property owner continues the right to distribution of the product anywhere outside the region);
3. international exhaustion principle (refers to exhaustion of the intellectual property owner’s rights to the product across all the geographies, irrespective of the territory of the first authorized sale).

According to WTO’s documents (see, e.g. The Doha Conference 2001 (WT/MIN(01)/DECW/2, 2001), paragraph 5(d)), the WTO members are free to choose the exhaustion regime without challenge, provided the clauses of MFN and National Treatment are complied with. The ability of the intellectual property owner to restrict such movement depends on the exhaustion regime followed by the destination country. Thus, in an increasingly integrated world, the annual growth rate of parallel imports has been estimated to be 22%, and this is expected to rise as new trade agreements, like GATT, TRIPS, etc., further lower trade barriers across nations (Skoko, 2014).

The second driving force for parallel imports is the price discrimination of the same product across different geographies when a firm sets a different price for the same product for different groups of customers based on the region, demographics, or any such segmentation, as defined in elementary economics (Hirschey, 2009). Skoko (2014) writes, that there are two reasons why parallel imports occur in international markets. Firstly, the parallel import exists because foreign manufacturers practice price discrimination among countries and gray market sellers arbitrage these price differences. Secondly, parallel importers are more efficient than authorized sellers because parallel imports compete with the goods of authorized sellers, in turn leading to lower prices that are beneficial to consumers.

**Parallel importing in the Eurasian Economic Union: contradictions and Russian experience**

In the EEU countries, there are different principles of exhaustion of exclusive rights to trademarks and other objects of intellectual property. So, in Russia, Belarus and Kyrgyzstan, there is a territorial (national) principle of exhaustion of rights to intellectual property objects, which means that the right to import original goods from other countries into the country belongs to either the right holder or his official distributor. It is very important, that there is an international principle of the exhaustion of rights in Kazakhstan and Armenia, which assumes that the exclusive right of the right holder is deemed to be exhausted with respect to a particular commodity at the time of its first introduction into commercial circulation in any EEU country. Thus, the commercial movement of goods between EEU countries is almost not limited.

There is a regional principle between the EEU countries – freedom movement between states, which does not violate the exclusive right to a trademark to use this trademark in respect of goods that have been lawfully introduced into civil circulation in the territory of the EEU directly by the right holder or other persons with his consent. In accordance with the Customs Code of the EEU, those intellectual
property objects that are entered by the right holder in the single EEU customs register of intellectual property objects (ETROIS) or the national (Russian, Kazakh, Belarusian, Armenian, Kyrgyz) customs registers of intellectual property objects (TROIS) are subject to protection. It should be emphasized that to date, the main problem has not been resolved - the harmonization of national legislations with regard to the protection of intellectual property. This illustrates the fact that currently there are no registered intellectual property objects in the ETROIS.

In parallel with the ETROIS, the customs authorities of the EEU member countries maintain national customs registers of intellectual property (TROIS). However, the filling of these registers varies: as of March-April 2016, there were 3864 objects (trademarks) registered in Russia, in Kazakhstan - 605, in Belarus - 293, in Armenia - 174, in Kirghizia - 148. For example, through the use of Russian TROIS, its interests are protected as foreign producers of food and beverages: Unilever NV (trademarks RAMA, BERTOLLI, etc.), Nestle Food LLC (trademarks MAGGI, NESQUIK, etc.), the company Ferrero SpA.” ("Ferrero SpA") (trademarks KINDER BUENO, Kinder Chocolate, Ferrero, Nutella, etc.), Kraft Foods Deutschland Holding GmbH (trademarks "Jacobs" et al ), Jack Daniel's Properties, Inc. (JACK DANIEL'S trademark), and others. At the same time, there is a problem that undermines the effectiveness of the national TROIS, consisting in the fact that, due to the difference in their filling, there is the possibility of unimpeded importation of goods containing intellectual property to the territory of one of the states in which they are not protected by rights holders, and taking into account the absence of internal customs borders for their further distribution in the territory of other EEU countries. We will consider the possible schemes for the import of counterfeit goods into the territory of Russia, which will be legal from the point of view of the legislation of the EEU (Table 1).

<table>
<thead>
<tr>
<th>The essence of the scheme</th>
<th>Schema content</th>
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<tbody>
<tr>
<td>1) Scheme of import of &quot;gray&quot; goods to Russia, realized in connection with the difference in the principles of exhaustion of rights in the countries of the Eurasian Economic Union</td>
<td>There is the National (territorial) principle of exhaustion of rights in Russia, Belarus and Kyrgyzstan, while in Kazakhstan and Armenia it is international. According to this scheme, it is possible to import goods to Russia through the customs border of Kazakhstan or Armenia, where the exclusive right of the right holder is deemed to be exhausted after the introduction of a specific commodity into circulation in any country, and due to unimpeded movement within the EEU, the goods can be delivered to Russia. For Russia, these goods have the status of counterfeit (if they are not supplied by official distributors), but according to the legislation of the EEU, these are legal goods.</td>
</tr>
<tr>
<td>2) Scheme of the importation of illegal goods into Russia due to differences in the lists of controlled objects of intellectual property (TROIS) throughout the customs border</td>
<td>The scheme enables the import of counterfeit goods through the territory of the country where the objects of intellectual property are not subject to customs protection (the difference in the filling national TROIS): A) Import of goods into Russia through the territory of the Republic of Belarus or Kyrgyzstan (provided that the intellectual property object is not included in the TROIS of Belarus /Kyrgyzstan). In Belarus and Kyrgyzstan, the ex officio principle does not apply, customs authorities do not check goods not included in the TROIS; B) Import of goods into Russia through the territory of Kazakhstan, but one should take into account the possibility of applying the ex officio principle in force there, which allows customs authorities to detain counterfeit goods, even if they were not included in the national TROIS.</td>
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</table>

Most of the goods imported to Russia contain objects of intellectual property. This fact especially refers to the well-known international companies' goods imported to Russia and other EEU members from different countries. Analysing the Russian Federation customs bodies activity, we can see the number of intellectual property objects in the customs register (TROIS) increased by 24.4% in 2015 compared to 2013, from 3053 units up to 3860 units (Table 2). 304 units of intellectual property were included into the customs register in 2015. For the period 2013-2015 customs authorities prevented the damage of 10.3 billion rubles that could have been caused to the property right holders. In 2015 customs authorities identified 18.1 million units of counterfeit goods, and their share almost doubled in comparison with 2014, which may be partly due to the
problem of foreign trade sanctions. In 2015 customs authorities instituted 1121 proceedings in cases concerning administrative offenses. 96-97% of these proceedings - the article "illegal use of a trademark."

<table>
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<tr>
<th>Table 2: The main indicators of the intellectual property rights protection realized by the customs authorities of Russian Federation in 2013–2015</th>
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</table>

| Source: Author |

The analysis of judicial practice shows that the actors of parallel imports in certain cases are brought to:

1. administrative liability (for illegal use of a trademark). For example, the Arbitration Court of Sverdlovsk Region in its Judgment of 10 June 2014, upheld by the order of the Seventeenth Arbitration Appeal Court of 15 August 2014, brought the closed joint-stock company "Imcom" to administrative liability under article 14.10, part 1 of the Russian Administrative Code and sentenced it to administrative fine of 30,000 rubles and confiscation of the items containing illegal reproduction of a trademark "Barbie", seized with the protocol of seizure of 16 January 2014 in the Customs of Yekaterinburg;

2. civil liability (compensation to official distributors on the territory of Russia). The table below shows examples of compensation payments to official distributors on the territory of Russia (Table 3).

<table>
<thead>
<tr>
<th>Table 3: Amounts of compensation for illegal use of trademarks</th>
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<tr>
<td>Examples of judicial practice</td>
</tr>
<tr>
<td><strong>A RECORD HIGH AMOUNT OF COMPENSATION FOR ILLEGAL USE OF TRADEMARK</strong></td>
</tr>
<tr>
<td>Judicial ground: Order of the West Siberian District FAS of 14 February 2013 in the case № A45-5005 /12 (the Supreme Arbitration Court of Russian Federation in its Definition of 05 June 2013 № BAC-6633/13 refused to refer the case to the Supreme Arbitration Court Presidium for supervisory review).</td>
</tr>
<tr>
<td><strong>2.1 mln rubles for illegal use of trademarks «Guinness» and «Merries» (single case).</strong></td>
</tr>
<tr>
<td>Judicial ground: Order of the Moscow region FAS of 18 June 2012 in the case № A40-78553/11-110-648 (the Supreme Arbitration Court of Russian Federation in its Definition of 08 August 2012 № BAC-681/12 refused to refer the case to the Supreme Arbitration Court Presidium for supervisory review).</td>
</tr>
<tr>
<td><strong>2.5 mln rubles in favour of each of the plaintiffs for a sale offer of the original watches on the territory of Russia. A Court has satisfied the requirements of the companies-owners of trademarks &quot;LONGINES,&quot; &quot;OMEGA,&quot; &quot;RADO&quot; about compensation, but less than the declared amount.</strong></td>
</tr>
<tr>
<td>Judicial ground: the Supreme Arbitration Court of Russian Federation in its Definition of 15 July 2014 № BAC-12583/13 refused to refer the case to the Supreme Arbitration Court Presidium</td>
</tr>
</tbody>
</table>

| Source: Author |

3. criminal liability (for the illegal use of a trademark repeatedly or by causing large-scale damage). For example, in the case of the illegal use of a trademark «Creative,» the guilty person was brought to criminal liability for entering into civil circulation of the original goods (Definition of a Sverdlovsk Regional Court of 25 November 2009 in the case №22-110966).
To date, the issues relating to the administrative liability and compensation to the trademarks rights holders in arbitration courts are most relevant. The analysis of Russian judicial practice permits to single out two approaches to parallel importing: when parallel imports are an independent illegal way of using a trademark and when parallel imports do not violate the exclusive rights of the right holder. In the first case, when parallel import is an independent illegal way of using a trademark, the import of both counterfeit original goods to Russia with the independent use of a trademark without the consent of the right holder is an illegal way of using a trademark, that is a violation of exclusive rights to the trademark. Thus, the Arbitration Court of Moscow in its Judgment of 02 June 2011 in the case № A40-12515/11, recognized illegal the Ltd. “ElitVoda Ru” import of goods (mineral water) labelled «PELLEGRINO» to the territory of Russia; ordered to seize and eliminate the goods labelled «PELLEGRINO.» In the second case, when parallel imports do not violate the exclusive rights of the right holder, the main purpose of a trademark is to provide a potential consumer the opportunity to distinguish goods produced by one person from similar goods produced by other persons. It is a customer loyalty issue and when some similar design of trade mark cannot mislead consumers to choose these similar goods but not the right holder’s goods, hence, there is no place for applying the trademark rights protection. This approach was used in a case with the claim of the company KAIABA KOGYO KABUSHIKI KAISHA to Ltd. «Avtologistiika» (Definition of the Ninth Russian Arbitration Court of Appeal of 28 September 2009 in the case № A40-2250/09-51-27).

Conclusion

In conclusion, it should be noted that the problem of protecting intellectual property rights for producers’ trademarks is quite acute in Russia, despite significant steps to improve the legislative base of the Russian Federation and the EEU. The problem of delimitation of the counterfeit original products importation is especially urgent. Specialists on the protection of the trademark from parallel imports distinguish three main ways of such protection: the information introduction in the customs registers of intellectual property objects in order to suspend the release of goods; appealing to the court, including with the claim of recognizing the parallel importer actions as unfair competition; and attracting a parallel importer to criminal liability.

References


THE IMPACT OF FISCAL DECENTRALIZATION ON PUBLIC ADMINISTRATION

Jozef Kubás,¹ Zuzana Štofková,² Ján Mišík³

Abstract: The allocating revenue to the individual budgets of self-governments in the Slovak Republic is a highly sophisticated process. Redistribution of resources using fiscal decentralization is an effective instrument through which the government attempts to eliminate subsidizing of municipalities and self-governing regions from the state budget and thus achieve higher stability of the economy. The function of municipalities and higher territorial units is secured by so-called special purpose tax revenues, which do not go into the state budget but directly into the budgets of self-governments. This research contribution focuses on the revenue side of budgets of public administration institutions for the period of the last five concluding budget years. The analysis demonstrates the meaning and importance of tax revenues for the mentioned institutions as well as the expenditure side of the state budget. In this contribution, a comparative study identified the changes that occurred in the individual years of the presented range and subsequently, evaluated fiscal decentralization and its influence on the revenue side of budgets of municipalities.

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Keywords: Fiscal decentralization, tax, finance, budget.

Introduction

The state budget provides the funding for public administration in the Slovak Republic, through which the primary functions of the state are financed for the relevant year. The National Council approves the budget through the Act on the State Budget on the Amount of Incomes and Expenditures. In the case of an imbalance between revenue and expenses, it also approves the amount of the deficit. The budget is compiled annually for three budget years, which correspond to calendar years, the first year of which is binding. The budget may also be amended during the year. It takes into consideration incomes that are domestic as well as income resources from the European Union (EU). Benjamin Franklin noted the importance and sovereignty of taxes in his historical sentence: “There are only two certainties in the world taxes and death”. It is taxes that are the pillars of revenues, and taxpayers request a functional socio-economic system and the provision of basic needs. A variety of systems and instruments of redistribution of public budgets have been tackled through fiscal decentralization. Fiscal decentralization means independence for authorities of regional administration when deciding on the use of their own revenues, responsibility for the use of public resources, justice when deciding on where to direct public resources and transparency when separating funds according to objective statistical indicators. In this approach, municipalities and self-governing regions can better fulfill their designated tasks and functions as well as meet the requirements of citizens. This research contribution focuses on revenues originating from the Slovak Republic, which comprise the predominant portion of income and a significant portion of tax revenues in the budget.

Methods

Used methods were analysis, synthesis, comparison, induction, deduction and logical thinking, the main source of information was drawn from the Public Administration Budget. This study focused on the allotment of revenue according to the economic classification in order to identify the importance of tax for revenue of the state budget and regional self-governments. This classification separated the individual revenues into main categories, subsequently, items and sub-items. The main revenues are categorized as follows:

- Tax revenues,
- Non-tax revenues, and
- Grants and transfers.

The Tax System in the Slovak Republic

The tax regime of the Slovak Republic involves two basic groups of tax revenues: direct and indirect. These taxes make up the major portion of revenue to the state budget. A direct tax is collected directly

¹ Faculty of Security Engineering, University of Žilina, Slovakia, Jozef.Kubas@fbi.uniza.sk
² Faculty of Operation and Economy of Transport and Communication, University of Žilina, Slovakia, Zuzana.Stofkova@fpedas.uniza.sk
³ Faculty of Security Engineering, University of Žilina, Slovakia, Jan.Misik@fbi.uniza.sk
from individual taxpayers and is not transferable to another (Bieliková, 2015). In the fiscal system of the Slovak Republic, income tax has a major position according to law (Act no.595/2003 Coll. on Income Taxes). Direct tax applies to the following:

- incomes of natural persons
- incomes of legal entities
- local taxes
- motor vehicle taxes

With indirect taxes, it is not possible to specifically determine the taxpayer to which the tax relates; such taxes apply to goods and services. The payers, in this case, are manufacturers (producers) while end-consumers are the ones who bear the cost. These taxes include value-added tax (VAT), which according to law (Act no.222/2004 Coll. on Value-Added Tax) is a universal indirect tax and is among the main sources of revenues for the state budget. This type of tax on consumption is characterized as a universal tax in that it all goods and services. The tax applies to all business subjects who have tax obligations (Štoňková, 2015). It is indirect in that the end-consumer bears the cost as it is part of the price of the goods or services received, but it is the producer or service provider who delivers the tax to the state budget. Since it is a consumption tax, all public and private spending, including that by a business operator is subject to the tax. Other indirect taxes include specific consumption taxes that are applied independently of VAT. A consumption tax, unlike other taxes, has a fixed amount per unit. Products covered by this tax are in accordance with those in other states of the EU (Kováčiková, 2015). This tax is placed on selected types of goods made domestically and also on imports, but goods brought in from the territory of a third state (outside the EU) in personal luggage, up to a certain value, are exempted. A consumption tax is added onto the sales price and so affects natural persons indirectly, upon the purchase of certain types of goods. As indicated in the Financial Report (2017), in the Slovak Republic, the following items are taxed in this way:

- Alcoholic beverages – spirits, wine, semi-products, and beer;
- Electricity, coal, and natural gas;
- Mineral oil, e.g., motor diesel, motor petrol, lubrication oil, heating oil, liquid petroleum gas (LPG), and others; and
- Tobacco products (cigarettes, cigars, cigarillos, and tobacco) and tobacco raw materials (tobacco leaf, tobacco residue, and tobacco papers).

While the classification of taxes into direct and indirect is important, it is also necessary to designate the territory for taxing and the organization that acts as the administrator of individual taxes. On the basis of this, tax revenues are allocated to the budget of the state, the budgets of higher territorial units (regional government), and the budgets of municipalities. Up until 2014, the tax on motor vehicles belonged to the revenue part of budgets of the higher territorial units. Since 2015, this tax has been revenue of the state budget. For the purpose of increasing revenue to higher territorial units, the state changed the distribution of income taxes from natural persons and thus, boosted the share of income proceeding to self-governing regions. Since 2016, the amended act on budget allocation of tax revenues pertaining to the revenues of a regional self-government has been in force. According to the law (Act no.564/2004 Coll.) tax revenue in the relevant year is divided so that 30.0% is contributed to the budgets of higher territorial units and 70.0% to municipalities. Among other revenue for municipalities are local taxes and fees for communal waste and small construction waste, which are defined by the law (Act no.582/2004 Coll. on Local Taxes). These taxes are fixed, modified, lowered, or exempted by municipalities under a generally binding regulation. These include property taxes, dog taxes, the tax on the use of public spaces, accommodation tax, tax from vending-machine sales and non-winning gaming machines, tax on the access and stay of a motor vehicle in the historical part of a town, and tax on core (nuclear) facilities.

**Share of Taxes in Incomes of the State Budget**

The state determines what comprises the revenue part of its budget. Fiscal decentralization determines which tax stream will be income and then which of these will be income of the state, higher territorial units, and municipalities. These revenues can be divided according to several criteria: economic classification, organizational classification, and sources of financing (Šoltés, 2016). Figure 1 shows a comparison of the amounts of total income tax revenues into the state budget for a period of five years.
Figure 1: The overall amount of total revenue compared to tax revenue in the state budget in 2012 - 2016

Source: Authors

Figure 1 shows the amount of income for the state budget from taxes. For the monitored period, the share of tax revenues was highest in 2016, making up 78.2% in the given year. The lowest share of tax revenues occurred in 2015 and comprised 64.9% of total revenue, even though the amount rose year-on-year by about €1,347 million. This share was influenced by the high proportion of income from EU sources.

Individual tax revenue for the state budget has the following tax sources:

- incomes and capital assets,
- goods and services,
- international trade and transactions, and
- sanctions imposed in tax proceedings and sanctions associated with payments for public services provided by Slovak television and Slovak radio.

Figure 2 shows the tax revenue for the individual years for the state budget.

Source: Authors

With the tax structure contributing to the state budget for the monitored periods (Figure 2), the highest share of total tax was from goods and services, which ranged from 72.7% to 78.7%. The share derived from income tax and tax on capital assets ranged from 20.8% to 27.4%. Sanctions imposed in tax proceedings and tax from international trade and transactions combined was less than 0.7%.

Regarding fiscal decentralization, taxes were allocated for self-governing regions and municipalities. Since 2015, this has involved the division of revenues from the income tax of natural persons. A
comparison of total income and tax revenue contributed to the budget of higher territorial units for the period 2012–2016 is shown in Figure 3, and that for the municipalities are shown in Figure 4.

Figure 3: Total revenue compared with the share from taxes contributed to the budget of higher territorial units

![Figure 3](image)

Source: Authors

Figure 3 shows an increasing trend of revenue transferring to the budget of self-governing regions. These revenues have grown in direct proportion to tax revenues.

Figure 4: Total revenue compared with the share from taxes contributed to the budget of municipalities

![Figure 4](image)

Source: Authors

Budget revenues of municipalities are gradually increasing as are revenues from taxes (Figure 4).

Discussion

This contribution identified the development of revenue of municipalities and self-governing regions after fiscal decentralization in the Slovak Republic. Tax revenues are used in the financing of the state and for financing municipalities and self-governing regions. In 2016, tax in the Slovak Republic comprised as much as 78.2% of state budget revenues. In 2014, this tax was the highest at 78.7% and was sourced from tax on goods and services. The remainder consisted of tax revenue and capital assets, which in 2013, at its highest, comprised 27.4% of total taxes.

It is these taxes that most affect residents and entrepreneurs in the Slovak Republic. When setting the tax burden for these subjects, it is important to proceed with great sensitivity because merely increasing the tax burden may not lead directly to proportionally increased budget yield. The opposite effect may occur, where with higher taxes, the budget revenue streams will trend downwards, as
entrepreneurs try to avoid paying these taxes in different ways, one of which is shifting the company to a tax haven, where the tax burden is minimal to non-existent. Another method is for people to make payments to one another, or payments directly without any records, and thus, avoid taxation. In countries with high taxes on goods and services, the preference for buying goods and using services of nearby foreign countries may arise.

**Conclusion**

Fiscal decentralization, which was preceded by a change of competencies for self-governments and a change of tax laws in the years, 2002 to 2004, has influenced the flow of tax revenue streams for the state budget. Since 2015, the motor vehicle tax has been revenue of the state budget; while in contrast, the total income tax from natural persons has been divided among the regional administrations. Decentralization has been strengthened by increasing tax revenue streams from natural persons. This endeavor has had a positive effect on the revenue of municipalities and regions, which receive increasing amounts with every year.

**Acknowledgment**

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THE SET OF PERFORMANCE INDICATORS IN TRANSPORT AND FORWARDING SERVICES – CASE STUDY

Aneta Kucińska-Landwójtowicz,¹ Marcin Lorenc²

Abstract: This article applies to the set of performance indicators in companies operating in the transport and forwarding services. The authors described the importance of the process approach in the management of the organization, and its main requirements connected with the measurements and performance indicators. On this basis, the identification and analysis of the processes was carried out in small and medium-sized enterprises in the area of transport and forwarding. This is followed by a proposal to develop a performance measurement system dedicated to such companies. The system includes a comprehensive set of indicators to monitor the efficiency, effectiveness, timeliness and quality of the identified processes. The presented project is the original proposal of the authors, complementing the available literature knowledge. The paper depicts the research results which are based on a case study approach.

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Keywords: performance indicators, performance measurement system, effectiveness, efficiency, quality, process management

Introduction

To meet the constantly changing and competitive environmental requirements, firms are searching for ways of enhancing their efficiency and effectiveness in their operations. It necessitates them to establish the ability to respond to the escalating demands of their clients as well as adjusting relevant business processes. However, these objectives alone will not be able to serve as a basic guide for controlling and optimizing their entire enterprise (Jochem et al., 2010). The concept that assumes both the identification and improvement of processes and concentration of a client–generate value is the business process management. The essential part of process management is measuring process performance (Harter et al., 2000). Companies have understood that for competing in continuously changing environments, it is necessary to monitor and understand firm performance (Taticchi et al., 2010). Measurement has been recognized as a crucial element to improve business performance (Sharma et al., 2005). A performance measurement system (PMS) is a balanced and dynamic system that enables support for the decision-making processes by gathering, elaborating and analyzing information (Neely et al., 2002). Studies on the evolution of performance measurement indicate their development of focus from the financial perspective to a non-financial one (Neely, 2005). The compilation of the Balance Score Card was a crucial point of this advancement and led to a dramatic shift in the approach towards non-financial indicators, significantly promoting their position (Kaplan and Norton, 1996). The literature investigating the PMS is extremely elaborate and enables to point out various types of Measurement Systems (Agami et al., 2012). However, the result of the literature review reveals a certain maturity of the literature related to large companies and a significant lack of PMS literature for small and medium enterprises (SMEs) (Taticchi et al., 2010).

The purpose of this article is, therefore, to provide proposals for performance measurement system indicators dedicated to small and medium companies, which address concerns of the indicated cognitive need. The research studies are confined to the forwarding and transportation industry, which constitutes a very important service sector dynamically expanding in the Polish market. The developed project on performance measurement system indicators handles the original value of the studies carried out by the authors. The collection of indicators connects the traditional approach towards performance assessment with target-oriented indicators of quality, effectiveness and efficiency. The investigation of the system was preceded by a literature review on process management and performance measurement systems.

Literature background

Due to the constant enhancement of operations, process management affects a company’s effectiveness and stemming from the indicated process-oriented need, it results in building a flat customer–oriented organizational structure. It is interpreted as the organizational effort required for

¹ Faculty of Production and Logistics Engineering, Opole University of Technology, a.kucinska@po.opole.pl
² Faculty of Production and Logistics Engineering, Opole University of Technology, m.lorencc@po.opole.pl
making business processes the platform for organizational structure and strategic planning (Reijers, 2006; Sabherwal et al., 2001). Empirical studies refer to a positive impact of process-oriented organizational design on a firm’s performance (Kohlbacher and Gruenwald, 2011) and point out that process management is widely exploited in a number of industries and application areas (Syamil et al., 2004).

As it has already been stated, one of the crucial elements of a concept is the process performance measurement. The key factors of the measurement include: effectiveness, efficiency, quality and timeliness, as well as performance and productivity depending on the assumed operation strategy of a company. The modern performance measurement system is defined as a collection of measurements applied to quantify the efficiency and effectiveness of a company’s operations (Najmi and Kehoe, 2001). Following the Balanced Score Card, we should take into account both financial and non-financial indicators. Kapug and Smith (2007) state that although non-financial measures are increasingly important in decision making and performance evaluation, copying non-financial measures that others use may not work. Instead, the companies should link the measures to the factors such as strategy, drivers value, organizational objectives, and competitive environment. Morgan (2004) considers the PMS a strategic tool with a wide variety of metrics used by the management to monitor and guide a company toward successful and desirable objectives and goals. It is also highlighted that small firms can achieve benefits, similar to those of large firms, by using non-financial measures to identify and monitor quality (Kettering, 2001). According to Zeglat et al. (2012) using the integrated performance measurement systems by practitioners is recently not enough, on contrast, researches and practitioners should consider and implement the newest and latest trends introduced in the generic PMS literature.

The literature has comprehended a diversity of indicators to measure general or specific performance of logistic service providers regarding transport activities (Van Donselaar et al. 1998), timeliness, and accuracy (Bromley, 2001), delivery performance (Stewart, 1995), personnel scheduling, and safety measures (Crum and Morrow, 2002). Logistics service providers can also be distinguished based on their characteristics of customer relationships (Knemeyer et al., 2003), loyalty, and satisfaction (Stank et al., 2003). An extensive review of literature (Krauth et al., 2005; Twaróg, 2005) provided a sustainable footing to generate a set of indicators in our case study.

**Methodology and procedure**

This paper depicts the research results which are based on a case study approach. For conducting these studies, a documentary analysis and a semi-structured interview were applied. A forwarding and transportation company was selected for the sake of the case study. It implemented a system of quality management and decided to launch a performance measurement system, which would enable it to analyze both financial and non-financial outcomes. According to Jochem et al. (2010), the first phase of the study shall be the analysis of the company strategy, quality policy, its principles, and business requirements. In this stage, the actual analysis and solution development for a short-term improvement had been conducted. Apart from that, identification of the implemented processes took place with the division into the management, basic, and auxiliary ones. The second phase of the experimental part aimed at the selection of appropriate indicators linking business requirements, company’s objectives, and key process factors. The analysis was carried out in three consecutive steps, for the three groups of processes respectively. In addition to the set of indicators which were previously used for assessing an operations effectiveness, the indicators displayed in the literature were also adopted. Their choice was further limited to the ones which allowed for the process evaluation according to the principle of avoiding a data avalanche due to the substantial number of indicators. The system of the project was analyzed together with the board of directors and the process owners. The final version of the system was accepted at the fourth meeting with the appointed representatives of the company. The results of the analyses are delivered in the following parts of the article.

**The case of study**

The analysis carried out in a forwarding and transportation company, where quality management system was implemented, enabled to develop a model of a processes’ map for this type of operation. In accordance with Bitkowska et al. (2011) approach, management processes, as well as basic and auxiliary ones, were identified.
Stage 1 Project of indicators for processes assessment system

On the grounds of the evolved processes map, the analysis of their impact on the fulfillment of the company goals was initiated. Consequently, a range of performance indicators was chosen. The established indicators constitute a complementary compilation entailing to provide an assessment of effectiveness, efficiency, timeliness and quality of the undertakings. They are means of pursuing quality and quantity assessment. The owners of the processes are responsible for gathering data utilized for the evaluation of respective indicators as well as for performing up-to-date analyses.

Step 1 Performance indicators of management processes

The first phase of the analysis concerned the management processes which aim at improving both the company’s financial efficiency and the effectiveness of its quality management system. For the measurement of the financial efficiency, classic indicators of cash flow and profitability were proposed: sell, assets and equities. The indicators of receivables turnover and cash flow were also taken into consideration. Within the effectiveness assessment of quality management, two aspects were highlighted: the internal and external evaluation. The analysis of the audit results was put forward, including the amount of identified non-compliances and the implementation degree concerning remediating and preventive actions. The outer effectiveness of the quality management system is consumers – and was evaluated. Their satisfaction degree corresponding to the received services and cooperation with a company is the key to the evaluation criteria. Thus, the result analysis concerning client satisfaction was proposed together with complaint indicators including: percentage and frequency of substantiated complaints of the executed orders as well as the costs of complaints against the sell value. Evaluation criteria and indicators of management processes assessment are displayed in Table 1.

<table>
<thead>
<tr>
<th>Evaluation criteria</th>
<th>Indicators</th>
</tr>
</thead>
</table>
| Financial efficiency | Cash flow indicators  
Sell profitability indicators  
Assets profitability indicators  
Equity profitability indicators  
Receivables turnover indicators |
| Quality management system effectiveness | Number of non-consistencies in the consecutive internal audit  
Number of corrective actions assessed as effective/Total number of corrective actions assessed  
Number of preventive actions assessed as effective/Total number of preventive actions assessed |
| Degree of customer satisfaction | Client satisfaction results  
Percentage and frequency of substantiated complaints in the executed orders  
Costs of complaints/Sell value |

Source: Authors

Step 2 Performance indicators of the basic processes

The second phase connected with collecting the indicators was based on the analysis of the basic processes impact (orders acquisition, forwarding and transportation service execution, client service after the sales disposal) on the effectiveness and performance quality of the whole company. The aim was to identify the key success factors for individual processes and consequently, to develop suitable performance indicators. Assessment criteria and the indicators for the basic processes are displayed in Table 2.

In the process of order acquisition, the key factors affecting its effectiveness is the growing number of orders and acquiring new clients. Therefore, performance indicators were assumed as: the amount of orders accepted for execution in relation to the number of sent inquiries, the amount of executed orders, sell value in relation to the number of employees winning the orders, and the amount of new clients in relation to all the clients. Such a collection of indicators enables us to monitor the
implementation goal of this process being the increase of both the number figure of acquired orders and new clients.

The process of executing forwarding and transportation services is of major importance for the company not only from the point of internal effectiveness and efficient operations but also quality and timeliness of the provided services. The criteria assumed for his evaluation are: operation effectiveness, the equities level, delivery quality, carrier documentation quality, and the driver’s performance quality as well as timeliness of the service provision. The effectiveness of the analyzed process means implementation of all the received orders in accordance with their specification and with optimal use of their means of transport and their load capacity are also taken into consideration. These are the major success factors affecting the effective application of resources possessed by the company.

Table 2: Evaluation criteria and indicators of the basic processes assessment

<table>
<thead>
<tr>
<th>Evaluation criteria</th>
<th>Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acquisition of orders</td>
<td></td>
</tr>
<tr>
<td>Effectiveness in acquisition of orders</td>
<td>Number of received orders/ Number of inquiries</td>
</tr>
<tr>
<td></td>
<td>Number of executed orders</td>
</tr>
<tr>
<td></td>
<td>Sell value/Number of employees acquiring orders</td>
</tr>
<tr>
<td>Effectiveness in gaining new clients</td>
<td>Number of new clients/Total number of clients</td>
</tr>
<tr>
<td>Service execution</td>
<td></td>
</tr>
<tr>
<td>Operation effectiveness</td>
<td>Number of executed orders /Number of received orders</td>
</tr>
<tr>
<td></td>
<td>Extent of means of transport utilization</td>
</tr>
<tr>
<td></td>
<td>Extent of load capacity utilization</td>
</tr>
<tr>
<td>Equities input</td>
<td>Transportation costs/Sell value</td>
</tr>
<tr>
<td></td>
<td>Depreciation costs of means of transport/Sell value</td>
</tr>
<tr>
<td></td>
<td>People costs/Sell value</td>
</tr>
<tr>
<td>Delivery quality</td>
<td>Number of damages in transport</td>
</tr>
<tr>
<td>Shipment documentation quality</td>
<td>Number of mistakes occurring in the carrier documentation</td>
</tr>
<tr>
<td>Driver’s performance</td>
<td>Breakdown and repair costs depending on the drivers</td>
</tr>
<tr>
<td>Timeliness of service provision</td>
<td>Number of timely deliveries/Total number of the deliveries</td>
</tr>
<tr>
<td></td>
<td>Average delivery delay</td>
</tr>
<tr>
<td></td>
<td>Average time span between registration and order execution</td>
</tr>
<tr>
<td></td>
<td>Timeliness of vehicle provision</td>
</tr>
<tr>
<td>Service after sell</td>
<td></td>
</tr>
<tr>
<td>Timeliness of handling complaints</td>
<td>Time of processing a complaint</td>
</tr>
<tr>
<td>Effectiveness in testing client satisfaction</td>
<td>Number of completed questionnaires /Number of sent questionnaires</td>
</tr>
</tbody>
</table>

Source: Authors

They are divided into the following indicators: the amount of executed orders in relation to the collected orders, the extent their means of transport are utilized and the extent of their load capacity utilization. During the evaluation of this process, the analysis of the equities level was taken into consideration, including transportation costs, the depreciation of the means of transport and people costs in relation to the sell value.

Quality assessment concerning service implementation shall involve the quality evaluation of: supply, carrier documentation, and a driver’s value in performing the shipment. The indicators offered for the assessment of the presented criteria include respectively: the amount of damages occurring during shipment, the number of faults in the carrier documentation, the costs of breakdowns and repairs depending on the drivers. The final criterion of the process assessment is the timeliness of the service provision. Its evaluation shall involve the following indicators: the number of timelydeliveries in
relation to the number of total deliveries, average delivery delay, average time span between an order placement and an order execution and timeliness of a vehicle provision.

It was suggested to apply the indicators enabling to evaluate the operations connected with timely handling of the possible complaints and the effectiveness by conducting a client satisfaction survey.

The responsibility for the assessment of the processes results is held by the designated owners of the processes.

Step 3 Performance indicators of auxiliary processes

The final stage of designing the performance measurement system was the analysis and selection of indicators for the auxiliary processes which include: marketing and market research, infrastructure management, purchase and management of suppliers, human resources management and work environment management.

Evaluation criteria and indicators of auxiliary processes performance are revealed in table 3.

<table>
<thead>
<tr>
<th>Process</th>
<th>Evaluation criteria</th>
<th>Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marketing and market research</td>
<td>Efficiency of marketing operations</td>
<td>Marketing costs/Sell value</td>
</tr>
<tr>
<td></td>
<td>Customer Acquisition Cost</td>
<td>Marketing costs/Number of acquired customers</td>
</tr>
<tr>
<td></td>
<td>Effectiveness of marketing operations</td>
<td>Number of acquired customers due to marketing actions/Number of new clients</td>
</tr>
<tr>
<td></td>
<td>Customer loyalty</td>
<td>Number of regular clients/Total number of clients</td>
</tr>
<tr>
<td>Infrastructure management</td>
<td>Depreciation quality</td>
<td>Amount of vehicle breakdowns in the country</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Amount of vehicle breakdowns abroad</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Amount of executed repairs/Amount of scheduled repairs</td>
</tr>
<tr>
<td></td>
<td>Depreciation costs</td>
<td>Repairs costs/Sell value</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vehicle maintenance costs/ Sell value</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vehicle breakdown costs/ Sell value</td>
</tr>
<tr>
<td></td>
<td>Vehicle exhausts emissions</td>
<td>Emissions level : carbon dioxide, carbon monoxide, nitro gen oxides, hydrocarbons, sulphur dioxide and particulate pollutants</td>
</tr>
<tr>
<td>Purchase and suppliers management</td>
<td>Timeliness of suppliers</td>
<td>Amount of timely deliveries/Total number of deliveries</td>
</tr>
<tr>
<td></td>
<td>Suppliers quality</td>
<td>Amount of non-compliant deliveries/Total number of deliveries</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of filed claims</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Complaints costs/Purchase value</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Suppliers assessment</td>
</tr>
<tr>
<td>Human resources management and work environment management</td>
<td>Employee development</td>
<td>Employee number taking part in training courses/Total employee number</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cost of employee improving qualifications/Total employee number</td>
</tr>
<tr>
<td></td>
<td>Employee satisfaction</td>
<td>Employee turnover</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Employee absenteeism</td>
</tr>
<tr>
<td></td>
<td>Work safety</td>
<td>Amount of accidents at work*1000/Number of working people</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Absentee rate caused by accidents/Number of accidents at work</td>
</tr>
</tbody>
</table>

Source: Authors

The major aim of marketing operations of a company is gaining clients, maintaining constant relations with them, and creating their loyalty. Simultaneously, that process should be effective and efficient. For the sake of performance measurement, it was suggested to apply an indicator depicting the total marketing costs share in the sell value and an indicator related to the marketing cost per each new
client. Another assessment criterion is the effectiveness of marketing operations which, in this case, is evaluated by the share of acquired clients due to marketing within the group of total clients. Respectively, client loyalty may be measured with a regular client share in a group of all the clients.

Infrastructure management is understood by vehicles maintenance enabling effective exploitation and ensuring high quality of the provided services. For the sake of measurement of that process, it was suggested to apply the analysis of the number of breakdowns in the country and abroad and the share of executed repairs in relation to the schedule. An analysis of depreciation costs shall be carried out with the evaluation of repair costs, vehicle maintenance costs and vehicle breakdowns costs in relation to the sell value. The environmental aspect of the evaluation was also taken into consideration i.e. the analysis of exhausts emissions level.

The purpose of the purchasing and supplier management process is to ensure timely deliveries and the required quality of the stock, taking into account the appropriate price-quality ratio. Timeliness and quality measures have been proposed for the monitoring of the process, which concern the actions of their suppliers.

The crucial element of management of human resources as well as work environment consists of employee development care, their work satisfaction, and their safety. For the sake of monitoring the effectiveness of such a principle, it was suggested to apply the indicators which determine the percentage of employees entering trainings, improving their qualifications, and average spending on that type of operations. The level of employee work satisfaction may be indirectly assessed with the analysis of employee turnover and their absenteeism. A classical indicator of accident frequency during work and an indicator of the severity of these accidents, taking into account the employee absenteeism, shall be applied to measure work safety. This indicator illustrates the importance of company accidents and enables to differentiate between companies where accidents occur more frequently but with less consequences from the companies where accidents are less frequent but lead to longer convalescence of the injured. It is also worth it to take into account the specifics of the accidents during the work of the drivers and include this into such assessment.

Taking all the suggested indicators into consideration, the frequency of their measurement shall be defined. As far as the studied firm is concerned, the analysis of the basic processes indicators will be conducted once a year. However, the results of the basic and auxiliary processes shall be scrutinized once a month.

Conclusion

The performance measurement system presented hereby reflects the firm strategy and business objectives representing medium-sized enterprises operating in transport-forwarding service and it is keen to place emphasis on the need of aligning a substantial body of process-oriented measures with the demands of a specific group of companies. The applied process-oriented approach towards its design permitted simultaneously the association of these goals with the critical aims of the identified processes. This has provided a very compact and target-oriented PMS allowing for monitoring the efficiency, effectiveness, quality and timeliness of the identified processes. The delineated system constitutes an original proposal of the authors and particularizes the available literature knowledge. It should be noted, however that while designing it, a principle of eliminating superfluous information was adopted. That danger arises from too many selected indicators what usually impedes taking managerial decisions and dissuades from the application of such solutions. PMS shall become a tool for directing to adoption of improvement actions in accordance with the principle that measurement is the key to introducing alterations.

The limitation of the research lies in the fact that the results of the study are based on a single case study; therefore, caution is required before making generalizations on the basis of the data. Further research is required to gather analyses results within a larger number of enterprises, which would enable to certify the universal value of the designed system.

References


THE IMPACT OF VALUE ADDED TAX ON CASH FLOWS OF ROAD TRAFFIC COMPANIES IN THE SLOVAK REPUBLIC

Angelika Kútna,¹ Norbert Gyurián²

Abstract: Within the Member States of the European Union, value added tax (VAT) is the most harmonized form of tax from all types of direct and indirect taxes. It does not affect the costs or the revenues of the company, but it affects taxpayers on the other hand. The impact on the company's cash flows is most significantly affected. The basic principle of VAT taxation consists of the following idea. The Member State of final consumption of the goods or services is the state to whom the VAT finally belongs to. The free movement of goods and services between the Member States resulted in many new traffic companies being created. The measure of VAT influence on Cash Flows depends mainly on two impact factors. The first is the length of excessive deduction payment period to taxpayer bank account. The second impact factor is the amount of excessive deduction expressed through money. The objective of this study is an evaluation and quantification of the impact of value added tax on the road traffic companies’ cash flows. The financial burden of traffic companies had an upward trend only during the first and second year of the analyzed period. Since 2006, the financial burden had a downward trend. This decrease was more significant until 2009 (the end of the financial crisis in European countries). After this year, the declining rate had moderated. This development results not only from declining interest rates of the European Central Bank but also from economic growth and development in European countries.

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Key words: value added tax, cash flow, excess deduction, Traffic Company, expense interest

Introduction

The objective of this study is an evaluation and quantification of the impact of value added tax on road traffic companies’ cash flows. This research also focuses on the comparison of this impact on three different sets of traffic companies. The criteria for creation these three sets were three basic value added tax (VAT) schemes. The first scheme is supply of goods and services at Slovak territory. The second one is the acquisition of goods in the territory of the country from another member state. The third schema is the importation of goods.

The time period of 2005-2015 is analyzed in this study. The impact of the value added tax is quantified by financial expense interests. These expenses depend on the period of time limits for the excess deduction and also on the excess deduction. The authors have chosen three basic indicators: indicator: “value of money I,” indicator: “value of money II” and financial burden (base index). The analysis presented in this study confirms the time period between the day of VAT tax return submission to the Financial Directorate by electronic means (this is the day of taxpayer’s entitlement to excessive deduction) and between the validity day (the day when the taxpayer receives payment to his bank account from the Financial directorate) as the cause of VAT financial burden. The study is organized as follows. First, the background of the VAT system in the Slovak Republic is presented, this is followed by the literature review, and finally by the theoretical background of the study and the hypothesis development section. Next, the methods and findings are presented. Last, discussion and implications of the study are presented.

Literature review

There have been two basic approaches to contributing to the debate on the importance of cash flows and the factors which influence them. One approach is to consider the relative usefulness of earnings, in particular, cash flows in predicting future cash flows. For example, a recent US study with this approach is by Barth, Cram, and Nelson (2001), who document the superiority of operating cash flow over earnings in predicting future operating cash flows. However, as pointed out by Subramanyam and Venkatachalam (2007) and Akbar, Shah, and Stark (2011), the prediction horizon in such tests tends to be relatively short. Furthermore, there are many other factors which influence cash flows (present and future) of enterprises. In this research we analyze and influence one of these factors, the influence of taxes. Different studies have examined firms’ cash flows risks and their effects on capital costs, values, and appropriate levels of the debt financing (Céspedes, Gonzáles and Molina (2010), D’Mello and Miranda (2010) and Lang, Ofek and Stulz,(1996), Ferenczi- Vaňová, et al.

¹ J. Selye University, Faculty of economics, Slovak Republic, E-mail: angelika.kutna@gmail.com
² J. Selye University, Faculty of economics, Slovak Republic, E-mail: ngyurian@gmail.com
(2015). However, these studies take place under the linearity assumption of the relationship between FCF risks and its influential factors. Bojňanský, Krajčírová, and Ferenczi-Vaňová (2013) and Bašťincová (2009) have argued that value added tax as a classic representative of indirect tax burdens and impacts the final result on the end-user. However, its impact is often hidden to the general public in the methodology of its functioning as an indirect tax – i.e., the taxpayer is not obliged to pay this tax personally at the appropriate revenue authority. This will be done by the respective VAT registered company instead, also claim Svátková, et al. (2007) and Hájek, et al. (2015). Hence this tax is becoming an important factor on cash flows of a company, so the traffic companies are not exempt.

According to Babone, Bird and Vazquez-Caro (2012), modern taxation systems impose a heavy burden on taxpayers, particularly on small business taxpayers. The level of economic integration in the European Union is relevant and in an initial stage requires measures in order to eliminate tax limits and to remove obstacles to the free movement of production factors in the economic era (Staciokas and Valanciene, 2002). As mentioned by Becker and Fuest (2010) European Union policy is closely connected with tax competition. This free movement of services and goods (main production factor) is closely connected with the development of traffic through the whole European Union.

The basic incentive

The EU’s common system of VAT in the European Union member states is based on Council Directive 2006/112/EC. This Directive is used to bring different national laws into line with each other. Implementation of the EU’s common system of VAT into the Slovak tax law was one of the conditions of the European Commission during the accession negotiations. The date of the Slovak Republic’s accession to the European Union was also the first day of the validity of the new Slovak VAT Law - Act No. 222/2004 Coll. on Value Added Tax, as amended. Taxable transactions include supplies of goods or services within a single EU country, intra-EU acquisitions of goods (goods supplied and dispatched or transported by a business entity in one EU country to a business entity in another one) and imports of goods into the EU from outside. As for the supply of services — the place of taxation is the place where the services are supplied. This depends not only on the nature of the service supplied but also on the status of the customer receiving the service. To ensure that the service is taxed at the place where it is actually consumed, there are some exceptions to these general rules, such as transport services. Since 2004, a large number of traffic road companies have been established in the Slovak Republic. Hence the main aim of this study is the evaluation and quantification of the impact of VAT on the cash flows of road traffic companies.

Model specification

We have used the statistical data after elaboration from the proposed sources:

- The intranet portal of the Slovak Financial Directorate SAP-ISFS SR,
- Data from VAT tax returns which are submitted by taxpayers,
- Data from VAT control statements which are submitted by taxpayers,
- The Statistical Office of the Slovak Republic.

The basic set of taxpayers who are analyzed in this study was selected from databases of the Financial Directorate of the Slovak Republic according to the strict rules:

- SET 1 Traffic companies I - taxpayers are registered at the Slovak Financial Directorate and the Slovak Companies Register. The supplies of transport services connected with imports or exports of goods into the EU from non-EU countries are more than 60% of total turnover,
- SET 2 Traffic companies II - taxpayers are registered at the Slovak Financial Directorate and the Slovak Companies Register. The supplies of transport services connected with Intra-EU acquisition of goods (goods are finally located after transport from another EU country) are more than 60% of total turnover,
- SET 3 Traffic companies III - taxpayers are registered at the Slovak Financial Directorate and the Slovak Companies Register. The supplies of transport services within a single EU country (the Slovak Republic) are more than 60% of total turnover.
As for timing, years 2005-2015 are analyzed in this study and standard mathematical and statistical methods were used for analyzing and comparing the partial indicators in the reporting period (arithmetic Average, base index).

Financial burden
The cause of this burden is the time period between the day of VAT tax return submission to the Financial Directorate by electronic means (this is the day of taxpayer’s entitlement to excessive deduction) and between the validity day (day, when the taxpayer receives payment to his bank account from the Financial Directorate).

Indicator “value of money I” = principal x interest rate of ECB x average loan term /365
Principal... average amount of excessive deduction of traffic companies
Average loan term... time period during which the traffic companies as lenders lend money to the state budget (state is the borrower in this case)
365... number of days in a year

Indicator “value of money II” = principal x average commercial interest rate x average loan term /365
Principal... average amount of excessive deduction of traffic companies
Average loan term... time period during which the traffic companies as lenders lend money to the state budget (state is the borrower in this case)
365... number of days in a year

A methodological approach was used in our research using the following criteria:

1. Definition of the criteria for set I, set II, set III of taxpayers (traffic companies),
2. Data were obtained from VAT tax returns. Tax period applicable to a taxpayer is a calendar month. Tax return shall be submitted within 25 days of the end of each tax period by each taxpayer,
3. 95% of taxpayers used to submit their tax return on the very last day or on the day before the last day of this obligation. Following this, taxpayers submit the tax return on 25th or 24th, after the end of the tax period,
4. The day when a taxpayer is entitled to an excess deduction and the day of its returning to the taxpayer’s bank account is a period of 80-85 days. The period of 83 days (hereinafter only "the period") is considered in the analysis,
5. The Period and Excess Deduction are the most significant factors which influence the extent of impact of VAT to taxpayers’ cash flows,
6. An important factor is also the interest rate of ECB.

Results and Discussion
The scope of VAT influence on Cash Flows depends mainly on two impact factors. The first one is the time limit for the excess deduction refund to the taxpayer bank account. The second impact factor is the amount of excessive deduction expressed through money. If the taxpayer cannot deduct excessive deduction from his own tax obligation in the following taxation period, the tax office shall return the non-deducted excessive deduction or its non-deducted part no later than 30 days after filing the tax return for the taxation period following the taxation period, in which the excessive deduction was created. In approximately 90% of submissions, tax returns are submitted within 23 - 25 days of the end of each tax period by each taxpayer. The period of 83 days can be considered to be the most frequent period and also the average period. The extension of excessive deduction is created as the difference between the right to deduct the tax on goods or service (§49 to §54 Act No. 222/2004 Coll. on Value Added Tax, as amended) and obligation to pay VAT from taxable transactions (tax liability for the supplied goods and services) (§8 to §9 Act No. 222/2004 Coll. on Value Added Tax as amended). Monetization of the time period between the days of VAT tax return submission to the Financial Directorate by electronic means and between the validity day is considered in this study as the indicator “value of money.” This indicator represents the percentage of money which the taxpayer will have in case that he has them immediately after he becomes entitled to an excess deduction, and he lends them to the bank, having an interest in this financial operation. In addition, the majority of companies borrow money from financial institutions and pay interest to them. From this point of view, we can consider the indicator “value of money” to be an indirect cost of the company. The evaluating of the results expressed by the indicators “value of money I” and “value of money II” should also take
into account the following facts. The average commercial bank interest rate in this study is the average interest rate of loans with validity not longer than one year which were provided by financial institutions to commercial companies (not to households and also not to other financial institutions).

<table>
<thead>
<tr>
<th>Year</th>
<th>IR ECB</th>
<th>IR CB</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>3.00</td>
<td>6.15</td>
</tr>
<tr>
<td>2006</td>
<td>4.75</td>
<td>4.58</td>
</tr>
<tr>
<td>2007</td>
<td>4.25</td>
<td>5.96</td>
</tr>
<tr>
<td>2008</td>
<td>2.50</td>
<td>5.76</td>
</tr>
<tr>
<td>2009</td>
<td>1.75</td>
<td>3.54</td>
</tr>
<tr>
<td>2010</td>
<td>1.75</td>
<td>3.89</td>
</tr>
<tr>
<td>2011</td>
<td>1.50</td>
<td>4.45</td>
</tr>
<tr>
<td>2012</td>
<td>0.50</td>
<td>4.10</td>
</tr>
<tr>
<td>2013</td>
<td>0.30</td>
<td>3.88</td>
</tr>
<tr>
<td>2014</td>
<td>0.30</td>
<td>3.78</td>
</tr>
<tr>
<td>2015</td>
<td>0.30</td>
<td>3.45</td>
</tr>
</tbody>
</table>

The average amount of excessive deduction in the analyzed period in traffic companies was between € 1,500 and € 6,500. The highest level of excessive deduction was at traffic companies in which supplies of transport services connected with the intra-EU acquisition of goods (goods are finally located after transport from another EU country (hereinafter only “SET II companies”) was more than 60% of total turnover. There was the interval of excessive deduction from € 5,187 to € 6,411. As Figure 1 shows, in comparison with the traffic companies in which the supplies of transport services connected with imports of goods into the EU from non-EU countries (hereinafter only “SET I companies”) are more than 60% of total turnover, the amount of excessive deduction is higher than in traffic companies in which the supplies of transport services connected with imports of goods into the EU from non-EU countries the interval of excessive deduction was from € 3,569 to € 4,158. As Figure 2 shows, comparing with the year 2005 (base year and the first day of the analyzed period) the most significant changes of excess deductions were in SET III companies, which is most probably a result of constant changes in fuel prices. This price is the most important part of costs of traffic companies. The amount of excessive deduction had a downward trend until year 2009, which was closely related to the economic crisis in the whole Europe. After year 2010, it had an upward trend because of the upward trend in all economic areas (e.g. turnover of companies) after conclusion of the economic crisis in the European countries.
The financial burden of traffic companies had an upward trend only during the first and second year of the analyzed period, as we can see from the Figure 3. Since 2006, the financial burden had a downward trend. This decrease was more significant until 2009 (the end of the financial crisis in European countries). After this year, the declining rate had moderated. This development results not only from declining interest rates of the European Central Bank, but also from an increase in economic growth and development in European countries, as was mentioned previously. The average monthly financial burden was € 18.71 for one company (as a taxpayer) per month. The lowest VAT financial burden was for “SET III companies” of € 10.63 per month. The development of commercial interest rates is similar to the development of interest rates of the European Central Bank. For this reason, the development of “Financial burden II” is similar to “Financial burden I,” as Figure 4 presents. Financial burden reached the minimum in all three sets of the analyzed traffic companies in 2009. This minimum is mainly the result of the turnover’s decrease in these companies and the decrease of excessive deductions amount, which are closely connected. “Financial burden II” is more realistic because the commercial interest rates are the rates which represent the value of money in a real business life. Interest on loans or mortgages as a cost directly affects the economic (profit or loss) results of companies. The average cost of each company in this point of view was € 41.06 in the analyzed period. In SET I companies, these costs ranged from € 28.73 to € 56.04. In SET II companies, these costs ranged from minimum € 41.75 in 2009 to a maximum €78.76 in 2006. In 2006, there was a good financial and economic situation and also high interest rates. In SET III companies these costs ranged from € 12.96 to € 33.84.
Figure 4: Excessive deduction financial burden development (average interest rates) in traffic companies

Source: Information system of Financial Directorate of Slovak Republic

Figure 5 and Figure 6 present development of interest cost per one calendar year which is caused by a time period between the days of VAT tax return submission to the Financial Directorate by electronic means and between the validity days. SET I companies had average costs of € 217.66. SET II companies had these average costs approximately 1/3 higher, i.e. € 328.14. SET III companies had the lowest cost caused by time changing. The costs were €127.59 in average.

Figure 5: Indicator “value of money I”(ECB) per year

Source: Information system of Financial Directorate of Slovak Republic

In the analyzed period, SET I companies had the average cost € 478.71. SET II companies had the average cost approximately 50% higher at about € 718.46 per year. SET III companies had the lowest financial burden per year of € 281.02.

Figure 6: Indicator “value of money II”(average interest rate) per year

Source: Authors
Conclusion
The main aim of this study is the evaluation and quantification of the impact of value added tax on the cash flows of road traffic companies. The authors have chosen three basic indicators: indicator “value of money I,” indicator: “value of money II” financial burden (base index). Data for analysis were gained from the information system of the Slovak Republic ISFS SR under the condition of anonymity. The analysis presented in this study confirms: time period between the day of VAT tax return submission to the Financial Directorate by electronic means (this is the day of taxpayer’s entitlement to excessive deduction) and between the validity day (the day when the taxpayer receives payment to his bank account from the Financial Directorate) is the cause of VAT financial burden. The measure of VAT influence on Cash Flows (not only of traffic companies but in general all types of companies) depends mainly on two impact factors. The first one is the length of excessive deduction payment period to taxpayer bank account and the second one is the amount of excessive deduction expressed through money.

References
INNOVATION PROJECT MACHINE IN A SYSTEMS APPROACH TO ENGINEERING MANAGEMENT

Iwona Lapunka,1 Dominika Jagoda-Sobalak,2 Katarzyna Marek-Kolodziej3

Abstract: In recent years, the project approach has become an increasingly popular tool for achieving operational and strategic goals and to generally advance the business activity of organizations in fields such as innovation management. We demonstrate the need of including the project approach in the processes of creating innovative solutions. We posit that these two work methods can be combined into a coherent approach known as the innovation project machine. As part of this approach, innovations are implemented and developed more effectively, while agile project management and consolidated research for project managers, amongst others, are the source of inspiration. A systems approach to this concept could constitute a coherent synthesis of solutions available for engineering management. A proposition to integrate the project approach with innovative processes will enable expedient execution of business strategies in contemporary companies.

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UDC Classification: 658.005.4

Keywords: innovation, project management, engineering management, market-pull innovation, user-driven innovation.

Introduction

The rapidly increasing participation of developing countries in the global production industry impels Western European economies to undertake steps aimed at improving the competitiveness of factories who have thus far been operating in local markets. Industry 4.0 (German: Industrie 4.0), a program initiated in Germany, and promoted in other countries, is meant to drive a fourth industrial revolution. Poland, together with other Central and Eastern European countries of considerable industrial traditions, are becoming competitive not only due to low work costs. An increasing number of modern factories are being built in these countries, which, owing to the employed technologies, enable a rapid development of business with substantial added value. In this respect, the global concept of engineering of the future is in line with the ideas and assumptions of the Industry 4.0 program - it evolves towards innovative, adaptive, and intelligent technologies and industrial processes.

The transformation of economic focus from production to market forced entrepreneurs to look for new ways of developing and maintaining their position in the market of goods and services. In industrial practice, we observe a systematic evolution of the fundamental sources of competitive advantage (cf. Table 1). Innovations in companies are directed at implementing changes that lead to an increase in the modernity and competitiveness of a company, its development, and in consequence, boosting its value.

Table 1: Evolution of fundamental sources of competitive advantage

<table>
<thead>
<tr>
<th>Period</th>
<th>Motivation</th>
<th>Advantage</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960s and 70s</td>
<td>cheaper production of goods and services</td>
<td>lower costs</td>
<td>work division, make-to-stock (MTS), mass production</td>
</tr>
<tr>
<td>1980s and 90s</td>
<td>better production of goods and services</td>
<td>higher quality and speed</td>
<td>lean production and management, just-in-time (JIT), flexible specialization</td>
</tr>
<tr>
<td>Post 2000</td>
<td>better goods and services, saving the environment</td>
<td>aesthetics, authenticity, sustained development</td>
<td>refined design, innovations, uniqueness, decreasing human impact on environment</td>
</tr>
</tbody>
</table>

Source: Burzyński (2008)

Innovation processes have become an inherent part of contemporary engineering management. Currently they constitute one of the foundations of managing technical functions, in particular: research, design, production, and in the strategic dimension in the areas of managing development projects, as well as production and services companies. This managing is carried out in the context of

1 Opole University of Technology, Faculty of Production Engineering and Logistics, i.lapunka@po.opole.pl
2 Opole University of Technology, Faculty of Production Engineering and Logistics, d.jagoda@po.opole.pl
3 Opole University of Technology, Faculty of Production Engineering and Logistics, k.marek-kolodziej@po.opole.pl
fierce market competition, high technology and under the conditions of rapid changes to production and operation techniques. The approach to innovations and the means of creating them in companies undergo continual changes too. These changes are a direct consequence of the arrival of new concepts and methods that tackle the creation of innovations in an increasingly comprehensive manner, especially at the level of production and in services companies. Contemporary processes of creating and implementing innovations require appropriate competences and knowledge founded on project management principles (Karbowiak, 2005; Kisielnicki, 2013).

**Engineering management paradigm in contemporary science**

Engineering (Latin: *ingenium*, i.e., inventiveness) defined as ‘broadly understood theory and practice of cognition, as well as deliberate influence and control over a process or system’ (Słowiński, 2009) reflects the contemporary development of directions of production. It is concomitant of a particular way of thinking oriented at streamlining processes that can result in a new product or a process closer to ideal than its predecessor. Its aim is to integrate information resources, design, production and control processes, transportation, and storage processes into a unified, comprehensively managed manufacturing process (Komitet Inżynierii Produkcji PAN, 2010). In this respect, a key role is played by engineering management, often identified with production management or managing a production workshop or plant. However, under the conditions of modern manufacturing technique, engineering management is usually understood as (Durlik, 1996):

- managing technical functions, such as: research, design, production (present in every company in which modern technologies are employed),
- managing more broadly understood functions, such as: marketing, manufacturing goods and services, distribution and trading, as well as managing development projects and manufacturing companies at higher levels, when the managing is carried out in the context of market competition, high technology and under the conditions of rapid changes to production and operation techniques.

Theoretical foundations of engineering management can be found in the school of scientific work organization (1890s-1930s), commonly known as scientific management or Taylorism, after its founder. Its aim was to find the best method to accomplish any task as well as to select, train, and motivate workers. Representatives of this trend include Frederick W. Taylor, Henry L. Gantt, Karol Adamiecki, and Frank and Lillian Gilbreth (Koźmiński and Piotrowski, 1998).

At the turn of the 19th and 20th centuries, in researching and optimizing workers’ productivity, Taylor noticed that every piece of work can be divided and subdivided into smaller elements, down to individual movements. In 1903 Gantt worked out a method for graphically representing many different activities performed over different times, comprising a complex enterprise. In 1896 a method similar to the Gantt chart was presented by Adamiecki, a Polish founder of the science of organization and management, and the inventor of chronoanalysis.

Scientific management has introduced scientific approaches for solving operational problems into industrial engineering. Over the years, the assortment of available technologies has increased, and simultaneously new trends in the science of organization and management have developed. Industrial engineering has become increasingly focused on process, defined as an organized sequence of human activities transforming resources into goods and services, abstracted to a degree, from the facet of physical and chemical detail. Gradually, a new dimension of engineering has entered the picture – production for profit. The product of industrial execution processes, resulting from technical thinking, is not manufactured for its own sake. Rather, it is the outcome of specific market expectations, incurred costs, fierce competition, and other economic factors playing part in the transformation of an idea into a product and selling it.

At present, a noticeable market trend is end-to-end product management, i.e., generating the requirements for a new product from the stages of design and test production, through market introduction and distribution, to withdrawing the product from the market and replacing it with a new version or a new product. This demonstrates the need for radical market transformations and innovative changes towards the integration of the processes of creating innovation and managing projects.
Particulars of executing innovation projects

Projects have become the main driving force of social development. Today, the methods for conducting projects used and disseminated by various organizations are mostly based on collections of good practices. Innovation projects have a special place among all enterprises. Companies perceive them as an opportunity to increase their competitive advantage, whereas the European Union has designated them to be the central theme of Horizon 2020, a program for financing research and innovation. Considering the specificity of innovation, the turbulent contemporary environment and the high risk of failure of innovation projects, it was recognized that the current, classical approach to managing innovation projects is insufficient (Spalek, 2016).

According to some authors the recent focus of science on human capital is also based on assumptions resulting from best practices, and therefore it should not be expected to significantly improve project processes. B. Lent sees the role of feedback as a basis for conducting projects, which could become the foundation of theoretical studies (Lent, 2012). The understanding of rules and mechanisms of feedback should lead to an expected significant increase in the effectiveness of executed projects. His rationalist theory is based on Wiener’s (1961) and von Foerster’s (1974) systems cybernetics, which Lent augments with the third degree cybernetic feedback in the project manager’s decision process.

Modern approaches to project management (agile, soft, and lightweight methodologies) (Wirkus et al., 2014) elaborated over the last two decades, constitute a group of alternative approaches to conducting IT projects. These approaches are increasingly applied to managing other types of projects, and innovation projects in particular. To a large extent, these approaches are based on adaptive, agile, and lean management, progressing towards a unified, strategic framework of AgiLean PM projects (Demir, 2013). Somewhat paradoxically, in innovation project management there exists a strong need for employing routine actions alongside new competencies (Czakon, 2012).

Project approach as support for creating market-pull innovations

New trends in innovativeness pertain both to creating goods and services (research and development – R&D, user-driven innovation), and to the changes within the structure of a company (organizational and marketing innovation). New forms of innovation (non-technological, user-driven, open, and social) require business entities to display new skills as well as to conduct an active policy that will stimulate the creation of such innovations in companies (Szymańska, 2012).

Particularly worth noting are the benefits of user-driven innovation (UDI). Progressing globalization processes have a direct impact on the increasing importance of consumers, understood not only as purchasers, but also as co-creators of goods and services. As a result, production and services are better suited to the expectations of the end user, while at the same time the costs of innovation are reduced. UDI is a method of implementing innovation focused on creating new ideas and solutions based on consumers’ knowledge and needs. In other methods of implementing innovation, the consumers’ knowledge is used mainly to assess existing solutions.

User-driven innovation is based on a more thorough understanding of both the explicit and implicit needs of consumers, their expectations and requirements. It consists in acquiring and using information, ideas and ready-made solutions proposed by consumers. User-driven innovation is poised to become the second pillar of programs supporting innovative businesses, alongside technological innovation. In general, there are two main perspectives on user-driven innovation: the voice of the customer perspective, and the lead-user innovation perspective (cf. Table 2). These two ‘schools of thought’ are borne out of the academic research and practical experiences of David Kelley, Tim Brown and Eric von Hippel (among many others) (Nordic Council of Ministers, 2006).

It is assumed that the business activity of companies in the scope of R&D, with active cooperation on the part of consumers (user-driven innovation), can be treated as a specific innovation project serving the effective execution of strategic business goals of a company. Initiated in the scope of R&D, gradually laid out and expanded in terms of results, such a project requires project-oriented management. The management model for R&D processes is reflected in project management methodologies. Classical methodological approaches reflect the philosophy and organization of project processes in the form of waterfall models, driven by the principle ‘plan first to avoid change’. In the waterfall model, it is assumed that precisely defined stages follow in succession, always in the same order. In R&D processes, this is possible when actions are executed in the scope of fundamental and
applied research. The strategy of implementing solutions within such a model is currently termed market-pull strategy.

Table 2: Comparison between traditional and user-driven approach to innovation

<table>
<thead>
<tr>
<th>Aim of the process</th>
<th>‘Traditional’ product development and marketing methods</th>
<th>User-driven innovation methods</th>
<th>Lead-user methods</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Identify consumer needs</td>
<td><strong>Voice of the customer</strong> (design thinking) methods</td>
<td><strong>Lead-user methods</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Identify consumer needs</td>
<td>Identify solutions</td>
</tr>
<tr>
<td>Where innovation takes place</td>
<td>In the company (asking consumers what they need)</td>
<td>In the company (often with external/consulting support)</td>
<td>Outside of the company</td>
</tr>
<tr>
<td>Method/process</td>
<td>- segmentation, statistics and surveys, prototypes, test groups</td>
<td><strong>Product-focused observation</strong> (discovering consumers identified and latent needs), brainstorming to define consumer needs, multiple alternative prototypes/solutions, reiterative testing and implementation</td>
<td><strong>Strategic usage</strong> organizations work in new ways: deliver new experiences for their customers and employees, while developing the infrastructure and capabilities needed to grow and sustain a culture of innovation</td>
</tr>
<tr>
<td>Case examples</td>
<td>P&amp;G, HP</td>
<td>Intel, Electrolux</td>
<td>Adidas, Lego</td>
</tr>
<tr>
<td>Comment</td>
<td>- higher innovation ‘hit rate’ - faster and less expensive than traditional innovation methods (although not yet ‘scientifically’ proven), - (strategic usage) requires new skill sets, shifts in resources and investment in organizational changes</td>
<td>- high innovation ‘hit rate’ (as commercializing solutions developed by lead users themselves), - fast and inexpensive innovation process, - requires investment in identifying lead users in own and related customer bases, - ‘democratizing innovation’ means that the company partner with users and needs to accept relinquishing control</td>
<td></td>
</tr>
</tbody>
</table>

Source: Authors

Developmental works, on the other hand, based on information processing so as to adjust the developmental process to the changing environment (e.g., target market for developed goods and services), necessitate an agile and adaptive approach to management. They are driven by a different principle – ‘implement incrementally to manage change.’ Efficiency, flexibility and rapid pace are among the most significant features of the agile approach to user-driven innovation (Abbas, Gravell, Wills, 2008). These result from self-organization, adaptability, radical shortening of the development cycle, the introduction of control events ensuring the high incidence of customer or end user feedback, as well as other elements comprising the internal and external project environment.

The unpredictable and unique nature of innovation projects in R&D is a consequence of the market-pull strategy. Innovation projects are characterized by an element of uncertainty as to the course of the project and thus to its future result. As a general rule, at the outset of such projects, only the general aim is known, while the exact course of action is adjusted on the fly, in close cooperation with users/consumers.

**Innovation project machine in a systems approach to engineering management**

Popular innovation management models generally operate according to a similar formula: strategy-creativity-execution. The innovation process itself is typically analyzed along three dimensions: inspiration, ideation, and implementation. The latter two can be compared to two major stages of project management, i.e., planning and execution. In the project approach, ideation as a process of forming and developing new ideas concerns initiating, defining, and planning innovation projects. Implementation, in turn, involves the execution of projects. Therefore, a fundamental question that we
ask here is: why should the methods of working with ideation and implementation in innovation process be any different from the methods for enabling efficient project execution? Arguments presented in this article indicate that these two work methods can be integrated into a coherent approach, termed an innovation project machine (Vedsmand, 2013). Within the scope of this approach, innovations are implemented more effectively, while inspiration is drawn, among others, from agile project management methods and established knowledge for project managers. Innovation project machine proposes a coherent synthesis of solutions available as part of engineering management for processes, projects and innovation (cf. Figure 1).

Figure 1: Engineering management for processes, projects and innovation

Source: Authors

Figure 2: Traditional approach to innovating and project management

Source: elaboration based on Vedsmand (2013)

Project managers responsible for generating ideas often approach this project stage somewhat condescendingly, and as a result their true engagement materializes too late. Despite generating many attractive ideas inspired by creative processes, as a general rule, ideas that lack specified execution models and/or clearly defined vision are rejected. The majority of managers, even the experienced ones, are reluctant to undertake challenges that carry a significant risk. Poor acceptance for generated ideas is one of many problems faced by the traditional approach to innovating (cf. Figure 2). Moreover, compared with other stages in a project lifecycle, such activities are not given sufficiently high priority. Similar observations apply to innovation projects, which in general are less prone to be selected for execution compared with other projects. In this respect, lower risk and established managerial know-how significantly increase the chances of success. Without doubt, the roles of the
innovator and that of a project manager have to be distinguished here, as in a traditional approach, their competences do not overlap.

Innovation projects stand out mostly due to the nature of creating and developing ideas. They cannot directly enter the first or second phase of a stage-gate process, since their end result is often underspecified, and the initial concept itself requires incubation. Innovation projects are hard to assess through standard criteria, such as time-to-market or fitness to strategy. This fuels the negative perception and reluctance of companies to engage in innovative activities. Still, the introduction of innovation through a project has the potential to cause significant changes to a company and its market position. Traditional approaches to innovating and project management, presented in Fig. 2, are two separate branches of idea development. Each of them is in a way responsible for obtaining suboptimal results, despite their strong points in terms of, respectively, creating or executing innovative solutions. Streamlining the innovation process does not necessarily involve designing completely new formulas. It is possible to re-use the solutions that are employed and perform well in project execution. Rather, it is the tools and methods for aiding creative processes that require integration with project processes, so as to comprise a coherent system which will play a pivotal role in increasing the effectiveness of conducting innovation projects. The concept realized through such integration was proposed by Vedsmand and is termed innovation project machine (cf. Figure 3).

Figure 3: New innovation process integrating the best practices of creating innovation and project management

Summary
Engineering management as a dynamic field develops by adjusting to the needs of economy and continually strives to improve organizational processes and increase production efficacy. Over the last years, the shift in economic orientation from production to market-based forced entrepreneurs to seek new methods of development and to stay afloat on the market of goods and services. Increasing uncertainty due to rapid changes necessitated the creation and implementation of new approaches to organizing processes and production systems in almost every branch of industry. An appropriate reaction to the dynamic needs of economy is a sign of the modern times. In the 21st Century, the concept of innovation project management has gained particular importance in the face of the challenges faced by contemporary organizations. Traditional management methods oriented at the harmonization of simple and unrepeatable activities turn out to be insufficient for continually changing situations; however, they offer stability. Management focused on simple and repeatable activities gives way to complex and unrepeatable management, carried out in a turbulent world (Kisielnicki, 2013).
Innovation has become one of the major elements of knowledge-based economy and keeps acquiring strategic importance in the context of generating economic growth, which translates into social prosperity. Up to a quarter of a century ago, Drucker already stated that ‘a company unable to create innovation dies’ (Drucker, 1990). According to experts, due to the increasing pressure of competition in the modern world, the ability to create innovation becomes one of the key factors determining the developmental potential of companies. Customers and consumers increasingly often take part in creating innovation. The most modern of currently known innovation implementation methods, oriented at creating innovative solutions based on consumers’ needs, is user-driven innovation or UDI. Simultaneously, the need to include the project approach in the creation of innovative solutions is acknowledged.

The evolution of innovation project management practices indicates the need to redefine numerous areas of the project approach, to adapt to transformations in the environment, and to shift in the direction of project-based and knowledge-based organizations. Eschewing traditional management concepts for their project-oriented counterparts, while taking into account lean and agile strategies; noticing the opportunities and risks of undertaken projects; feedback in the decision processes; developing soft aspects, such as: a proper conglomeration of competences of project teams, high intellectual capital, precise communication, and project knowledge management – all constitute current trends in innovation project management.

The concept of innovation project management presented in the article paves the way for future studies and could inspire a more in-depth exploration of the presented issues and attempts to fill research gaps in the proposition of systems approach to engineering management of processes, projects, and innovations. The continued search for sources, obstacles and processes related to including innovation creation in project management is an essential element of developing new principles in systems engineering management.

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PERFORMANCE EVALUATION IN KOSOVO ORGANIZATIONS
Thëllëza Latifi Sadrija

Abstract: The performance means the behavior and the resultant measured based on certain activities and duties. Enterprises performance could be measured thanks to indicators that express the quality of its activities. While, for individuals and groups, it is hard to identify the link between their performance and that of the company. Performance evaluation is an instrument through which the employees within the organization can reflect, discuss and change their work method that influences the organizational effectiveness. The focus of this paper is to argue that effective performance, feedback, and employee training are necessary for the success of an organization, and at the same time the development plan to support the employees in achieving the best possible results is necessary too. The employees’ training in Kosovo’s enterprises is closely related to the organization, and the planning of employees in a way to so they are prepared at a national level and the attempt to exchange employees and train them in international level. This would affect the effective performance and cultures exchanged.

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UDC Classification: 659
Keywords: performance, enterprise, culture, evaluation, effectiveness.

Introduction
Taking into consideration the fact that employees are the most important assets in an organization and the organizations’ effectivity is based on the work and the capabilities of its employees to realize organizational objectives, motivation, and an employee’s evaluation are the most important factors to achieve the aims of the organization. Performance management is a process focused on the employees in a way to contribute to achieving the objectives of the organization. This is necessary for every organization. In fact, performance management includes different types of systems.

The system of performance management is one of the management performance forms. Supervisors and managers are responsible for managing the performance of their employees. Any organizational policy should specify how it will be implemented in the performance management systems. The organizations should adapt their performance management practices, which are in accordance with the requirements of these policies to better fit the nature of the work and mission of the organization.

Of all the activities of human resources management, performance evaluation is the most argumentative, the more voluminous and the least popular method considered by the people who are involved in it. However, despite the impression on the evaluation within the organization is not highly appreciated this must be part of the organization management including some basic rules through which the performance is measured, monitored and controlled.

The aim of the paper: the aim of this paper consists of analyzing methods and practices used in Kosovo organizations to improve their performance, and whether or not the organization applies mechanism like employee training and staff rewards.

Basic hypothesis: to evaluate the performance, motivation methods are used like training and staff rewards.

Research question 1: Are the employees in Kosovo businesses rewarded?

Research question 2: do the organizations use motivating methods like staff rewards and training?

The objective of the study:
The creation of a questionnaire with private businesses in the city of Peja, in a way to show what are the problems that these organizations are facing with HRM. Analysing the qualitative and statistical information. Presenting the conclusions based on the results of the questionnaire that is created, that deals with training and rewards of employees.

Literature review
Human resources are considered to be the most valued asset of the organization. But, only a few organizations use their full human potential in their organizations. The system and human resource

1 University Haxhi Zeka Peja/Kosovo, thelleza.latifi@unhz.eu
practices are defined as a set of activities, functions, and processes that are connected to each other and directed to attract, develop and retain the human resources and the group. An important issue of human resources management is the idea that an appropriate combination of human resources policies and the implementation of the same are necessary to achieve a high performance (Wright & Boswell, 2002).

Performance management is a process that contributes to the effective management of individuals and teams in ways to achieve a high level of organizational performance. As such, it sets equal understanding of what needs to be achieved and an approach in guiding and developing people that will ensure its achievement (Armstrong & Baron, 2004).

Performance management is a systematic approach to improve individual performance and team performance in order to achieve organizational goals…..the approach one should take depends on their organization, its culture, relationship with employees and the types of jobs they do (Hendry et al., 1997).

Performance evaluation - making employees know exactly what is required from them in order to improve their performance or change their behavior and it also helps them to stay focused

Periodic feedback helps employees to self-correct continuously and give them a feeling of control in the results of their performance. The ability to make changes and improve their performance leads to employee motivation and helps them to renew their efforts. Human resource managers who use the objective and scientific performance measures are most able to motivate their employees better.

The employees’ evaluation consists of different forms of evaluation: when employees are evaluated based on the work they do and are trained for additional advancements, where they are rewarded in monetary form when they are motivated by acknowledgments and rotational position, through which the organization determines the value and express their qualities.

The evaluation of the employees is a process that happens continuously within organizations consciously or not. When we appreciate something, we try to determine the value, usefulness, and the qualities (Koli & Llaci, 2001)

Businesses have the advantage to decide the culture and organizational environment for their employees. If we talk about models that explain the connection between managers and employees for Kosovo organizations we are based on the critical-evaluation model of personnel manager (Legge, 1987).

Human resources managers very often behave according to a profitability view and the efficiency of the organization. Based on this view/model the businesses should not focus on the welfare of employees. Human resources managers do not deal with the individual development of employees. All activities of training and development are realized with the aim to improve the affectivity of employees with the aim to contribute more to the organization.

**Methodology used:**

The present paper is divided into two parts: the theoretical part and the empirical part. In the theoretical it part includes all the aspects that are related to human resources and performance evaluation as important factors that influence business effectiveness. The theoretical interpretation of this part explains the relation and the treatment of employees in an organization as a most valuable asset.

The empirical part includes the research that is realized through the questionnaire, the hypothesis is tested, and the interpretation of results is done. For the realization of the research, we are based in primary data. The questionnaire is distributed in private businesses, respectively their employees in the city of Peja in different departments. 280 questionnaires are distributed, and only 200 of them are valid for further analysis.

**Registration of businesses by ownership structure:**
Table 1: Ownership structure of enterprises

<table>
<thead>
<tr>
<th>Ownership structure</th>
<th>Number of businesses</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual Business</td>
<td>6613</td>
<td>92.83%</td>
</tr>
<tr>
<td>General Partnership</td>
<td>196</td>
<td>2.75%</td>
</tr>
<tr>
<td>Limited Partnership</td>
<td>5</td>
<td>0.07%</td>
</tr>
<tr>
<td>Limited Liability Company</td>
<td>291</td>
<td>4.08%</td>
</tr>
<tr>
<td>Joint Stock Company</td>
<td>8</td>
<td>0.11%</td>
</tr>
<tr>
<td>Enterprises in Foreign Ownership</td>
<td>10</td>
<td>0.14%</td>
</tr>
<tr>
<td>Social Enterprises</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Public Enterprises</td>
<td>1</td>
<td>0.01%</td>
</tr>
<tr>
<td>Agricultural Cooperative</td>
<td>1</td>
<td>0.01%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>7125</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Source: Municipal center for business registration in Peja/Kosovo (MCBR)

Table 2: Type of activities

<table>
<thead>
<tr>
<th>Type of activity</th>
<th>Number of businesses</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trade</td>
<td>3050</td>
<td>42.80%</td>
</tr>
<tr>
<td>Services</td>
<td>1884</td>
<td>26.40%</td>
</tr>
<tr>
<td>Production</td>
<td>984</td>
<td>13.90%</td>
</tr>
<tr>
<td>Construction</td>
<td>317</td>
<td>4.40%</td>
</tr>
<tr>
<td>Hotels and restaurants</td>
<td>890</td>
<td>12.50%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>7125</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Source: Municipal center for business registration in Peja/Kosovo (MCBR)

The research is focused on service and production businesses in the city of Peja. The results will be drawn from the responses of managers of those companies surveyed and based on these results every question is interpreted while also the labor market and employees’ requests are analyzed.

Figure 1: Has your business an evaluation system

To the question: “Has your business an evaluation system?” Based on Figure 1 about 75% of managers have a positive answer result with effectiveness as an important information and necessary for the function, the possibility to express to the employer what they expect to achieve and as well as a general understanding of organizational culture.
To the question: “which form of evaluation you apply”, from a total of 200 managers 100 of them answered that the businesses apply the method “wage based on performance” of evaluation performance, where the effectiveness is that they pay the employees based on merit, incentive wages that increase motivation, rewards, share splits.

To the question: “what kind of reward your company applies,” 92.5% of the answers of managers are a non-monetary reward. In fact, these kinds of rewards influence employee performances, either through intangible benefits of values such as career, social services such as job security, flexible work hours, professional growth, acknowledgments and strong friendship.

To the fourth question, 65% of managers declare that reward incentives influence the productivity growth, 30% of them declare that it influences less, and 5% of them abstained to this question.
To the fifth question, 65% of managers declare that reward incentives influence the productivity growth, 30% of them declare that it influence less, and 5% of them abstained to this question.

According to the statistics presented for the above question, 80% of managers declare that the department of HRM for training activities exists in their businesses and represent an important development factor.

Is the training of the staff a method for strategy implementation?
To this question, 50% of managers have answered positively, and the other part does not support the training of the staff as a part of the strategy.

**Figure 8: Are retrained employees evaluated and do they participate in the decision-making process?**

<table>
<thead>
<tr>
<th>Are evaluated</th>
<th>Are not evaluated</th>
<th>Are included in decision making process</th>
<th>Are not included in decision making process</th>
</tr>
</thead>
<tbody>
<tr>
<td>200</td>
<td>120</td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>60</td>
<td>125</td>
<td>25</td>
<td>35</td>
</tr>
</tbody>
</table>

**Source:** Author

To this question if the trained staff is evaluated and if they participate in the decision-making process the results are that they are evaluated but are not included in the decision-making process.

**Figure 9: If you train your employees do you think that these employees will leave the organization?**

<table>
<thead>
<tr>
<th>Sample</th>
<th>Nr. of answers</th>
<th>Total %</th>
</tr>
</thead>
<tbody>
<tr>
<td>200</td>
<td>160</td>
<td>80</td>
</tr>
<tr>
<td>200</td>
<td>30</td>
<td>15</td>
</tr>
<tr>
<td>200</td>
<td>10</td>
<td>5</td>
</tr>
</tbody>
</table>

**Source:** Author

To this question if the trained employees will leave the organization 80% of managers declare positively.

**Conclusion:**

The success of the organization is related to employee training. Here are included the job satisfaction and employee motivation that try to give the best of them for the consumers, and in this way, they achieve success for their owners or shareholders. Through this two objectives are achieved: the objective of the organization and the objective of the employees.

We can certainly say that in Kosovo the application of the modern concept of the motivation of human resources, as is done in Western countries, is the far way in our organizations.

The political and economic instability (wage differences in Kosovo is much lower with respect to other European countries) that exists in Kosovo has created a disadvantage that directly affects the fact that motivation is a very important factor for increasing the performance, the application of a more reward system in the form of cash a reward since our country is facing the problem of low salaries.

Another conclusion, based on the statistics is that employees are evaluated, but they do not take part in the decision-making process. This must be changed, and the employees must have the right to give
their ideas in a way to have more innovations within organizations. Develop a training culture where all the specialized and not specialized employees can participate

_We can conclude that the rewards based on performance motivate and guarantees the success of the company_

**References**


COACHING TRENDS IN ROMANIA

Lorena Florentina Popescul, Loredana Jitaru

Abstract: The purpose of this study is to determine the future coaching trends in the Romanian market in the short, medium, and long term. We conducted a qualitative analysis where we administered a semi-structured, in-depth interview with 10 coaches asking them to share their opinions about the incoming trends in the Romanian coaching market. We note that the answers provided by coaches indicate a strong tendency for future growth in coaching; the public’s awareness of this topic is estimated to increase, especially because most organizations will realize that they can no longer cope with the new waves of change in the markets and in people’s behavior. This study can benefit experts interested in the current state of coaching, as well as decision-makers who seek to implement coaching in their organizations or in their personal lives. This work highlights valuable results that can act as starting points for additional research. This type of study is rare in Romania, and hence, this present study is important for understanding the impact of coaching trends in the Romanian market in the short, medium, and long term.

JEL Classification Numbers: L25, L84, M19; DOI: http://dx.doi.org/10.12955/cbup.v5.938

Keyword: Coaching, Trends, Romania, Qualitative research, in-depth interview.

Introduction

Coaching was introduced into Romania in the 2000s in a market that, in the beginning, was slightly apprehensive and distrustful of the results that this process might offer to individuals and organizations. It failed to gain momentum quickly in Romania. Only after the establishment of new foreign capital companies were Romanians introduced to coaching, and they began to view it as a process that helped people to understand and to grow and develop themselves either personally or professionally. Botton (2004) considered that in our meritocratic world, with prestigious and well-paid jobs being filled based on intelligence and personal skills alone, wealth is a sign of strength. Today, affluent people are not just wealthy, they are developed personally.

Often, both small and medium-sized enterprise employees and entrepreneurs realize they need a change in their lives. People seek coaching sessions because they wish to achieve that change. They want to surpass themselves, be better at what they do in their careers and in their personal lives, be richer from a spiritual point of view and wiser, or attain self-fulfillment. People might seek coaching sessions because they have continually ignored their need for self-fulfillment due to money, time, or family limitations. They may have neglected themselves, and this inevitably leads to a feeling of unease. As a result, many people start to develop states of anxiety, stress, fatigue, concentration disorders, panic, and excessive negative emotions.

Considering these notions, we have set out to determine the future trends of coaching in Romania.

Data and Methodology

The purpose of this study was to determine the future coaching trends in the Romanian market for the short, medium, and long term.

To achieve this objective, we conducted a qualitative analysis where we administered a semi-structured, in-depth interview with 10 coaches holding national and international certification, asking them to share their opinions about the incoming trends in the Romanian coaching market in the short, medium, and long term. These timeframes were 2017 - 2018, the next five years, and the next ten years, respectively. The interviewees were life and business coaches with more than three years of experience in the city of Iași, Romania. The interviews were conducted between September 25 and October 30, 2016. The duration of each interview was one hour. Subjects were asked three open questions and were allowed time to think about these and to give free and detailed answers.

The three questions of the interview guide were:“

References:

1  Alexandru Ioan Cuza University of Iași, Doctoral School of Economics and Business Administration, lorena.popescul@student.uaic.ro
2  Alexandru Ioan Cuza University of Iași, Doctoral School of Economics and Business Administration, jitaru_loredana10@yahoo.com
Results and Discussion

Table 1 summarizes the results of this study.

<table>
<thead>
<tr>
<th>Short term</th>
<th>Medium term</th>
<th>Long term</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The number of coaching schools in Romania will increase.</td>
<td>1. The public’s awareness of coaching will increase.</td>
<td>1. The vast majority of organizations will employ a coach to help the staff gain self-confidence, make decisions, innovate, and manage risks.</td>
</tr>
<tr>
<td>2. The number of certified coaching experts will increase.</td>
<td>2. The vast majority of organizations will realize that they can no longer cope with the new waves of change in the markets and in people’s behavior, so they will employ or contract various certified coaches, either internal or external.</td>
<td>2. The number of team coaches will increase.</td>
</tr>
<tr>
<td>3. The number of e-coaching sessions (coaching through digital means) – via telephone, Skype, e-mail, and chat – will increase compared to the face-to-face coaching sessions.</td>
<td>3. Organizations will send their employees to attend coaching sessions.</td>
<td>3. The number of organizational leaders that will attend a coaching course will increase.</td>
</tr>
<tr>
<td>4. The number of persons (natural persons or legal persons) interested in using coaching services will increase.</td>
<td>4. Coaching as a tool will be used more and more by people, both in their personal lives and in their professional lives.</td>
<td>4. The number of pseudo-coaches will increase.</td>
</tr>
<tr>
<td>5. Distance learning via webinars will gain momentum in Romania.</td>
<td>5. The number of training and continuing education courses for coaches will increase.</td>
<td>5. Organizations will learn to be more transparent and more open towards their staff, partners, and customers.</td>
</tr>
<tr>
<td>6. The number of online students will increase significantly.</td>
<td>6. Coaching will be promoted far more intensely.</td>
<td>6. The number of personal coaches will decrease, because companies will seek to have in-house coaches, to cut costs.</td>
</tr>
<tr>
<td>7. The number of educational Web sites will increase. Web sites will focus on creating and providing unique content that has value for their users.</td>
<td>7. There will be more life coaches for individuals interested in changing their life path, for dealing with health problems, for students, for couples, and for small businesses.</td>
<td>7. There will be more life coaches for individuals interested in changing their life path, for dealing with health problems, for students, for couples, and for small businesses.</td>
</tr>
<tr>
<td>8. Organizations will realize that they need to invest time, human resources and money into coaching programs.</td>
<td>8. The amount of innovation in organizations will increase.</td>
<td>8. The amount of innovation in organizations will increase.</td>
</tr>
<tr>
<td></td>
<td>9. People will learn to become independent and make decisions themselves.</td>
<td>9. People will learn to become independent and make decisions themselves.</td>
</tr>
<tr>
<td></td>
<td>10. Customer satisfaction will increase and so will sales because employees will approach customer problems from a coaching perspective.</td>
<td>10. Customer satisfaction will increase and so will sales because employees will approach customer problems from a coaching perspective.</td>
</tr>
<tr>
<td></td>
<td>11. Employee morale will improve because employees either will attend a coaching course or will have an in-house coach.</td>
<td>11. Employee morale will improve because employees either will attend a coaching course or will have an in-house coach.</td>
</tr>
<tr>
<td></td>
<td>12. The efficiency and effectiveness of coaching will be measured by organizations based on the number of innovations, the number of happy customers, and the number of new customers.</td>
<td>12. The efficiency and effectiveness of coaching will be measured by organizations based on the number of innovations, the number of happy customers, and the number of new customers.</td>
</tr>
<tr>
<td></td>
<td>13. Organizations will focus on creating a work environment based on learning, mutual trust, and personal development, which will offer the best employees the opportunities they need.</td>
<td>13. Organizations will focus on creating a work environment based on learning, mutual trust, and personal development, which will offer the best employees the opportunities they need.</td>
</tr>
</tbody>
</table>

Source: Authors
Concerning the answers almost every coach had a different opinion to the others. Therefore, their answers were unique, except for a few cases involving forecasts for the short term (1 - 2 years):

- The number of coaching schools in Romania will increase (five coaches out of 10),
- The number of e-coaching sessions will increase compared to the face-to-face coaching sessions (10 coaches out of 10), and
- Distance learning via webinars will gain momentum in Romania (five coaches out of 10).

With regard to the coaching trends for the medium term (3 - 5 years), 10 coaches out of 10 said that the public’s awareness of coaching would increase. The rest of the answers were unique.

Then, for long-term trends (5 - 10 years), seven coaches out of 10 said that the number of pseudo-coaches would increase, while 10 coaches out of 10 said that people would learn to become independent and make their own decisions. The rest of the answers were unique.

We note that the answers provided by the coaches indicate a strong tendency for future growth in coaching; the public’s awareness of this topic is estimated to increase, especially because most organizations will realize that they can no longer cope with the new waves of change in the markets and in people’s behavior. People need to become what they must be. Ignoring the need for self-fulfillment leads to anxiety (Bolchover, 2006). Leaders will want to change if they receive support and encouragement. This is the part that coaches will continue to play. Free market capitalism evolves into the knowledge-based economy. Leaders must learn more and more, but there is insufficient time for them to do that (Goldsmith, 2004).

Using Skype and other instant messaging services, coaching sessions can be conducted without the need for either party to travel. Therefore, webinars combined with online discussions can be an efficient way to exchange knowledge within organizations, thus allowing people to learn from one another.

For instance, intranet systems in organizations facilitate both learning and the development and improvement of organizational performance. This is because these systems can reflect knowledge coded in the shape of change and organizational initiatives aimed at helping employees accept and adapt to changes in a way that is compatible with their personal objectives and values (Goldsmith, 2004).

We noticed a certain concern among coaches regarding the increase in the number of pseudo-coaches in the Romanian market. One for this concern is that coaching has yet to consolidate in the market, hand this means that the potential clients could easily be confused about the meaning of coaching. This is true especially considering the existence of so-called coaches who do not hold the necessary certificates to work in this line of business, leading to a great deal of shortcomings in the field of coaching.

While the data in this study cannot be extrapolated, it can be used as a starting point for further research concerning coaching trends.

**Conclusion**

This study can benefit experts interested in the current state of coaching, as well as decision-makers who seek to implement coaching in their organizations or in their personal lives. This work highlights valuable results that can act as starting points for additional research. Furthermore, the findings indicate a constant interest in developing and individualizing coaching as a profession in its own right.

This type of study is rare in Romania and hence, the reason this current study is important for understanding the impact of coaching trends in the Romanian market in the short, medium, and long term.

**References**


DEOFFSHORIZATION POLICY: CASE OF RUSSIAN COMPANIES

Anna Loukianova, Egor Nikulin, Alexander Kanivetc

Abstract: This paper investigates the impact of deoffshorization on the market value of Russian companies. The methodology of event study was used. Three events were analyzed, including the announcement of intentions to leave offshore from several major companies and the introduction of anti-offshore legislation (December 2013 - March 2014). We have not revealed any mutually significant market response to the selected events, since some of the firms faced positive cumulative abnormal returns, while the others encountered negative ones. At the same time, an empirical study showed evidence of significant negative effect on the market value for several companies. It can be argued that the deoffshorization impact on companies depends to a large extent on the offshore structure they use. Companies that are significantly exposed to deoffshorization need to adjust their strategy in order to counter potential negative consequences of this process.

JEL Classification Numbers: M10, M40, M41, M48; DOI: http://dx.doi.org/10.12955/cbup.v5.939

Keywords: offshore, deoffshorization, deoffshorization policy, company valuation

Introduction

Offshores or as they are alternatively called tax havens, play an important role in today’s worldwide economy. It is presumed that companies, as well as individuals, use them in order to lower their taxable income. Such a phenomenon is known as tax avoidance. As a result, governments receive less taxes than expected. As Zucman (2015) points out, wealthy individuals hide an estimated $7.6 trillion in tax havens, that leads to an estimated annual loss in government tax revenue of $190 billion worldwide. Not surprisingly, state authorities of different countries have started to elaborate specific instruments in order to hinder the extent of offshorization. For example, General Anti-Avoidance Rules (GAAR) were enacted in the UK in 2012; financial transactions taxes have been developed in several European countries in 2012-2013, etc. Russia made no exception in this regard. The address of the President of the Russian Federation Vladimir Putin to the Federal Assembly of Russia on December 12th, 2013 ushered in the initial stage of state deoffshorization policy in the country.

Deoffshorization generally brings negative consequences for companies, since they lose benefits of offshores they used to enjoy and in addition to that are expected to incur a particular amount of costs. These economic effects can be classified as follows (Desai and Dharmapala, 2004). Firstly, companies lose the tax benefits granted by offshore zones. Secondly, they may incur significant nontax costs because of the necessity to restructure their operations. Finally, companies often have to relocate their business to a less attractive regulatory environment and consequently, take more risks.

The goal of the current paper is to assess and explain the effect of the announcement of the state deoffshorization policy, triggered by the Russian government in late 2013, as well as the consequent corporate decisions to deoffshorize on the market value of Russian companies. Such a task has certain practical implications. The change in share price at the time of announcement would reflect how investors estimate the net present value of all the deoffshorization effects described above. If the change is negative, then a company should develop a set of measures in order to counter the detrimental consequences of deoffshorization. In other words, a company should develop the strategy of how to switch from offshore jurisdiction to the national one as cheaply as possible and to remain competitive at the same time.

Theoretical background

The term “offshore,” as well as some other terms implying the same meaning (i.e. tax havens), are frequently used nowadays in academic as well as professional publications. In a nutshell, offshores are considered to be countries (or strictly speaking, legal units) that provide favorable economic conditions for businesses. One of the first attempts at classifying and analyzing offshores and offshore operations was provided in the reports conducted by several well-known international organizations in late 1990s – early 2000s. (see, e.g., OECD, 1998; IMF, 2000; FATF, 2000). For example, the report of the International Monetary Fund (IMF) distinguished between offshore finance and offshore financial center.

1 Graduate School of Management, Saint Petersburg University, anna.loukianova@gsom.pu.ru
2 Graduate School of Management, Saint Petersburg University, nikulin@gsom.pu.ru
3 Graduate School of Management, Saint Petersburg University, aleksandr.kanivetc@gmail.com
The term “offshore finance” was used in this report in a very broad meaning, encompassing all financial services provided to non-residents. Hence, the concept of offshore financial center that was also used in this report appeared to be somewhat vague, since it covered every financial center that provided offshore services.

Over the course of years, the concept of offshores has become more specific. For example, Kheyfets (2013) outlined the main criteria that needed to be met by legal units in order to be considered offshores:

1. Opportunities for significant tax and other expenses mitigation;
2. A favorable legal environment for establishing and running a business. This usually includes simplified administrative and financial control;
3. The possibility of anonymous financial transactions and concealing the final beneficiaries of such operations.

In other words, the concept of offshores or tax havens started to be used primarily with reference to the tax avoidance phenomenon. A lot of studies show that companies that have part of their operations in offshore are able to decrease their overall tax burden (Lee, 2017). Such an effect can be detrimental to governments all over the world, since they get less revenue than expected. Taking this into consideration, it seems quite feasible that a number of deoffshorization measures were initiated at the national as well as international levels.

The prominent wave of deoffshorization measures in the world was initiated in 2008 and can be attributed to the beginning of global economic crisis. One of the first steps was the classification of different offshore zones (under the three-coloured scale) by the Organisation for Economic Co-operation and Development (OECD, 2009). Subsequent measures included the enactment of the Foreign Account Tax Compliance Act (FATCA) in the USA in 2010; the establishment of an EU-wide tax avoidance countering system (Eurofics) in 2010, etc…

Deoffshorization policy in Russia

The issue of offshores for Russia was and remains significant. Kheyfets (2010) argued that the Russian economy was offshore to a large extent, since many Russian corporations were in fact controlled by holdings incorporated in offshore zones. Thus, the need for deoffshorization was feasible. According to (Glaz’ev, 2014), the purpose of deoffshorization in Russia could be treated in two ways: firstly, as the decrease of quantity of offshores used by Russian companies, and secondly, as the decrease of the flow of money and goods that come from Russia and into Russia through offshores.

The event that in our opinion has triggered the development of deoffshorization measures in Russia was the address of President Vladimir Putin to the Federal Assembly of the country on December 12th, 2013. In this address, he pointed out the existence of a big amount of losses to the federal budget caused by an excessive degree of offshorization of the Russian economy. He touched on the same issue in his address of the previous year however, according to his opinion, the results were hardly visible as of 2013. That’s why he suggested a set of measures targeted at deoffshorization. For instance, he proposed to cut off the Russian companies registered abroad from governmental support measures and to forbid them to participate in governmental purchase tenders (NewsKremlin.ru, 2013). He also emphasized the necessity for increasing the transparency of the Russian economy.

As a follow-up event, several Russian companies (RusHydro, UC RUSAL, Sovcomflot and KAMAZ) announced their intentions to deoffshorize on December 18th, 2013 (Infox.ru, 2013). RUSAL press-secretary Olga Sanarova declared that the company has already developed a plan of reorganizing financial and trade operations to shift to Russian jurisdiction. CEO of KAMAZ Sergey Kogogin announced that KAMAZ shareholders also supported the idea of restructuring. RusHydro planned to finish the elimination of its Cyprus subsidiaries by the end of 2014, according to vice-chairman of the company George Rizhinashvili.

As for the initial legislative measures of the deoffshorization policy, the draft of Controlled Foreign Entities Bill was proposed by the Ministry of Finance on March 18th, 2014. The importance of this bill is that it introduced the notion of a controlled foreign company. It is a company that simultaneously fulfills the following criteria (abridged):

1. It is not considered a tax resident of Russian Federation.
2. It is a tax resident of a country (jurisdiction), which is on the list of low-tax zones approved by Russian Ministry of Finance.
3. It is controlled by companies or individuals, who are tax residents of the Russian Federation.
4. Company shares are not publicly traded on stock exchanges approved by the Russian Ministry of Finance.

The Bill also introduced the concept of control. According to the document, a controlling company or individual was considered to be the one who had implicit or explicit ownership of more than 10% of the controlled foreign company. The main practical importance of the Bill was that it required controlled companies to report its profits in accordance with the Russian Tax Code. This initiative, without a doubt, targeted offshore subsidiaries of Russian companies used for profit accumulation and other aggressive tax avoidance measures.

Although the anti-offshore legislation in Russia continued to develop since then, in the current paper we focus only on the initial measures and events targeted to ensure deoffshorization in Russia (Loukianova, Kanivetc, 2014). In other words, we aim to identify the market’s reaction to the very first steps in the direction of deoffshorization in Russia. Such an approach would enable us to single out companies that are more exposed to the potential negative consequences of deoffshorization. We believe that the strategy of these companies should contain specific instruments tailored to counter these negative factors in order to maintain their enterprise value.

**Methodology**

For our research, we have chosen nine large Russian companies that, according to open sources of information, were involved in offshore schemes. Another criterion was the availability of free-trading stock. The final sample comprised the following companies: JSC Rushydro, JSC KAMAZ, JSC MTS, JSC NLMK, JSC Nornickel, JSC Gazprom, JSC Rosneft, Evraz Plc and UC RUSAL Plc.

An event study methodology was used. There were two types of events: reorganization announcements by the companies' officials and the governmental bodies' actions. The following three major deoffshorization-related events were selected for the study:

1. December 12th, 2013: V.V. Putin’s address to the Federal Assembly of the Russian Federation
2. December 18th, 2013: The declaration of intentions to deoffshorize by RusHydro, UC RUSAL, KAMAZ, etc.
3. March 18th, 2014: The introduction of the Controlled foreign companies (CFC) law by the Ministry of Finance.

One-day, two-day (from day 0 to day +1) and five-day (from day -2 to day +2) cumulative abnormal returns (CARs) around the announcement date (which is denoted day 0) were examined. We also introduce a 5-days gap between the two intervals to exclude any preliminary effects of the event, which could possibly influence the stock behavior in advance to the event itself and add bias to the estimation window. We introduce the following notation: \( T_0 \) is the first day of the estimation period, \( T_1=T_0+249 \) is the last day of the estimation period, \( T_2= T_1+5 \) is the first day of the event window, \( T_3 \) is the last day of the event window (see Figure 1).

**Figure 1: Timeline of empirical study**

<table>
<thead>
<tr>
<th>T0</th>
<th>T1</th>
<th>T2</th>
<th>Event date</th>
<th>T3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimation window (250 days)</td>
<td>Gap (5 days)</td>
<td>Event window</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Authors
Simple daily returns are constructed using the stock market data for the selected companies’ share prices in the period outlined above. First, usual daily returns are calculated as follows:

\[ R_{i,t} = \frac{P_{i,t} - P_{i,t-1}}{P_{i,t-1}} - 1, \]  

where \( P_{i,t} \) is the share price of \( i \)th company on day \( t \), \( i = 1, \ldots, 9 \), a number of companies in selection (here and further, unless noted otherwise).

Cumulative returns were computed according to the following formulae:

\[
\begin{align*}
1-day \text{ CAR}_i &= AR_{i,t} = R_{i,t} - ER_{i,t} \\
2-day \text{ CAR}_i &= \sum_{t=0}^{1} AR_{i,t} \\
5-day \text{ CAR}_i &= \sum_{t=2}^{4} AR_{i,t}.
\end{align*}
\]

Then the expected returns for the selected companies were constructed. Though Desai and Hines (2002) and Cloyd et al. (2003) propose using simple market daily returns as a proxy of expected return, we aimed to increase the precision of the results and therefore used the CAPM model:

\[ ER_{i,t} = r_f + \beta (R_{m,t} - r_f), \]

where \( ER_{i,t} \) is the expected return for the company \( i \), \( r_f \) is the risk-free rate of return, \( \beta \) is the beta-coefficient, and \( R_{m,t} \) is the market return.

\( R_{m,t} \) was taken as the market portfolio return according to the stock exchange residence of the company. For companies traded at the Moscow Stock exchange the proxy for market return was the MICEX index portfolio behaviour. For Evraz, which is traded at the London Stock exchange, the proxy was return on FTSE100, and for RUSAL (traded at Hong Kong Stock exchange) market return was taken as return on the Hang Seng index.

To obtain the quantitative form of equation (3), a regression of \( R_{i,t} \) on \( R_{m,t} \) was carried out for each company across the estimation period window (250 trading days) preceding the event date. The results are shown in Table 1.

<table>
<thead>
<tr>
<th>Company</th>
<th>RusHydro</th>
<th>Kamaz</th>
<th>MTS</th>
<th>Rosneft</th>
<th>NorNickel</th>
<th>Gazprom</th>
<th>NLMK</th>
<th>Evraz</th>
<th>Rusal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beta 12th Dec</td>
<td>1.10</td>
<td>1.18</td>
<td>0.70</td>
<td>0.76</td>
<td>1.02</td>
<td>1.26</td>
<td>1.32</td>
<td>1.58</td>
<td>1.23</td>
</tr>
<tr>
<td>Beta 18th Dec</td>
<td>1.09</td>
<td>1.17</td>
<td>0.71</td>
<td>0.75</td>
<td>0.99</td>
<td>1.27</td>
<td>1.32</td>
<td>1.59</td>
<td>1.24</td>
</tr>
<tr>
<td>Beta 18th Mar</td>
<td>1.09</td>
<td>1.17</td>
<td>0.75</td>
<td>0.81</td>
<td>1.02</td>
<td>1.27</td>
<td>1.32</td>
<td>1.61</td>
<td>1.24</td>
</tr>
</tbody>
</table>

Source: Authors

Finally, the possible biases from external events are taken into consideration by taking away the strings of data related to dividends and earnings announcements (based on companies’ press releases and business news, including financial calendars). Approximately 5-10 dates were excluded for each company from the estimation window.

Given the potential negative consequences to deoffshorization we expect that the market value of companies will react negatively to the deoffshorization announcements.

**Results**

Firstly, cumulative abnormal returns of companies were constructed for each event date and compared with each other to reveal, if present, similar direction of returns on stocks movements against the market portfolio. Secondly, a mutual significance of CARs was estimated based on the GRANK statistic.

Figure 2 shows the distribution of CARs by companies selected for the study for the 12th, 18th and 19th of December.

It was reasonable to expect mutual negative reactions at least for the majority of companies. However, no correlated behavior of the companies’ share prices against the market is observed, as some of the firms face positive CARs, while the others face negative ones.

At the same time, CARs are correlated within most companies for consequent days. One of the exceptions would be KAMAZ. We can see that this company has at first reacted positively to the announcement, but afterward had strong negative reaction to the events.
This effect can be attributed to the fact that not all companies’ values are subject to significant market response to the observations in Figures 2 and 3. Furthermore, the average behavior across the portfolio is positive (though insignificant) for all events. This effect can be attributed to the fact that not all companies’ values are subject to deoffshorization implications for the companies, we see no mutually negative (or positive) market response to the introduction of the initial version of the CFC law by the Russian Ministry of Finance. Here it would be reasonable to expect mutual negative behavior of the companies’ abnormal returns, with possible little negative change for KAMAZ, as the market may have already incorporated the expected loss into its share price in December. However, here we do not observe such effect, as only Norilsk Nickel and NLMK demonstrate negative abnormal returns over the selected timeframe. At the same time, Evraz and RUSAL have outstanding positive returns in comparison to the market portfolio. So far, the comparison of absolute values of cumulative abnormal returns does not allow for witnessing the presence of mutual negative (or positive) market responses to the deoffshorization events. To assess this statement statistically, we proceed to estimate the mutual t-statistics by using the GRANK approach. Unsurprisingly to the observations in Figures 2 and 3, but contradictory to the expectations highlighted in the theoretical explanation of deoffshorization implications for the companies, we see no mutually significant market response to the selected events (see Figure 4).
announcements and legislations introduced. Thus, positive or no market reaction for some companies blurs the overall picture for the portfolio.

![Figure 4: Mutual GRANK t-statistics of CARs across the selected events’ dates](image)

We believe that such a difference in results between companies can be attributed to the fact that they use different offshore schemes. That is why they are to a different extent sensitive to the state’s deoffshorization initiatives. This can be shown with the example of two companies: UC RUSAL and JSC KAMAZ.

UC RUSAL is almost fully owned through offshore-registered holdings and companies (RUSAL, 2014). Such a structure makes this company less sensitive to the CFC law. This fact may cause the absence of negative market reaction to the enactment of the initial version of this law on March 18th and 19th. If a company strives to maintain its offshore advantages, it needs to keep the existing offshore structure.

JSC KAMAZ possesses another ownership structure. Some of its owners are registered in Russia, while the other are registered in Cyprus (KAMAZ 2014; Lyapunov et al, 2014). Such a structure renders this company exposed to the deoffshorization policy of Russia, since the owners of this company face the issue of increased taxation. In order to restrain these negative effects, they should consider the following options. Firstly, they can leave the Russian tax residence. However, this option is not very likely, since a significant share of ownership of JSC KAMAZ belongs to the state. Another option could be the dispersion of the ownership of the Russian business across several offshore companies with a small stake in each.

**Conclusion**

The results of our study revealed that there was no universal market reaction to the three events that characterized the initial stage of the state deoffshorization policy in Russia: V.V. Putin’s address to the Federal Assembly of Russian Federation (December 12th, 2013); the declaration of intentions to deoffshorize by several large Russian companies (December 18th, 2013); the introduction of the Controlled Foreign companies (CFC) law by the Ministry of Finance (March 18th, 2014). Some companies faced positive cumulative abnormal returns, while others had negative ones. The difference in results can be attributed to the fact that companies used different offshore schemes that make them more or less sensitive to the state’s deoffshorization measures. The implications of the empirical analysis are that companies should analyze whether their structure is dependent on the state’s deoffshorization policy and if it is, to develop a set of measures in order to mitigate these negative factors.

We believe that the findings of our research are not limited to the companies considered in our sample. Indeed, they can be applied to different companies in Russia that are engaged in offshore operations and serve a useful tool for the development of strategies against the potential negative consequences of deoffshorization.

**References**


MEDICAL TOURISM POTENTIAL OF CENTRAL AND EASTERN EUROPE: ATTEMPT AT CLASSIFICATION

Adrian Lubowiecki-Vikuk,1 Justyna Kurkowiak2

Abstract: Medical tourism potential of CEE is currently not clearly identified due to the lack of data concerning the number of medical tourists in respective countries. The aim of the present study is to shed light on potential research topics in the field of medical tourism. A detailed analysis of scientific and consulting literature was used to identify the elements of medical tourism potential. The agglomerative clustering algorithm forms distinct groups of countries that are similar with regard to that potential. Creating the statistical synthetic measures allows one to construct the ranking of countries with respect to their potential regarding medical tourism. Four distinct groups of countries emerge from the cluster analysis. It was found that the countries from the European Union (EU), which are characterized by higher economic indicators, create similar clusters and take the highest positions in the ranking. Surprisingly, the price level is not the top criterion determining the position within the classification. The obtained results fill the gap in the field of medical tourism in CEE and have implications for further research related to medical tourism. This classification could be a useful tool for the various stakeholders interested in the development potential of medical tourism in this part of Europe.

JEL Classification Numbers: 015, I11, Z32; DOI: http://dx.doi.org/10.12955/cbp.u.v5.940

Keywords: Central and Eastern Europe, medical tourism, healthcare, medical tourism potential, Ward’s method.

Introduction

Medical tourism is a characteristic phenomenon of the modern times. Patients take up travel to use health-related services, including services offered as part of tour packages (Connell, 2013; Rab-Przybyłowicz, 2016). The scope of the services is wide – they come from the field of preventive care, dental treatment, plastic surgery, aesthetic medicine and dermatology, orthopedics, ophthalmology, gynecology and other (Beladi et al., 2015; Lunt et al., 2014). The concept of medical tourism varies from country to country. Unlike in Western Europe, where the emphasis is put on prevention and maintaining both mental and physical health, in Central and Eastern Europe (CEE), physical health is the main focus. In southern Europe, treatments based on sea water is popular, while in northern Europe spa tourism is based on natural landscapes and treatments using cold lake water (Smith & Puczkó, 2014). Medical tourism generally takes place at a short distance and has a rather dispersed character, despite being part of an increasingly global medical industry that is linked to the tourism industry (Connell, 2013). There is a need for determination and integration of concepts. Medical tourism is the subject of scientific research by many academics focusing on countries offering medical tourism services: Asian countries, the USA, Mexico, countries of Central and South America. The other medical tourism destinations, CEE countries in particular, are still poorly researched.

The CEE region has a rich tradition in providing a variety of health-related services. Therefore, it is not surprising that this part of Europe is becoming increasingly more prominent on the map of medical tourism destinations (Fetscherin & Stephano, 2016). Smith et al. (2016) report that the market potential is large and more agencies will specialize in medical tourism in the future. The situation is helped along, among others, by the favorable climate, beautiful and often pristine natural environment, a good position on the map of Europe, and competitive prices for international tourists. On the other hand, health tourism in this region still suffers from a number of weaknesses (cf. Kesar & Rimac, 2011; Kiss, 2015). The relatively poor infrastructure and the service quality should be improved. The industry needs better education, more training and new skills. Efforts should be made to change the often negative image of the region and build up trust of potential visitors. Another hindrance is poor cooperation between healthcare and tourism, and country-specific regulations. Migration of medical professionals to the EU countries outside of the CEE area is becoming a serious problem, prevention of which requires government support, an innovative approach to eliminating defects and the use of the opportunities and observation of contemporary trends in the market. All these issues need to be addressed in the research on the development of medical tourism in CEE.

The CEE concept has a dual sense: geopolitical and culturo-historical. The opinions on which country should be qualified as belonging to the region vary depending on historical issues, standardization of

1 Poznan University of Physical Education, Poland, alubowiecki@interia.pl
2 Medical University of Warsaw, Poland, justyna.kurkowiak@wum.edu.pl
geographical names and ideas of representatives of various research centers (UNGEGN, 2016). Each division will spark discussion. Therefore, it is assumed that the CEE region will include the following countries: Albania, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Kosovo, Latvia, Lithuania, Macedonia, Moldova, Montenegro, Poland, Romania, Serbia, Slovakia, Slovenia and Ukraine.

Since the early 1990’s, significant socio-demographic changes have been taking place in the CEE region, such as the falling birth-rate, the increasing number of elderly people, the decline in the number of people in households, the changes in the family model and the process of migration (immigration, mainly to larger urban centers of European countries). The region is diverse due to: (i) economic as well as social retardation in comparison with the “old” EU countries, (ii) the varying standard of living in individual countries, (iii) changes in the structure and resources of the healthcare system, and (iv) globalization and its effects (Iordache, Ciochină & Popa, 2013; Karmowska & Marciniak, 2015; Romaniuk & Szromek, 2016). Consumerism encourages the development of tourism, translating into specific benefits for the national economy and changing consumption patterns. At the same time, broadly defined health-related services often become a part of tourist trips or even their main goal. These phenomena significantly shape and differentiate the medical tourism market in the CEE region, which makes it even more difficult to estimate the medical tourism potential. A need has emerged to create favorable conditions for the material and technical, as well as organizational measures in the services sector.

The aim of this paper is to identify the potential of medical tourism destinations in this part of Europe. This would make it possible to prepare medical tourism products that meet tourists’ individual needs. The practice of medical tourism depends on successfully informing potential patients about procedure options, treatment facilities, tourism opportunities, travel arrangements, and destination countries (Crooks et al., 2011). The medical tourism potential itself should be treated as a collection of internal, both structural and functional, possibilities of the country enabling the development of medical tourism in its territory.

This study aims to fill the gap in the research on the process of shaping the image of a medical tourism destination, with particular focus on the medical tourism potential. It is also useful in that it is the first step towards a comprehensive analysis of the potential of the medical tourism market in CEE, from which future promotional strategies can be developed. The results will make it possible for medical tourism facilitators / brokers and destination management organizations, as well as for the interested academics, to comprehend the medical tourism phenomenon better.

**Methods**

This study concerned with the creation of the classification of CEE countries in terms of medical tourism development potential, for which Ward’s method was used along with independent methods of linear order (Ward, 1963, p. 238). The classification is an attempt to determine the potential of individual CEE countries as medical tourism destinations. Nineteen out of 20 CEE countries were taken into account, as Kosovo could not be included in further analyses due to the lack of relevant data. It was assumed that a predisposition to medical tourism development in individual CEE countries is the result of three factors: medical potential and tourism competitiveness of a given country, and the cost of medical services. Ward’s algorithms were used to construct the data structure agglomerative clustering. Cluster analysis divides objects (countries) into homogeneous groups based on the information found within the data, describing the objects without establishing a hierarchy between them. Ward’s method is regarded as very efficient in capturing the natural structure of the data.

The purpose of this method is to join objects into successively larger clusters, using some measure of similarity defined as the error sum of squares (used in the analysis of variance), defined as $ESS = \sum_{i=1}^{k} (X_i - \bar{X})^2$, where $k$ denotes the number of clusters. The choice of the appropriate variable was determined, apart from the substantive criteria and the accessibility of statistical information (Eurostat, 2015; WHO, 2015), also by the usefulness of the diagnostic variables for Ward’s cluster analysis. The analysis requires variables which have sufficient variability and are not too strongly correlated with each other. The threshold value chosen for the coefficient of variation was set to be 0.15, and for the correlation coefficient to be 0.75. Because the range of values differs between variables the standardization of data was done so that all attributes were on the same scale. Finally, medical
potential of the country was determined on the basis of tourists per population, total health expenditure ($ per capita and % of GDP), total number of hospitals, number of physicians, nurses and dentists (per 100,000 population), total density of linear accelerator per one million inhabitants and Euro Health Consumer Index (EHCI) 2015 (Björnberg, 2016). Tourism competitiveness of a given country was specified by Travel & Tourism Competitiveness Index consisting of 14 pillars organized into four subindexes: business environment, safety and security, health and hygiene, human resources and labor market, ICT readiness, prioritization of travel and tourism, international openness, price competitiveness, environmental sustainability, air transport infrastructure, ground and port infrastructure, tourist service infrastructure, natural resources, and cultural resources and business travel (Travel & Tourism Competitiveness Report, 2015). Due to the assumptions of Ward’s method the analysis included the indicators marked in italic. Lack of data on tourism competitiveness of Belarus, Bosnia and Herzegovina and Ukraine was replaced by the average of the corresponding indexes of countries similar in terms of the ratio of GDP per capita and the number of foreign tourists. The average price level ($) of selected medical services for medical tourists in various CEE countries was estimated on the basis of a widely available price list (Treatment Abroad, 2015): dental implant, IVF with donor eggs, breast enlargement and gastric bypass.

In the next analysis, the diagnostic variables from Ward’s method were aggregated to determine the synthetic measure in order to create the ranking of countries with respect to their potential regarding medical tourism. There exist a number of methods for creating a synthetic variable. Three different methods were used to compare the resulting rankings and to check if the choice of a particular method affected the ranking order.

First, we followed the methodology proposed by Hellwig (1968). For the given \( m \) objects described by \( n \) standardized variables \( Z_{ij} \), where \( i = 1,2, ..., m \), \( j = 1,2, ..., n \), the model patterned object \( z_{0j} \) was chosen which is described as follows:

\[
z_{0j} = \begin{cases} 
\max_i \{z_{ij}\}, & \text{if variable is stimulant} \\
\min_i \{z_{ij}\}, & \text{if variable is destimulant}
\end{cases}
\]

Then, for each of \( m \) objects the distance from the patterned object model was computed According to Euclidean measure:

\[
d_{ij} = \sqrt{\sum_{j=1}^{m} (z_{ij} - z_{0j})^2} \]

Those distances were used to calculate the synthetic measure which was next used to construct a linear order:

\[
h_i = 1 - \frac{d_{i0}}{\bar{d}_0 + 2s}, \quad i = 1,2, ..., m
\]

where \( \bar{d}_0 \) and \( s \) denote, respectively, the average and standard deviation for the calculated distances, i.e.

\[
\bar{d}_0 = \frac{1}{n} \sum_{i=1}^{n} d_{i0}, \quad s = \sqrt{\frac{\sum_{i=1}^{n} (d_{i0} - \bar{d}_0)^2}{n}}.
\]

The next two methods are not model methods: the average ranks method (Brazdil & Soares, 2000) and the zero unitarization method (Kukula & Bogocz, 2014). The average ranks method for standardized variables calculates the average rank for each object according to the formula:

\[
r_i = \frac{\sum_{j=1}^{n} r_{ij}}{n}, \quad i = 1,2, ..., m
\]

Stimulant variables that are ranked \( r_{ij} \) from the highest to the lowest, and destimulant variables from the lowest to the highest. If two or more scores have the same value then they are ‘tied’, i.e. first, each tied score is given a rank it would have, if it was different from the other scores. Then, the ranks for the tied scores are added and divided by the number of tied scores. This way each tie gets the same average rank.

In the third method, the selected diagnostic variables were subjected to the normalization process by using the zero unitarization method. If the variables are stimulants the normalization is performed using the following formula:
If the variables are destimulants, the appropriate formula is as follows:

\[ z_{ij} = \frac{x_{ij} - \min_i \{x_{ij}\}}{\max_i \{x_{ij}\} - \min_i \{x_{ij}\}} \]

For each object the synthetic variable \( u_i \) is defined as the average of normalized diagnostic variables:

\[ u_i = \frac{\sum_{j=1}^{n} z_{ij}}{n}. \]

Spearman’s rank correlation coefficient, which is a measure of the strength of the relationship between data, was calculated to check if the selected measures brought similar classification results. All statistical analyses were and conducted using data analysis software system StatSoft, Inc. (2014). STATISTICA, version 12. www.statsoft.com. The significance level was set as \( p \leq 0.05 \).

**Results**

In view of the factors influencing the development of medical tourism in CEE, the countries were grouped, which resulted in a dendrogram illustrating the hierarchical structure of the countries (Figure 1).

The adoption of binding distance of 7 allowed us to distinguish four clusters (Table 1). The first group consists of Belarus and Ukraine. The group is characterized by a medium number of tourists, lower expenditure on health per capita, and at the same time a higher than average number of hospitals, physicians, nurses and dentists. Lower economic indicators are also noticeable, the EHCI at 0 and low prices of selected medical services in the CEE countries. The second group (Czech Republic, Hungary,
Lithuania, Poland, Romania, Slovakia, Slovenia) and the third one (Bulgaria, Croatia, Estonia, Latvia), are characterized by higher than average economic indicators, expenditure on health and EHCI level. The number of tourists constitutes a differentiating factor. In the second group it is at an average level, while in the third group it is higher than average. Both groups are made up of countries belonging to the EU. Albania, Bosnia and Herzegovina, Macedonia, Moldova, Montenegro and Serbia make up the last group which is characterized by a lower than average number of tourists, lower expenditure and economic indicators, lower EHCI level and the highest prices of selected medical services of all CEE countries.

<table>
<thead>
<tr>
<th>Table 1: Characteristics of the numerical variables analyzed for each cluster (the mean±SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cluster centroids</strong></td>
</tr>
<tr>
<td><strong>Tourists per population</strong></td>
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<tr>
<td><strong>Total health expenditure per capita</strong></td>
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<tr>
<td><strong>Total health expenditure as % of GDP</strong></td>
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<tr>
<td><strong>Hospitals per 100.000 population</strong></td>
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<tr>
<td><strong>Physicians per 100.000 population</strong></td>
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<td><strong>Nurses per 100.000 population</strong></td>
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<tr>
<td><strong>Dentists per 100.000 population</strong></td>
</tr>
<tr>
<td><strong>Linear accelerators per million population</strong></td>
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<tr>
<td><strong>EHCI 2015</strong></td>
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<tr>
<td><strong>Dental implant</strong></td>
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<tr>
<td><strong>IVF with donor eggs</strong></td>
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<tr>
<td><strong>Breast enlargement</strong></td>
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<tr>
<td><strong>Gastric bypass</strong></td>
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<tr>
<td><strong>International openness</strong></td>
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<tr>
<td><strong>Air transport infrastructure</strong></td>
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<tr>
<td><strong>Tourist service infrastructure</strong></td>
</tr>
<tr>
<td><strong>Natural resources</strong></td>
</tr>
<tr>
<td><strong>Cultural resources and business travel</strong></td>
</tr>
</tbody>
</table>

Source: Authors

The use of tools of the multidimensional comparative analysis allowed us to create a ranking of CEE countries as shown in Table 2.

The rankings of CEE countries received large consistency of the results confirmed by the high value of the Spearman’s rank correlation coefficient (about 0.93 for each pair). In the general classification, the leading positions are occupied by the EU countries, the last by Moldova and Albania.
<table>
<thead>
<tr>
<th>Country</th>
<th>Hellwig’s synthetic measure</th>
<th>Average ranks measure</th>
<th>Zero unitarization measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albania</td>
<td>19</td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td>Bosnia and Herzegovina</td>
<td>13</td>
<td>17</td>
<td>13</td>
</tr>
<tr>
<td>Belarus</td>
<td>15</td>
<td>16</td>
<td>15</td>
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<tr>
<td>Bulgaria</td>
<td>4</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Croatia</td>
<td>10</td>
<td>5</td>
<td>3</td>
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<tr>
<td>Czech Republic</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Estonia</td>
<td>3</td>
<td>4</td>
<td>4</td>
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<tr>
<td>Hungary</td>
<td>9</td>
<td>8</td>
<td>10</td>
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<td>Latvia</td>
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<td>5</td>
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<tr>
<td>Lithuania</td>
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<td>6</td>
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<tr>
<td>Macedonia</td>
<td>16</td>
<td>15</td>
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<tr>
<td>Montenegro</td>
<td>12</td>
<td>11</td>
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<td>Poland</td>
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<td>Moldova</td>
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<td>Romania</td>
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<td>Serbia</td>
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<tr>
<td>Slovakia</td>
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<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Slovenia</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Ukraine</td>
<td>11</td>
<td>12</td>
<td>12</td>
</tr>
</tbody>
</table>

Source: Authors

Discussion

Medical tourism is an example of not only the possibility of economic revival in the CEE countries, but also specific consequences of various factors affecting decisions about medical treatment abroad (Directive 2011/24/EU, 2011; Fetscherin & Stephano, 2016). This is due to the medical tourism potential. According to our own research, the following countries occupied top places in this regard: Czech Republic, Slovenia, Estonia, Slovakia, Croatia, Bulgaria, Lithuania, Latvia, Hungary and Poland.

Marinou et al. (2009, p. 282) emphasized that countries such as Hungary, Slovenia, Czech Republic, Slovakia and Poland, which made considerable investment efforts to modernize and develop their resorts, are currently major competitors for many countries of Western Europe with tradition of medical tourism. An increase in exports of health services in the countries such as Estonia, Latvia, Lithuania and Croatia has been observed (Langvinienė, 2014, p. 312). Bulgaria, which also continually improves its offer of health tourism, is becoming a major rival of Romania (Marinou et al., 2009, p. 283).

Medical tourism development is possible thanks to the support from EU funds, and drawing particular attention of the representatives of private companies to the quality of medical services, while maintaining an optimal level of their prices. Furthermore, in most of these countries, the health systems are also run properly (Romaniuk & Szromek, 2016, p. 95). Safety as well as attractiveness of
tourist destinations constitute an additional advantage of the leaders in the CEE countries ranking. The Czech Republic, Slovenia, Hungary and Poland are currently a group of safe destinations in this part of Europe (2015 Global Peace Index, 2015).

CEE countries outside the EU (except for Romania in the 13th-14th place) occupy significantly lower places (11-19) in the overall classification in terms of medical tourism potential. The lack of subsidies is a major cause of this situation. The case of Montenegro proves how crucial subsidies are. The country received government support, thanks to which (as Smith et al. suggest) health tourism has increased by 20% in the past five years, mainly because of the medical tourism industry (Smith et al., 2016).

The price of medical tourism products and services, which substantially affects the participation in medical travel (Lubowiecki-Vikuk & Rab-Przybyłowicz, 2015, p. 85), is believed to be an allocative effect of medical tourism market function. In this respect, the lowest prices of medical services in Belarus and Ukraine or the highest in CEE in Serbia, Moldova, Macedonia, and Montenegro (Treatment Abroad, 2015), did not result in high places in the ranking of medical tourism potential in the studied region. Moreover, a low position in this classification may be associated with different health care systems of CEE countries. According to Romaniuk and Szromek (2016), Albania, Belarus, Moldova, and Ukraine are among the countries whose health systems are the weakest and with least improvements in recent years. Given the above, it is the quality, not the price of medical services that is the priority for medical tourism development. Poland occupies 8-10th place in the overall classification of the CEE countries. It should be noted that Poland was the only country in the CEE region included in the Medical Tourism Index (Fetscherin & Stephano, 2016, p. 541).

The authors assumed that medical tourism potential is a collection of internal, both structural and functional possibilities of the country, enabling the development of medical tourism in its territory. Scientists do not have access to many variables because the appropriate data are not available. The created clusters give a general idea of the CEE region, however, it deserves more attention in regard to medical tourism. The variables used speak of the current state of things rather than future.

Given those limitations, the authors are aware of the fact that their initiative should be continued and would constitute a basis for further research in this area, taking into account an increasing number of studies on medical tourism.

Conclusions

The CEE countries, especially those belonging to the EU, in many respects, such as health, economy, tourism, favorable prices, together broadly defined as the medical tourism potential, are becoming more and more attractive for citizens of countries with developed economies. The countries characterized by higher economic indicators create similar clusters and take the highest position in the ranking (e.g. the Czech Republic, Slovenia, Estonia, and Slovakia).

In the future, identification of the CEE medical tourism potential will help to determine the brand of a given destination. It should be noted, however, that the ongoing economic, political and religious instability and conflicts in the region can damage its image and limit the potential.

Acknowledgement

Thanks to Dominika Mucha the final manuscript is infinitely better than anything that we could have produced without her support.

References


TURNING DATA INTO VALUABLE INSIGHTS: THE CASE STUDY IN AVIATION SECTOR COMPANY
Daiga Ergle,1 Iveta Ludviga,2 Agita Kalviņa3

Abstract: Since the early 2000s, there is increasing pressure on Human Resource Departments to show their impact on organizational performance. This pressure is related to the shift from industrial based economies to knowledge based economies and positioning people as potential sources of competitive advantage, and to the rise of Evidence-Based Management (EBM), which requires making decisions based on data and analysis. New technologies have enabled HR departments to start a transition from HR metrics to HR Analytics, thus transforming from the traditional administrative HR function to a more strategic HR function that can express qualitative matters and its impact on organizational performance with numbers. This case study describes the implementation of HR analytics in an aviation sector company. Quantitative data gathered from an annual staff engagement survey are analyzed using a Structural Equation Modelling technique with Smart PLS software. The results show that the analysis offers insights which are much more valuable than traditional diagnosis of the level of employee engagement. Thus, management can trace an employee’s journey within the organization and be able to predict their behavior in relationship to the time spent in the organization. Moreover, the changing needs of employees are seen form the analysis and Evidence-Based Management can be implemented.

JEL Classification Numbers: M1; M50; M54; M51; DOI: http://dx.doi.org/10.12955/cbup.v5.941

Keywords: Human Resource analytics, employee engagement, structural equation modelling, evidence based management

Introduction
Over the past three decades many researchers have tried to prove Human Recourse’s (HR) impact on business by unraveling the link between HR and individual and organizational performance (Evans & Davis, 2005; Fitz-Enz, 1984; Huselid, 1995; Paauwe et al., 2012). However, still a lot of questions regarding the link between HR and organizational performance remain unanswered (Paauwe et al., 2012) and there is still a lot unknown. In the early 2000s, the pressure on HR to be able to show its impact was increasing. On the one hand, this pressure was caused due to the shift from industrial based economies to knowledge based economies. This shift positioned people as valuable assets within the organization that play an important role in gaining competitive advantage (Pease et al., 2014). Knowing how HR impacts organizational performance therefore became more important as it could help to create competitive advantage. On the other hand, it was a result of the rise of Evidence-Based Management (EBM), which requires making decisions based on data and analysis (Fink, 2010; Rynes et al., 2007). As the opportunities to collect and use huge amounts of data increased over the last decade due to new, fast and relatively cheap technologies, the ability to make better data based decisions grew (Russel & Bennet, 2015). Many organisational functions, such as finance and marketing, nowadays conduct EBM and have successfully adjusted themselves to make data based and analytic decisions to justify their activities (Boudreau & Ramstad, 2005; Lawler et al., 2004; Rynes et al., 2007). However, in most organizations HR still relies on gut-based decisions (Mishra et al., 2016).

As a result, investments in HR cannot be justified due to a lack of available data and it is not possible to quantify the returns on investments (Mondere et al., 2011). It is likely that HR will be able to implement EBM within the next decade. New technologies developed during the 2000s have enabled HR to start a transformation from HR metrics to HR Analytics (Bassi, 2011).

This paper presents a case study of an aviation sector company and describes the value of the implementation of HR analytics by presenting predictive analytics of available HR metrics. The paper is structured as follows: first HR metrics and HR analytics are defined and the transition discussed. Further the methodology is presented, followed by analysis of the company’s HR data and findings.

From HR metrics to HR analytics
In the early 1970s, HR metrics were established by HR practitioners and researchers as a first attempt to quantify HR activities (Bassi, 2011; Fitz-enz, 2010). HR metrics are measurable units describing the personnel related characteristics of an organization, traditional examples are retention rate, turnover rate and cost of hire (Bassi, 2011; Fitz-enz, 2010; Fitz-enz & Mattox, 2014). In the 1980s and 1990s
the established HR metrics were further developed and new HR metrics were created (Fitz-enz, 2010) enabling organizations to conduct benchmarks with other organizations using HR metrics (Bassi, 2011), which marks the first step towards the ability of HR to show its impact on organizational performance.

HR analytics is defined as “the application of a methodology and integrated process for improving the quality of people-related decisions for improving individual and/or organizational performance” (Bassi, 2011, p. 16). Applying HR Analytics goes beyond using HR metrics (Fitz-enz & Mattoo, 2014). HR metrics merely describe personnel related characteristics of an organization in numbers. HR Analytics goes one step further by trying to understand relations and interactions between personnel related characteristics of an organization (Fitz-enz & Mattoo, 2014). The transition of the use of HR metrics towards HR Analytics is seen as the beginning of an evolution of the HR function (Fitz-enz, 2010; Van den Heuvel & Bondarouk, 2016). This evolution entails a transformation from the traditional administrative HR function to a more strategic HR function that is able to show impact on organizational performance with numbers (Fitz-enz, 2010). HR Analytics is seen as an HR tool for conducting Evidence Based Management (EBM) (Falletta, 2014; Fitz-enz & Mattoo, 2014; Mondore et al., 2011).

Effectively conducting HR Analytics means showing HR’s impact on business results (Mondore et al., 2011). This is experienced as a struggle by many starters in HR Analytics as a clear purpose for HR Analytics is often missing (Fitz-enz & Mattoo, 2014). As a result, HR practitioners report on analyses that are not perceived to be relevant for business (Mondore et al., 2011). For example, only reporting on the time it takes to hire a new employee is not relevant for the CEO as it does not show the impact on organizational performance. The purpose of HR Analytics should be linked to the HR strategy as the HR strategy determines the kind of investments and decisions HR makes with regards to the workforce (Pease et al., 2014). Aligning the purpose of HR Analytics with the HR strategy should lead to alignment of HR Analytics with organizational goals as the HR strategy should be based upon the organizational strategy.

When the purpose of HR Analytics is clear, HR Analytics can be used to solve business cases. By using HR Analytics on a particular business case, HR practitioners can figure out how HR activities support improving business results by improving business decisions (Fitz-enz & Mattoo, 2014). The purpose of a specific business case forces HR practitioners to focus on particular data sets, which helps to overcome data abundance and focussing on HR activities that impact organizational development. As HR Analytics combines HR and business data, it is relevant to thoroughly understand the business in which the organization is operating to be able to select relevant HR and business data (Fitz-enz, 2010; Pease et al., 2014; Rasmussen & Ulrich, 2015). Understanding the business will give insight in the critical outcomes of organizations and the problems that organizations are facing (Gardner et al., 2011; Mondore et al., 2011). Furthermore, it will teach HR practitioners to speak the language of the business (Fitz-enz & Mattoo, 2014; Pease et al., 2014).

Since HR Analytics is a new HR tool, only a few organizations have so far succeeded in implementing and using HR Analytics. Many HR practitioners are struggling with HR Analytics as it is difficult to have the right competences and available resources and thereby, HR Analytics should be specifically tailored to the organization (Bassi, 2011; Lawler et al., 2004; Van den Heuvel & Bondarouk, 2016). Since researchers have only recently focused their attention on HR Analytics, there is not much academic literature available yet (Fink, 2010; Van den Heuvel & Bondarouk, 2016). Therefore, HR practitioners who want to conduct HR Analytics are highly dependent on success stories, recommended action plans and advises of HR practitioners that have already implemented HR Analytics within their organizations (Fitz-enz, 2010; Fitz-enz & Mattoo, 2014; Pease et al., 2014). Comparing the current literature regarding HR Analytics, five questions can be constructed on how to approach HR Analytics. Those five questions are: What is the purpose? What data is available? How is the data structured? What kind of analysis is needed? How can the outcome of the analysis be used?

Methodology

The company analyzed in this research paper operates in the aviation industry and has recovered from a financial setback in 2011. During the financial setback, the organization suffered cutbacks and
reorganizations, which also influenced the position and the budget of the HR department. Now the organization is doing better, the HR department envisions a more strategic position for itself. However, the HR department has difficulties building credibility and persuasion power. Consequently, they are not yet able to convince the board and other business executives of their position as a strategic partner and they don’t know how to show their impact on business results. As HR Analytics is referred to as a tool to build credibility of HR and persuasion power by proving the impact of HR on business, the HR department wants to implement HR Analytics within company.

This research starts with assessing the current data capability with regards to HR Analytics. In order to capture the underlying beliefs and understandings of the HR strategy, policies and practices and thoroughly understand the aviation industry, this research starts with a qualitative approach - semi-structured interviews which enable the interviewer to ask follow-up questions if needed to gain a better understanding of the answers given by respondents (Verschuren & Doorewaard, 2010). In total 12 semi-structured interviews are conducted. The interviews with HR practitioners had a duration of 90 minutes and the interviews with business executives were approximately 60 minutes. The HR practitioners provided an insight into the HR strategy, policies, practices and the daily tasks of HR practitioners, which gave insight into the purpose of implementing HR Analytics and the available data. The business executives gave insight in the aviation industry and in business needs. All interviews were recorded and transcribed verbatim to be able to analyze them and construct key word takeaways. In addition, this research used document analysis to figure out what data is available and to analyze the data structure. For the document analysis, HR policy documents, HR documents and notifications on intranet and excel files with collected HR data were used, which were created between 2011 and 2016 by HR practitioners.

The final stage of this research is quantitative - existing data from an annual employee commitment survey was analyzed using a structural equation modelling technique and Smart PLS software thus showing the value of predictive analytics. This research can be classified as an evaluative case study. Through case studies, the researcher aims to interpret the data, moreover, in evaluative case studies, the researcher goes further by adding their judgment to the phenomena found in the data (Zainal, 2007).

Findings

The results of the interviews with the HR department revealed that the recruitment and selection process is the main responsibility of human resources. For some positions, this process is more challenging as the Latvian labor market is shrinking which is enforced by the low wages compared to other countries. Interviews with the business show that their decisions are limited by the international regulations of the aviation industry. Since strategic decisions can only be taken by higher management, employees need to follow the hierarchical chain via the direct manager. Furthermore, interviewees from the business explain that HR only supports them in the recruitment & selection process. They also mention the benefits from having a database in which language capabilities and trainings would be accessible by managers, as currently HR data cannot be easily found. Yet, investments in better systems are often postponed due to budgets.

Looking at the available HR data, it is evident that the company is currently doing basically descriptive analytics. For example, based on the sickness rate of cabin crew, it can describe trends regarding absence due to sickness for this specific employee group. Furthermore, some diagnostic analytics can be conducted on HR data, such as the Commitment Survey results and the results of the Annual Performance Review Dialogue. However, solely using HR metrics for descriptive and diagnostic analytics would not be sufficient for the evolvement of a strategic partner, because these types of analytics give only insights in the past. To support HR as a strategic partner, HR Analytics should provide predictions about the future that can help HR to formulate and execute adequate HR strategy and make evidence-based decisions (Fitz-enz & Mattox, 2014). The type of analytics that would be suitable for the HR department to grow into the position of strategic partner is predictive analytics. Therefore, further an attempt to analyze existing data from annual commitment survey with SmartPLS software and thus provide the company with much more valuable insights is presented.
Implementation of HR Analytics

In the company employee commitment and engagement is measured on a yearly basis using an external consulting company and multiple recommendations for increasing the commitment are provided. However, actions based on these recommendations have not been effective in the past. Since 2012, employee commitment is significantly underneath Latvia’s benchmark. Over the years, there has not been any real indication of improvement in employee commitment.

The data of the Employee Commitment survey is gathered on an individual but anonymous level via a self-reporting questionnaire using a 5-point Likert type measurement scale, where code 1 is assigned to “Not at all satisfied,” and 5 is assigned to “Extremely satisfied.” The questionnaire includes the scales measuring employee engagement (ENG, 8 items) and commitment (COM, 3 items), and employee satisfaction with general management (Man, 5 statements), company in general (Comp, 5 items), team (Team, 5 items), direct management (DirMan, 6 statements), remuneration (Rem, 5 items), growth possibilities (Grow, 3 items), availability of information (Inf, 5 items). In addition, demographic type questions like tenure and department are included.

In total 640 employees participated in the survey in 2016. The overall commitment of employees is identified as 55 points out of 100. Although this is an average commitment score following the methodology, it is underneath the benchmark of Latvia, the Baltic States, Europe and other service providers in Europe. The lowest commitment score is obtained by the cabin crew department, with 44 points out of 100. The highest commitment score is obtained by the administration and support department, with 63 points out of 100. Although almost all commitment scores among departments are either stable or slightly increasing, the commitment scores of the cabin crew show a negative trend. Furthermore, a difference is noticeable between employees that are less than one year working in the company, with a commitment score of 78 out of 100, and employees that are working for 6 to 10 years, with a commitment score of 47.

To identify causal relations, a Structural Equation Modelling (SEM) technique is used to test how management, team, company, information, remuneration and direct management is linked to engagement and commitment. SEM is a statistical method for representing and testing a network of relations between observed and latent variables (Suhr, 2006).

First the validity of the model was tested. To evaluate reflectively measured models the following should be examined: outer loadings (size and significance); composite reliability; average variance extracted (AVE) or convergent validity; discriminant validity (Hair et al., 2011). All outer model loadings, except two, had a loading higher than .70, which indicates that they are good measurements of the latent variables. However, as the two indicators match with the Gallup model of engagement and the indicators have a .85 Cronbach’s alpha, this research does not exclude the indicators from the model. Convergent Validity of the reflective constructs is examined with average communality or Average variance extracted (AVE). All scores were above the minimum threshold which is .50 (scores were between .55 for Rem and .77 for Grow). Internal consistency reliability is estimated by composite reliability (scores are from .086 Rem to .95 DirMan) and all scores exceed the minimum level of .70. Discriminant validity shows if measures of a particular construct differ from measures of other constructs in the model. The Heterotrait-Monotrait (HTMT) ratio of correlation was used and the values ranged from .37 to .78, thus, the discriminant validity is sufficient since all scores are above .85. All collinearity statistics scored lower than 5, which indicate that the model has no problems with collinearity. Thus, the model appeared to be valid for further analysis.

The predicting capacity of the model is evaluated by determination coefficients. As the R2 for ENG is .63, the model has a rather substantial predicting capacity for engagement. The R2 value for COM .38 indicates a predicting capacity of the model which is rather moderate for commitment. Since engagement can be predicted for 63% via the HR related scales, and engagement can predict commitment for 38%; the model has substantial predicting capacity.

First the general model is analyzed. The path coefficients show a strong relationship between engagement and commitment. Information has the biggest impact on the engagement of employees, then team, company, remuneration and growth. However, to identify the cause of low commitment of specific groups, multigroup analysis is required. Descriptive analytics showed large differences
between employees with different years of working experience within the company. These differences are further examined via a multi group analysis and presented in Table 1.

Table 1: Multigroup analysis: Tenure (dependent variable - Engagement)

<table>
<thead>
<tr>
<th>Tenure (years)</th>
<th>Less than 1</th>
<th>1 to 3</th>
<th>4 to 5</th>
<th>6 - 10</th>
<th>More than 10</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n=63</td>
<td>n=210</td>
<td>n=75</td>
<td>n=163</td>
<td>n=99</td>
</tr>
<tr>
<td>Company in general (Comp)</td>
<td>-.07</td>
<td>.31 ***</td>
<td>-.02</td>
<td>.03</td>
<td>.25</td>
</tr>
<tr>
<td>Direct management (DirMan)</td>
<td>-.01</td>
<td>.06</td>
<td>.06</td>
<td>.11</td>
<td>.04</td>
</tr>
<tr>
<td>Growth (Grow)</td>
<td>.00</td>
<td>.03</td>
<td>.28 **</td>
<td>.17 ***</td>
<td>-.01</td>
</tr>
<tr>
<td>Information (Inf)</td>
<td>.50 *</td>
<td>.24 **</td>
<td>.21</td>
<td>.40 ***</td>
<td>.23</td>
</tr>
<tr>
<td>Management (man)</td>
<td>.12</td>
<td>.00</td>
<td>.17</td>
<td>.03</td>
<td>-.06</td>
</tr>
<tr>
<td>Remuneration (Rem)</td>
<td>.08</td>
<td>.07</td>
<td>.16</td>
<td>.20 **</td>
<td>.08</td>
</tr>
<tr>
<td>Team (Team)</td>
<td>.24</td>
<td>.31 ***</td>
<td>.38 ***</td>
<td>.13 *</td>
<td>.28 ***</td>
</tr>
</tbody>
</table>

*p<.05; **p<.01; ***p<.001.

Source: Authors

The Table 1 shows that depending on the stage of the employees’ journey in the organization, distinct factors become relevant for their engagement. When an employee just joined the organization, information is the only and most important factor relating to the engagement of employees. Throughout the journey of an employee in the company, information remains one of the predicting factors for the engagement. When an employee is between 1 to 3 years employed, team becomes significant and remains important for the remainder of the journey. After 4 to 5 years in the organization, when the employee understands the industry, understands the organization and their job; growth becomes an important factor influencing engagement. For the group employees that are employed between 6 to 10 years, remuneration becomes important for engagement. When an employee is longer than 10 years within the company, team becomes again the most important factor for engagement.

Similar multi group analysis is done with seven groups, which represent the different departments: Coalition Rewards, Administration and Support, Cabin Crew, Commercial department, Operations department, Technical department and Flight Deck, since descriptive analytics showed large differences between departments regarding employee commitment and engagement.

Evidence based recommendations for the company

Since analyzing and modelling data provided more information from annual commitment survey than the diagnostic analysis which was done previously, the following evidence based recommendations for company management were provided.

As information, team and remuneration have the highest impact on engagement and commitment throughout the different departments and tenure groups, these topics should be the focus of HR. First of all, the company needs to target and increase the available information for employees. As information is identified as the most important factor influencing engagement, all efforts should be focussed on increasing the information flow and finding the most efficient ways how to ensure that employees obtain the necessary information for them. Thereby, employees specifically need more information with regards to the company’s strategy for their engagement. Furthermore, employees feel rather unaware of the division of responsibilities within the organization which might be linked to departments acting as silos. Therefore, more effort should be taken to increase the linkages between departments, enabling employees with deeper insights into the division. Lastly, employees do not feel that they can give feedback in the organization, enabling horizontal and vertical dialogues can counteract these feelings. Secondly, as team is identified as a strong influence on engagement and commitment, HR needs to foster a good team atmosphere. Targeting remuneration is the third recommendation as it has a rather strong impact on commitment. Although increasing all wages is not realistic, the recommendation provided is to increase information given to the employees with regards to the adequacy of the remuneration compared to the market and to their job performance.

Conclusion

The added value of HR is often questioned due to the inability to show its impact on organizational performance in order to justify its activities. Although researchers have been studying this link between HR and organizational performance a few decades, still a lot is unknown. With the rise of EBM, HR Analytics evolved as a tool for HR to conduct EBM. However, only a few organizations
have succeeded in implementing and using HR Analytics yet, because it is difficult to have the right competences, available resources and HR Analytics should be specifically tailored to the organization. The researched case serves as evidence that predictive analytics provide focused evidence-based recommendations within the low available financial resources. What the entire organization needs in addition to the existing resources is knowledge and skills of an analyst and software. Analysing data with predictive methods, such as structural equation modelling (or regression analysis) allow organizations to gain much more valuable insights and make evidence based decisions.

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References

PRICING POLICIES FOR HIGH DEMAND DATA COMMUNICATIONS,
THE CASE OF ALBANIA

Irena Malolli¹

Abstract: Mobile data traffic has dramatically increased during the recent years. The high demand for data communication increased the challenges for network operators. Communication Network operators are investing to provide more capacities and they are looking for innovative ways to cope with increased market demand for broadband data communication.

The liberalization of the telecommunication market and the competition put the operators under pressure to keep high quality services with low cost. New pricing policies are introduced in order to maintain market share and keep their users in a competitive market. The battle with OTT makes the situation more critical.

This article will analyze the situation in the field of data communication, compare different instruments which are used or are under development in different countries and in Albania. The article will analyze the pricing policies used for data communication as a solution to cope with the high demand of data traffic. The article will identify some critical issues on these practices, draw conclusions and give some recommendations on the proper ways to keep the right balance between technical and commercial solutions and user experience/satisfaction.

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Keywords: data communication, pricing policies, broadband, data traffic

Introduction

The penetration of mobile service subscribers by the end of 2015 achieved a level of 96.8%, the Internet penetration is estimated at 43.5%, and mobile broadband penetration at 47.2% (Ponder, 2016). The mobile broadband penetration is grown fast. This trend is related to a high demand for data traffic. The global mobile data traffic grew 63% in 2016 (Cisco, VNI 2016), while it has experienced an 18-fold growth over the last five years. They forecast that 20% of total IP traffic by 2021 will be mobile and that global mobile traffic will increase sevenfold between 2016 and 2021.

The increased penetration of mobile, internet users, and growth of broadband is closely related with higher demand for data services and traffic, thanks to a great number of applications and online service already in place and under development, due to easy accessibility in any part of the world through the internet.

The growth of smart devices is also a key driver for this phenomenon. On the other hand, different applications ask for a certain threshold of data rate, which means that the networks/service providers need to invest in order to offer these new applications.

Besides all of these factors, competition is one of the strongest drivers of this development and growth, which brings along the need for further investments in order to ensure better QoS / QoE. On the other hand, competition leads to lower prices as well as need for the renovation of tariff plans. New pricing policies are introduced in order to maintain market share, keep the level of profitability, as well as avoid the subscribers churn.

Traffic growth and ARPU in Europe countries

The data usage per SIM user per month in European countries has increased fast during the period 2011-2015 (Tefficient, 2016). The highest consumption is in Finland with an average of 5GB/month per user as is shown in Figure 1.

The same trend of data usage is in Albania. The figures published by the Albanian regulatory body (AKEP, 2016), for electronic communication gives that the average use of data in a month per user has increased 9 times during the period 2011-2016. It was on average 926MB/month at the end of 2015 which is comparable with some European countries, if we refer to Figure 1 above. But which are the drivers of data traffic? The key drivers of mobile traffic growth are related with four pillars as is shown in the figure below (Capgemini, 2012).

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¹ University of Tirana/Computer Science & Applied Mathematics, Albania imalolli@hotmail.com
Other studies on this topic have linked the growth of mobile broadband with the advancement of mobile technology to provide ubiquitous services and mobility. In the case of Albania and in other countries with low fixed penetration, it is also related to the effect of mobile-fixed substitution due to the low coverage of fixed broadband infrastructure. High data growth is also related to two other factors, the price reduction over the years, due to higher competition, and regulatory intervention. Looking onto data traffic growth it is normal to consider is as the “the cream” of the telecom revenues or, at least, it should be the core of future revenues. But the figures, on different cases, tell this is not the real case.

The growth of data is not associated with the same trend in revenue growth for mobile data. According to (ETNO, 2016), the Average Revenue per User (ARPU) evolution considering fixed broadband, mobile voice and mobile data shows that the total ARPU in mobile combining voice and data is lower during 2008-2016 in ETNO perimeter, but the ARPU mobile data is increased slightly (fig. 3).
If we observe what is happening in our local market, in a specific region, or wider, we can easily notice that while the volumes of traffic or consumption have increased year by year, the revenues or ARPU has reduced. It is noticed that while the fixed and mobile broadband penetration continues to increase, this is not necessarily associated with increasing average revenues (BEREC, 2016). First of all, competition is the main driver leading to lower prices. On the other hand, lower prices lead to more consumption, and yet, new applications and online services are the main drivers for increased demand.

Traffic data and ARPU in Albania

The telecommunication market in Albania is fully liberalized since 2008. There are four mobile market players and a great number of alternative operators providing fixed telephony, internet access and some of them are offering triple services. The main telecom figures show very low fixed telephony penetration and also low fixed broadband penetration, even though, this figure has increased year by year. Mobile broadband has increased fast after its launch in 2010 as it is shown in the figure below.

The mobile market is well developed with good coverage with 3G/4G which is offered from all mobile market players. Mobile broadband based on the HSPA/HSPA+ technology was introduced in late 2010 in Albania, while 4G/LTE technology was introduced in September 2015.
The growth of broadband access based on UMTS/LTE technology, especially during last year, is related to data traffic increase. In 2014 the annual data growth in mobile networks was 148%. This trend continued during 2015 with a 103% growth compared to 2014. But what is happening with ARPU in this market? Figure 5 shows the change of ARPU, versus consumption of voice calls and data per user in a month.

![Figure 5: ARPU evolution in Albania](image)

Source: Author based on data of AKEP

It is clear that the data traffic has increased while ARPU has decreased over the years. The graph above is limited in two indicators of user consumptions: voice calls and data. But, in the trend of IoT and M2M communication, the consumption is a sophisticated calculation “it will take time, education, and tools for consumers to feel comfortable estimating consumption” (CISCO, 2012). In this paper, we focus on data consumption per user and pricing policies related to it.

The explosive growth of data communication asks for more investments in the CAPEX infrastructure and other aspects related to it. In parallel with technical issues, such as the need for endless capacities as well as signaling storms, pricing policies are critical in order to identify the appropriate strategy of pricing in a new era of IoT communications. CEOs of telecom operators have emphasized the importance of developing innovative pricing models in order to ensure that revenues keep pace with growing mobile data consumption will be the top challenge, and is seen as the most critical challenge (Capgemini, 2012).

**Data pricing policies developments**

Data Pricing policies have changed over the years. Different studies on data pricing tell us that different methodologies are used during the years such as: a simple metering price model, flat rate, usage based pricing, data caps, Ramsey pricing, price discrimination in broadband services, tiered services etc.

At the beginning of the internet, during the 1990s early 2000s the data charging was metered based. This experience before broadband development was mainly related with the dial up connection. During the 2000s to early 2010s there were new ways of charging such as a flat rate and after that usage based charging.

The metered method for dial up connections was closely related to the service provision, the technology used, the limited demand for service and applications. For that time dial up connection was considered a value added service compared to basic phone services mainly used for voice.

Flat rate was related to broadband development. It was imposed from the competition and customers need for volume. It gave some positive effects for end users. But even though it was good at the very first stage of broadband, the higher demand for data traffic lead to the necessity of more network capacity and more investment. Higher consumption or heavy users lead to look for other alternative charging ways to monetize the investment. Usage based charging is now often combined with flat rate or other techniques for traffic management.
Usage based pricing policy is combined with different traffic management techniques. Some of the traffic management tools/methods are: throttling, additional charging, policy control, prioritizing etc. Each of these techniques of traffic management has advantages and disadvantages from the user side or provider side. It is difficult to say which will be the best method of traffic management as pricing policy. In theory, it is easier to say the method which avoids any kind of user damage, which keeps the QoS at the required level, which leads to more profit for company etc. In practice, it is quite complex due to the great number of factors that traffic management includes: users, demand, network configurations, capacities, critical point of failures, congestion management, revenues, quality of services, better services than competitor, provider brand name, etc.

All these make network providers to consider the development of policy charge controls seriously. A summary of different techniques used by operators to manage traffic (ITU, 2013) are summarized below:

- Best efforts: No traffic management by provider, no change for tiered QoS;
- Traffic management only applied during periods of high congestion;
- Priority always given to most vulnerable types of services e.g. voice, video, streaming, games;
- Throttling/degrading of some types of traffic e.g. P2P;
- Priority given to some service providers content or applications over other;
- Blocking rival’s content or applications e.g. rival IPTV service;

Recent developments on policy charge control and techniques used for traffic management raised a number of critiques from different institutions such as regulatory bodies and academic studies and also from the users. Filtering of some traffic or applications, prioritization of traffic and also throttling or slow down raise a number of issues regarding the freedom of the Internet, consumer protection, guaranteeing the objectivity and non-discrimination between different applications and users etc. As it is given in the report of (ITU, 2013) “Concerns arise because these same tools can also be used to threaten competing services and providers. In particular, the use of traffic management by an operator for anti-competitive purposes by using its control over Internet access (e.g., to discriminate against any competitors that rely on its network) has been the subject of greatest concern.”

The impact of changes of data pricing policies in Europe

The main objective of any kind of business is to increase revenues, market share and to make more profit. In a competitive market, to achieve this the business’s aim is more difficult especially today with OTT competition. The telecom service providers are offering a great number of service packages, bundle services, different tiered tariff packages to attract different target group of users. The renovation of pricing policies for data is widely used in the European market.

The impact of new data pricing policies and especially the great number of tariff packages is positive from the competition’s and the user’s perspective. The users have more flexibility to choose the best package between different providers based on prices, variety of services, QoS etc. On the other hand, the complexity of packages offered and the combination of different services in packages, combination of flat rate with limited data usage with extra charge for traffic over the cap often is associated with end user confusion. The complex tariff packages are not easily understood by end users.

The changes and renovation of pricing policies in European countries seem to have a positive impact on the market players. It is noticed (GSMA, 2017), that in 2016 key European markets such as Germany, Italy and Spain returned to growth. The principal driver of this turnaround is tariff readjustments, which specifically offer greater data allowances at higher cost, and have been implemented in a number of European markets. Further analysis is needed in order to see the relationship with user impacts in those countries. Considering the continuous growth of data traffic and the forecasted traffic in IoT and M2M, research is also needed to study what might be the best way to address the problem regarding pricing policy, providing a “win-win” situation for both service providers and users.

Data tariff packages in Albania

With the focus on data traffic growth, also conducted in a previous research (Malolli, Sevrani, 2013), on the tariff packages in the local market during in the year 2013 and then repeating the same research in 2016.
The 2013’s research for the Albanian market noticed that an enormous number of tariff packages was offered from different providers. The total number of packages in the market offered from mobile and fixed operators was around 100. These packages often combined voice and data traffic. Almost all operators have adopted similar pricing policies such as flat rate, combination of flat rate with usage based, and application of additional charges after data cap consumed or the reduction of speed after the consumption of data predefined in the package. The tariff packages offered in the market were different for prepaid and the post-paid users. Some tariff packages included 1-3GB, while the extra data traffic was charged with 12 ALL/MB, based on a 10KB step in one operator and 40 ALL/MB based on a 10Kb step in another operator. The speed reduction varies from 256kbit/s to 128kbit/s or lower in upload. Almost all operators offer unlimited data packages, but there is still present the limitation in lowering the speed after the data cap. The combination of packages consists on voice calls on net/off net, voice calls national/international, SMS on net/off net, data caps. In some cases there are offers with unlimited data traffic.

From the research done in 2016, it was noticed that the situation regarding the data pricing policies is similar with the situation in 2013. There is again a great number of tariff packages offered in the market and these tariff packages consist on a combination of voice calls (on net/off net), SMS and data. There are some packages named “standard package” with a monthly base, and also others named “offers,” with a limited weekly/daily time of expiration. The packages generally include on net calls, some of them off net calls or national calls, SMS, and a data tariff of 1-3 GB. Some packages offer unlimited Internet with a noticeable speed reduction after 1GB/2GB consumption. It is noticed that the packages include a high volume of net calls per month such as 2000, 3000 or 6000 minutes (based on the package). Also, the on net SMS included vary from 100 up to 3000 SMS. In some flat rate packages for postpaid users with 4800 ALL/month or 7800 ALL/month the on net voice calls is unlimited or 4000/6000 minutes are included. The same situation with on net SMS is unlimited with additional SMS off net 300 to 500 etc.

The statistical data provided from AKEP (AKEP, 2016), shows that the average consumption per user in a month for voice calls (outgoing) was up to 128 minutes in 2015, while the average consumption of SMS outgoing/month is about 30 SMS/month. The high volume of on net communication (voice and SMS) being sold seems not possible to be consumed in a month. Therefore, the investment needed to cope with such tariff packages with high volume of voice and SMS offered, seems to be unreasonable.

The readjustment of tariff packages in order to be closer with real user demand is a necessity. It is important to build a pricing structure based on the demand of different customer profiles, based on their own usage by using information systems and data analytics. This will offer more value to a specific customer, by providing a balance between the quality of service required, the user satisfaction and network capacity usage, while minimizing the sunk investments.

Conclusions and recommendations

Following the impressive development of the ICT during the recent years, data traffic demand has exponentially increased. This growth in mobile data traffic is a result of many factors, including the rise of internet and mobile penetration, the increase in applications and online services and the technological development of a new area of connected devices. This high demand needs to be addressed from the network operators through adequate optimization techniques for traffic management. Pricing policies need to consider keeping the balance between consumer and provider interests carefully. A detailed analysis is needed to find the technical solutions to pricing issues and their impact on the market. The network operators need to carefully follow the current trends of data traffic and proactively react by assuring demanded capacities. On the other hand, the regulatory bodies need to carefully check the transparency of the tariff plans offered in the market. Their role in ensuring customer protection and non-discrimination is crucial for the normal functionality of a liberalized communications market. The future communications will encompass many new types of online services and connectivity under the framework of the Internet of Things. This imposes the challenge of designing new traffic models and their corresponding charging policies. Future work on this field should be focused on traffic management and charging policies for this new era of communications. Optimizing charging policies is a continuous process that needs to be further studied in order to
identify critical aspects related to traffic management, and helping the innovation of designing tariff policies.

References


ECONOMETRIC MODELING OF EXTERNAL FACTORS INFLUENCE ON INNOVATION ACTIVITY IN THE CASE OF REGIONAL HETEROGENEITY IN RUSSIA

Oleg Mariev,1 Andrey Pushkarev2

Abstract: Innovations are essential for international competitiveness. In this research study, we analyze factors that affect the involvement of Russian firms in the innovation process. Our objective is to find out which factors on a regional level are the most important for innovative activity that would allow for improving the innovation policy. We overview the main groups of factors that were considered to be significantly affecting innovations. We then proceed to analyze the regional-level data, and classify the Russian regions into three groups based on set of their characteristics. Our results suggest that currently the most important external determinants of innovation propensity for the Russian regions are the share of organizations that carried out scientific research, FDI, appropriate infrastructure and the quality of human capital. It implies that the innovation policy should focus mainly on these indicators. We also found substantial differences between regional groups, both in significance of the considered indicators and in their power. Based on the results, we propose several policy recommendations that would facilitate innovation activities of the Russian regions.

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UDC Classification: 338.2

Keywords: innovations, human capital, external factors, regional heterogeneity, econometric modelling, self-organizing map

Introduction
Currently, both in Russia and in many other countries, more attention is paid to the issue of innovation activity and how this activity is related to various economic indicators, both at the micro and meso levels. Nevertheless, according to many studies and reports, innovation activity in the country remains at a low level (i.e. Schwab, 2016; Kuznetsov, 2015).

This paper aims to uncover how the range of external factors affect the innovation activities in Russia. It is done by analyzing different economic and social regional indicators that, according to previous research, may affect the innovative activities.

The rest of the paper is organized as follows. Section 2 provides a brief literature review. Section 3 provides a detailed description of the dataset and empirical methods used in this research. Section 4 discusses the empirical results based on the Russian region level data and their policy implications. Section 5 concludes the paper.

Literature review
To find the most relevant factors for the empirical analysis that affect regional innovation activity we analyzed a number of papers that discuss similar problems. In this section, we will give a short summary of them. Modern research identifies a large number of potential factors that can influence the innovative development of a region. In order to organize a large number of available indicators, we divide them into several groups.

1. Level of human capital in the region
The research of Junge et al. (2012) highlights that the presence of highly qualified specialists in the region is a prerequisite for the development of innovative technologies and products, and their production. To attract specialists to the region and prevent the outflow of highly qualified personnel, a decent standard of living is necessary. Therefore, this group of indicators, in addition to various indicators of the level of education, also may include public spending on medicine and education, the level of crime, GRP, the level of unemployment, the balanced financial result of organizations, etc.

2. Condition for competition development
Currently, among economists, the prevailing view is that the active perception, development and introduction of new technologies requires competition between enterprises. In particular, Dezhina

1 Graduate School of Economics and Management, Ural Federal University, Yekaterinburg, Russian Federation; Institute of Economics, Ural Branch of the Russian Academy of Sciences, Yekaterinburg, Russian Federation, olegmariev@mail.ru
2 Graduate School of Economics and Management, Ural Federal University, Yekaterinburg, Russian Federation, a.a.pushkarev@urfu.ru
(2008), in the work on the role of the state, science and business in creating an innovation-oriented economy, emphasizes that one of the reasons for the reluctance of Russian companies to invest in R&D is the lack of competition and the monopoly of larger companies on various markets. Thus, according to the author, the Russian economy needs to diversify the size of firms. To represent this group of factors indicators reflecting the development of financial institutions and the share of small enterprises in the total number of enterprises in the region are included.

3. Investment climate in the region

The innovation process is impossible without investing. To assess the investment activity of the region, it is necessary to take into account not only the volumes of investments, but also their distribution by industries and sources of financing. The impact of increasing investment in fixed assets on innovation is not obvious. As presented by Shtercer (2005), physical capital and knowledge are mutually reinforcing factors that stimulate economic growth. As it is mentioned in the named research, there is also an alternative point of view according to which the increase in physical capital leads to economic growth only in the medium term, and, accordingly, cannot determine innovation activity, which in most cases has a long-term characteristic.

4. Quality of the infrastructure

A large number of works have been devoted to the study of the influence of the level of infrastructure development on welfare. For example, Calderon and Serven (2004) in their study confirmed the positive relationship between a developed infrastructure and an increase in GDP, and a reduction in inequality in the distribution of income at the country level. The level of infrastructure development in the region affects the transaction costs of enterprises, and accordingly, the market efficiency of innovative products, which, in turn, will affect the desire and ability to carry out R & D. This group of factors includes such indicators as the volumes of cargo transportation, density of roads, number of telephone sets, etc.

5. Degree of involvement of the region in foreign economic activity

It is frequently mentioned that foreign economic activity and innovative activity in many respects are interconnected. On the one hand, without developing and introducing innovative products, domestic enterprises will not be able to compete in the world market. On the other hand, without developing the sphere of foreign economic relations, which is one of the main channels for technology transfer, it will be difficult for Russian organizations to raise the level of innovation activity. This group includes indicators that characterize the volume of exports/imports to near and far abroad; indicators of the number of agreements, the value of the subject matter of the agreement and the receipt/payment of exports/imports of technologies and services of a technical nature, foreign direct investment.

Foreign direct investment (FDI) in this case is not only a source of funds, but also one of the most important channels for technology transfer. However, it is necessary to take into account the industry specificity of FDI. Since one of the goals of the innovation process in Russia is reducing the share of raw-material oriented industries in GRP.

As an indicator of innovative development at the regional level, the number of granted patents for inventions has been chosen in this study. This indicator has a number of advantages. Firstly, it characterizes the effectiveness of the research sector, which is the main source of innovation. Secondly, this indicator can be considered objective, since the only source of information on the grant of patents for inventions in Russia is the Federal Service for Intellectual Property (Rospatent). Thirdly, this indicator is widely used in similar studies, demonstrating good results in reflecting the level of innovation activity (Gorodnikova et al., 2015).

We present a methodology for the econometric estimation in the next section.

**Data and econometric model**

As a statistical basis for the study, we used data from the Rosstat for 68 regions of Russia (regions with a small number of data were excluded from the sample) for the date range 2001-2014 published in official publications, as well as those contained in electronic databases.

However, taking into account the development heterogeneity of the Russian regions, the model was considered not only for the whole dataset, but also for individual groups formed according to certain indicators. For classification of the regions, self-organizing maps of Kohonen (SOM) were used. The
application of SOK allows grouping the analyzed territorial objects in accordance with their characteristics in such a way that objects close in value of these characteristics in the original multidimensional feature space are next to each other on the plane. The use of this method has a number of advantages, in particular, it allows taking into account the complexity of the formation of regional socio-economic systems.

The criteria for assessing the degree of industrial development of the region were chosen as targets for this study, since a high level of industrial development of the region can serve as an indicator of the readiness of its transition to innovative development. Based on the selected five criteria (gross regional product per capita, gross fixed capital formation per capita, urban population share in the total population of the region, industrial production index (as an % increase compared to the previous year), and the share of processing industries in the GRP), 68 regions were divided into three groups (see Figure 1, for indexing and more details see Appendix A).

Figure 1. Regional groups based obtained by applying self-organizing maps of the Kohonen approach

Source: authors’ estimates on Rosstat regional data

The first group incorporates most of the regions (62%). One can say that this group is representation of the general situation in Russia, since all of the five indicators for the average value completely repeat the dynamics and only slightly exceed the average characteristics of the whole array of regions. For the regions included in the first group, there is a high level of well-being and a well-developed manufacturing industry; therefore, it can be assumed that they are the most innovative, as evidenced by statistical indicators. The presence of a direct relationship between the level of industrial and innovative development confirms the correctness of the hypothesis put forward earlier to determine the criteria for breaking down regions.

The second group of regions is characterized by a much lower level of welfare, a relatively low opportunity for the accumulation of fixed capital, and the lowest number of urban population. At the same time, these regions are characterized by the largest increase in industrial production. The level of innovative development is lower than the national average. Thus, we can assume that the regions of the second group have a good potential for innovative development, however, first they need to achieve a higher level of industrial production development.

The third group of regions, at first glance, is characterized by a much higher level of income and a good ability to accumulate fixed capital. However, taking into account the fact that this group includes regions mainly with harsh climatic conditions, in particular, the regions of the Far North and the Northeast of the country, it is necessary to understand that this indicator needs to be adjusted taking into account much higher prices ("the factor of the northern appreciation"). Being significantly lower than the national average, the index of industrial production and the share of manufacturing industry indicate a weak industrial development of the regions of this group. The level of innovative development is inferior to the Russian average. Therefore, stimulating innovation development in these regions is the most problematic. The inclusion of St. Petersburg into this group is associated with a high level of welfare in the region, which, unlike the rest of the group, is not explained by a much higher price level. Thus, the innovative development level of St. Petersburg, rather, is more similar to the regions of the first group.

To compile a generalized econometric model that takes into account all possible factors, we used the modified Cobb-Douglas knowledge generation function with fixed effects at the firm level:
\[ y_{i,t} = \beta X_{i,t} + \alpha_i + \epsilon_{i,t}, \]  

(1)

Where \( y_{i,t} \) is an explanatory variable characterizing the innovative activity of the region \( i \) in year \( t \); 
\( X_{i,t} \) is a vector of explanatory variables for the region \( i \) in year \( t \); 
\( \alpha_i \) is a region-level fixed effect.

**Results**

Results of the modelling are presented in Table 1. They cover both overall model and three models for different regional groups.

<table>
<thead>
<tr>
<th>Variable</th>
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<tbody>
<tr>
<td>Log of GRP</td>
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<tr>
<td>Log of revenues of the consolidated budget of a constituent entity of the Russian Federation</td>
</tr>
<tr>
<td>Log of gross fixed capital formation</td>
</tr>
<tr>
<td>Log of the number of registered crimes per 100,000 people</td>
</tr>
<tr>
<td>Share of organizations that carried out scientific research and development in the total number of organizations</td>
</tr>
<tr>
<td>Log of the balanced financial result of enterprises</td>
</tr>
<tr>
<td>Log of the public railway tracks density (km per 10,000 sq. km)</td>
</tr>
<tr>
<td>Log of the public motor roads density (km per 10,000 sq. km)</td>
</tr>
<tr>
<td>Share of credit institutions in the total number of organizations in the region</td>
</tr>
<tr>
<td>Log of the volume of investments in the fixed capital of organizations: transport</td>
</tr>
<tr>
<td>Log of the volume of investments in fixed assets of organizations: communication</td>
</tr>
<tr>
<td>Share of graduates of state and municipal universities in the total population of the region</td>
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<tr>
<td>Log of the number of employees of organizations engaged in research and development</td>
</tr>
<tr>
<td>Log of FDI</td>
</tr>
<tr>
<td>Log of payment of funds for the import of technologies and services</td>
</tr>
<tr>
<td>Number of observations</td>
</tr>
<tr>
<td>R²within</td>
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</table>

<table>
<thead>
<tr>
<th>Overall</th>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
</tr>
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<tbody>
<tr>
<td>0.42***</td>
<td>-</td>
<td>1.27***</td>
<td>-</td>
</tr>
<tr>
<td>0.14***</td>
<td>0.24***</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>-0.09***</td>
<td>-0.08***</td>
<td>-0.12***</td>
<td>-</td>
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<tr>
<td>-</td>
<td>-</td>
<td>-0.48**</td>
<td>-</td>
</tr>
<tr>
<td>3.97***</td>
<td>2.82***</td>
<td>9.43***</td>
<td>5.84**</td>
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<tr>
<td>-</td>
<td>-</td>
<td>0.05*</td>
<td>-</td>
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<tr>
<td>0.26***</td>
<td>0.16**</td>
<td>1.08***</td>
<td>-</td>
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<tr>
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<td>0.05***</td>
<td>-</td>
<td>0.33*</td>
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<tr>
<td>-</td>
<td>-</td>
<td>12.97*</td>
<td>-</td>
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<tr>
<td>0.01*</td>
<td>0.02***</td>
<td>0.01**</td>
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<tr>
<td>-</td>
<td>0.01*</td>
<td>-</td>
<td>-</td>
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<tr>
<td>0.40*</td>
<td>0.68***</td>
<td>1.20*</td>
<td>-</td>
</tr>
<tr>
<td>0.13**</td>
<td>0.17***</td>
<td>0.26**</td>
<td>1.33***</td>
</tr>
<tr>
<td>0.02***</td>
<td>0.02**</td>
<td>0.02***</td>
<td>0.01**</td>
</tr>
<tr>
<td>-0.04***</td>
<td>-0.23***</td>
<td>-0.06**</td>
<td>-</td>
</tr>
<tr>
<td>952</td>
<td>588</td>
<td>280</td>
<td>84</td>
</tr>
<tr>
<td>0.79</td>
<td>0.82</td>
<td>0.88</td>
<td>0.55</td>
</tr>
</tbody>
</table>

Source: authors’ estimates on Rosstat regional data

*Significant at 10%; **Significant at 5%; ***Significant at 1%. – not included in the final model due to insignificance
According to the results of the econometric estimation it can be concluded that out of each of the five initially formed groups of factors potentially affecting the innovation development of the regions, at least one indicator is included in the final model.

According to the test results, the model includes two factors that can be attributed to the field of international effects: foreign direct investment and payment of funds for the import of technologies and services. The significance of the first one may be because products and technologies created through direct foreign investment are often new. However, they may also represent imitations of already used technologies abroad, and in this case, accordingly, may not lead to an increase in the number of issued patents. The inverse relationship between the number of issued patents and the payment of funds for the import of technology is natural, and indicates a decrease in the innovative activity of enterprises with the possibility of borrowing technologies from abroad.

The positive correlation between the level of development of the regional economy (GRP) and the number of patents granted to inventions confirms the hypothesis that the most innovative regions of Russia also have the most developed economy.

The significance of the revenues of the regional budget can be explained as follows: an increase in the budget revenue component can increase the financing of various government programs aimed at improving human potential, infrastructure, and stimulating innovation activity.

The negative impact of gross fixed capital formation testifies to the hypothesis that the increase in intangible assets (including patents) and the increase in fixed assets are interchangeable. Enterprises investing in fixed assets divert a significant part of their income for this and, due to financial constraints, they do not have the opportunity to invest in research and development in parallel.

The significance of infrastructure development is confirmed by the positive influence of the railway's density and investments in the transport industry. Improving the transport infrastructure has a positive impact on turnover, thereby increasing the potential sales markets, which is an important incentive in deciding whether to develop a new product.

The quality of human capital in the model is reflected by two variables (the share of graduates of state and municipal higher education institutes in the total population of the region, and the number of employees of organizations engaged in research and development), which speaks of the exceptional importance of human resources development for innovative development. A direct and rather strong relationship between the share of organizations that have performed scientific research and development, in the total number of organizations, and the number of issued patents indicates a high degree of effectiveness of research activities. In other words, a large number of organizations engaged in R & D achieve the desired result, which is the receipt of a patent. Therefore, further investments in this fields contributes to the emergence of innovations.

Analysis of separate regional groups also shows several noteworthy results. The significance of the logarithm of revenues of the consolidated budget for the regions of the first group indicates that in these regions the state is most active in supporting innovation development through various programs financed (partly) by state funds. It can also be assumed that the amount of investment in the fixed capital of communication industry enterprises turned out to be significant only for the regions of the first group due to the already achieved high enough level of technology development in comparison with other regions.

The significance of the balanced financial result of enterprises for the regions of the third group indicates that innovation activity is carried out, first of all, at the expense of the profit of organizations. This is facilitated by the inadequate development of financial institutions and, consequently, the inaccessibility of the fund for borrowing. Another feature of this group is the strong significance of this indicator of human development, such as the number of employees of organizations engaged in research. Due to severe climatic conditions and the low level of social and economic development, the regions of this group are unattractive for young specialists, which leads to a shortage of qualified scientists and researchers. Thus, with low patent activity in general, an increase in the number of researchers leads to a substantial increase in the number of issued patents.

It can be concluded that each group has individual characteristics that manifest themselves either in the degree of influence of a factor or in the absence/presence of its influence, which highlights the need to improve regional economic policies to stimulate innovation in specific regions.
However, there are also common factors for all regions that determine their innovative development, as evidenced by the high explanatory power of the general model of factors applied to the regions. Such indicators include the share of organizations that carried out scientific research and development in the total number of organizations; logarithm of the number of employees of organizations engaged in research and development; logarithm of direct foreign investments.

At the same time, the absolute values of the coefficients for the first two named variables show a difference in the power of their influence in regions of different groups. The third factor, foreign direct investment, influences positively and equally on the innovation activity of region groups, which necessitates its further detailed study with the aim of stimulating economic policy at various levels.

**Conclusion**

To sum up, in this research we have analyzed effects of different regional level factors on innovation activities. The results suggest that indicators, such as FDI, regional budget revenue, GRP, infrastructure development level and quality of human capital have a positive effect on the number of patents granted. Therefore, it may be beneficial for policies to target fields that these indicators represent, when aiming to increase innovation activity.

Additionally, we find that there are substantial differences between regional groups. For example, the group of Northern regions shows weaker correlation with most of the indicators however, significant ones have a stronger effect on innovation output than in all other regions. Thus, policy should be adjusted with these specialties in mind. We also find that there are several generally significant indicators, such as share of organizations that carried out scientific research and development in the total number of organizations; logarithm of the number of employees of organizations engaged in research and development; and logarithm of direct foreign investments. This means that federal policy should target these common traits first.

As prospects for further research, it would be beneficial to construct a model that would include not only factors on a regional level, but also at the level of separate firms. It would increase the overall quality of the model and provide better understanding, which firms the government should target as the main innovators and how exactly they could be supported.

**Acknowledgements**

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**References**


Appendix A: Groups of regions and their indexes

Group 1: Amur Region (2), Astrakhan Region (4), Belgorod Region (5), Chelyabinsk Region (7), Irkutsk Region (8), Ivanovo Region (9), Jewish Autonomous Region (10), Kemerovo Region (16), Khabarovsk Territory (17), Kirov Region (19), Kostroma Region (21), Krasnodar Territory (22), Krasnoyarsk Territory (23), Kursk Region (25), Leningrad Region (26), Lipetsk Region (27), Moscow Region (31), Nizhny Novgorod Region (33), Novgorod Region (34), Novosibirsk Region (35), Omsk Region (36), Orel Region (37), Orenburg Region (38), Perm Territory (40), Primorsky Territory (41), Republic of Bashkortostan (44), Ryazan Region (51), Samara Region (53), Smolensk Region (55), Sverdlovsk Region (58), Republic of Karelia (60), Republic of Tatarstan (62), Tomsk Region (63), Tula Region (64), Tver Region (65), Udmurt Republic (67), Ulyanovsk Region (68), Vladimir Region (69), Volograd Region (70), Vologda Region (71), Voronezh Region (72), Yaroslavl Region (74).

Group 2: Altai Territory (1), Pskov Region (42), Republic of Adygea (43), Republic of Buryatia (45), Chuvash Republic (46), Republic of Dagestan (47), Republic of Mordovia (48), Republic of North Ossetia-Alania (49), Rostov Region (50), Saratov Region (54), Stavropol Territory (57), Tambov Region (59).

Group 3: Kamchatka Territory (14), Komi Republic (20), Magadan Region (28), St. Petersburg (56), Republic of Sakha (Yakutia) (61).
THE IMPORTANCE OF TANGIBLE FIXED-ASSETS REVALUATION: A COMPARISON BETWEEN ROMANIAN ACCOUNTING REGULATIONS AND THE IPSAS 17 ‘PROPERTY, PLANT AND EQUIPMENT’

Nicoleta Cristina Matei,1 Marin Țole,2 Mihaela Andreea Stroe3

Abstract: The purpose of a tangible fixed-assets revaluation is to establish true values for assets and a genuine picture of the financial position and the result of public institutions. This article presents the legislation needed to implement international provisions regarding the accounting system of public institutions, especially those concerning the revaluation of tangible fixed assets. It contains a comparison between the national regulations and guidelines of the International Public Sector Accounting Standard for tangible fixed assets. It highlights the convergences and divergences regarding the accounting treatment for determining the initial value of tangible fixed assets, the setting out of the reassessed value, the accounting treatment applied to the revaluation results, and the achievement of a revaluation surplus. It also describes the manner in which the revaluation of tangible fixed assets can influence the financial and patrimonial position of a public institution.

JEL Classification Numbers: M41; DOI: http://dx.doi.org/10.12955/cbup.v5.944

UDC Classification: 657

Keywords: tangible fixed-assets revaluation, initial value, fair value, financial position, result of public institutions

Introduction
Since 2005, coinciding with the adoption of the methodological norms, the accounting system of public institutions underwent a comprehensive reform to adapt to the new economic, political, legal, and social context. An objective of the reform is to implement international accounting standards in the public sector. However, the current national accounting regulations have inconsistencies with the provisions of international standards.

This study investigates statements relating to the converging and diverging aspects of adapting the national accounting regulations to the international standards of public sector accounting regarding the revaluation of tangible fixed-assets. These include the accounting treatments applied to determine the value of tangible fixed-assets at the balance sheet date; the new provisions concerning the revaluation of fully depreciated tangible fixed-assets; and how the revaluation of tangible fixed-assets influence the financial position and the patrimony of a public institution.

Literature review
As Ristea and Jianu (2010) wrote, the ever-increasing need for information in the public system as well as the need to provide comparable and transparent information have led to the development and popularization of the International Public Sector Accounting Standards (IPSAS).

Luca (2010) identifies how the accrual accounting principles, as well as the international regulatory framework for public accounting, were considered in developing the methodological norms for organizing and operating the accounting departments of public institutions adopted by the Minister of Public Finance Order No. 1917/2005.

According to Luca (2010) the transition to accrual accounting was manifested amid extensive financial and accounting changes, which include the adoption of the following: Law No. 500/2002 on public finance; new budget classification in compliance with the European System of Accounts (ESA) 1995; Government Ordinance No. 81/2003 on revaluation and depreciation of fixed-assets owned by public institutions; and modification, addition, and republishing of the Accounting Law No. 82/1991.

Data and Methodology
The study involved normative research in analyzing the manner in which the IPSAS 17 ‘Property, Plant and Equipment’ provisions are implemented under the national accounting regulations for revaluating...
tangible fixed assets. It was considered that because the tangible fixed-assets are elements that hold a significant share in the patrimony of public institutions in Romania, their ‘balance-sheet’ value had special importance in decision-making.

Results and Discussion

Accounting Treatments on Establishing Tangible Fixed-assets Initial Value

Fixed assets represent resources controlled by a public institution as a result of past events that are expected to generate future economic benefits for the institution, having a realistically measured cost and which are held with a view for long-term use.

As shown in the Minister of Public Finance Order No. 1917 of 2005, tangible fixed-assets are regarded as an item or, cumulatively, a set of items that meet certain criteria. These criteria include 1) their input value is higher than the limit established by government order and 2) the period of their normal use is greater than one year.

The IPSAS 17 ‘Property, Plant and Equipment’ has no minimum value for recognizing assets as tangible fixed assets, but rather refers to the purpose of acquiring the goods, the employment period, and the cost, which must be realistically measured. The entity retains any future economic benefits associated with the asset.

The tangible fixed assets, both according to the national accounting regulations and the IPSAS 17 ‘Property, Plant and Equipment’, are initially to be evaluated by cost when acquired for consideration or produced by the institution, or by a fair value when obtained free of charge. In this latter case, fair value is not an object for revaluation but represents an amount for which the asset could be willingly exchanged between two knowledgeable parties, in the context of a transaction with an objective set price (Luca, 2010).

The initial cost of a tangible fixed asset can either equal the acquisition cost, in the case of acquiring goods for consideration, or the production cost of goods manufactured by direct labor.

The initial cost of any tangible fixed asset obtained for consideration includes the purchase price, non-recoverable expenses related to the purchase, and any other expenses directly attributable to acquiring the asset, apart from the trading discounts under national regulations. The international accounting standards for the public sector mention that, upon the initial recognition of a tangible fixed asset, one must include in its cost of acquisition the nonrecoverable expenses. Any costs are directly attributable to conveying the asset to the location and provided the conditions necessary for it to function in the manner intended by management.

According to the Minister of Public Finance Order No. 1917 of 2005, the acquisition cost of raw materials, consumables, and production expenses that are directly attributable to the asset are part of the production costs.

The initial cost of an asset plays a critical role in establishing its accounting value, a value against which one compares a fair value, obtained as a result of revaluation, to determine a difference.

Revaluation as a Procedure to Establish Fixed Tangible Assets Current Value

The annual financial statements of a public institution, according to the national accounting regulations, must provide a true picture of the total assets, liabilities, financial position, and performance as well as any patrimony. This requires public institutions to present their tangible fixed assets at the end of the financial exercise as well as the balance sheets showing the assets at their ‘real’ value, a value that can be determined by a basic accounting treatment, an allowed alternative, or by revaluation, respectively.

Both the national accounting regulations and the IPSAS 17 ‘Property, Plant and Equipment’ stipulate provisions that allow public institutions to opt for one of two treatments for setting the value of the tangible fixed assets, as at the balance sheet date.

According to the basic accounting treatment, tangible fixed assets can be presented as at the balance sheet date, as a cost under accumulated depreciation or accumulated depreciation loss, whereas according to the allowed alternative treatment, they can be presented as their revaluated value.

The revaluation of tangible fixed assets updates their value to one considered a fair value.

The fair value is usually determined by a member of the evaluation profession and, generally speaking, it amounts to the market value of goods under the IPSAS 17 ‘Property, Plant and Equipment’. At the
same time, the national accounting regulations state that the fair value is determined by a commission appointed by the Head of the public institution, where where it is not established by authorized evaluators.

The commission appointed by the Head of the public institution must comprise members with the appropriate economic and technical background, and who can assess the condition, depreciation, use, and market value of tangible fixed assets subject to revaluation. The revaluation commission members establish the updated value of these assets by multiplying the accounting entry by the consumer price index, which is released on the website of the National Statistics Institute.

The national accounting regulations and the international standards provide for a reassessment with sufficient regularity so that the accounting value does not differ substantially from that which would be determined by using the fair value as at the balance sheet date. However, there are certain divergences, such as the revaluation of land and buildings, which, according to national rules on a revaluation of tangible fixed assets, must be performed at least once every three years, starting with the year 2008.

For tangible fixed assets with a market value, the fair value is the same as the market value, but there may be cases of assets that are not traded on the market. In these circumstances, the value of the assets is established according to the IPSAS 17 ‘Property, Plant and Equipment’ based on other elements with similar characteristics, in similar circumstances and locations.

The national rules on the revaluation of tangible fixed assets owned by public institutions, provided by the Minister of Economy and Finance Order No. 3471 (2008), categorize the revalued tangible fixed assets as follows:

- Land and land development, buildings, technical installations, means of transportation, animals, and plantations, furniture, office equipment, equipment for the protection of human and material values and other tangible fixed assets;
- Tangible fixed assets in concession, rented, or in free use for persons;
- Legal assets, without any patrimonial purpose, as well as the assets found in the administration of autonomous administrative overheads;
- Capacities commissioned in part, of the kind of tangible fixed assets that have not yet been registered as such;
- Tangible fixed assets that have undergone investment changes (modernization, repairs, rehabilitation and consolidation) that have increased their ‘accounting book’ value, regardless of the source of investment funding;
- Tangible fixed assets acquired by public institutions under finance leasing contracts;
- Tangible fixed assets at the diplomatic, commercial, military representations abroad, in conflict zones.

According to the Minister of Economy and Finance Order No. 3471 (2008), the fixed assets that are not subject to revaluation have the following categories:

- Tangible fixed assets that enter the patrimony of public institutions during the year when the reassessment is carried out and are recorded in books as their cost of acquisition, production, or fair value, as appropriate;
- Tangible fixed assets with a normal service life expiring at the revaluation date;
- Tangible fixed assets on conservation, as well as the mobilization reserves that are highlighted in accounting books as tangible fixed assets;
- Tangible fixed assets that have documents drawn, but the approvals for legal closure are unsettled, and the assets have not been dismantled, demolished or converted into parts; and
- Tangible fixed assets in progress.

Also, the national rules on a revaluation of tangible fixed assets contain some clarifications related to depreciable assets, namely those in the private domain of the state, the administrative-territorial units, and the private property of public institutions. Where these tangible fixed assets have common characteristics shared with the inventory objects, they are fully depreciated, and their value is less than the limit established by the government decision. They are classified in the category of ‘inventory object materials in use’. Inventory object materials derived from the tangible fixed assets that are recorded in
this category will be highlighted in the accounting books as their fair value, established by a committee of institution experts, appointed by the authorizing officer.

As previously mentioned, revaluation represents a procedure of establishing a fair value, which is the current value of the tangible fixed assets. The fair value is set up as a result of applying the alternative accounting method for determining the value of the tangible fixed assets as at the balance sheet date. As an alternative approach, public institutions can opt out of its application for the tangible fixed assets that can be revalued. However, for land and buildings, there is a compulsory treatment established using national rules.

Accounting Treatment of Tangible Fixed-assets Revaluation Results and Influence on Financial Position and the Result of Public Institutions

According to the national rules on revaluation of tangible fixed assets, the value resulting from the revaluation will be attributed to the asset in place of the acquisition cost or the production cost, as the case may be. Therefore, in the balance sheet, the tangible fixed assets that have been revalued will feature their revaluated worth.

The accounting books of public institutions in Romania show both depreciable and non-depreciable tangible fixed assets. In principle, the tangible fixed assets from the private domain of the state, the administrative-territorial units, the private property of public institutions and which are not represented by land, are depreciable. Their depreciation means the inclusion of a part of their initial value as an expense for the public institution until the full amount of the investment is recovered.

The following are tangible fixed assets (Government Ordinance no. 81, 2003) that are not depreciable: the property belonging to the public domain of the state and the territorial administrative units in compliance with the law, including the investments made in this property; tangible fixed assets from the patrimony of local public services performing economic activities, in which wear and tear is recovered using rate or price, in compliance with the law; tangible fixed assets on conservation, as well as the mobilization reserves that are highlighted in accounting books as tangible fixed assets; lakes and ponds that are not the result of an investment; land; property of the national cultural heritage; assets used under a lease; and goods, such as weapons and combat techniques.

According to the IPSAS 17, ‘Property, Plant and Equipment’, land is not depreciable as it does not have a limited service life, but all other tangible fixed assets can be depreciated.

The results of the revaluation are treated in the accounts of public institutions in Romania depending on the depreciable nature of tangible fixed assets.

The increase or decrease in value of the depreciable tangible fixed assets is calculated based on the difference between the value obtained from the revaluation and that recorded in the accounting.

The national accounting regulations and the IPSAS 17 ‘Property, Plant and Equipment’ stipulate different methods for treating results of the tangible fixed-assets revaluation (Table 1).

<table>
<thead>
<tr>
<th>The Accounting Net Value of Tangible Fixed Assets</th>
<th>National Accounting Regulations</th>
<th>IPSAS 17 ‘Property, Plant and Equipment’</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increases</td>
<td>The increase credits the account of ‘revaluation reserves’ and an income account to the extent to which it compensates a revaluation decrease of the same assets, previously acknowledged as expenditure</td>
<td>The increase credits the account of ‘revaluation surplus’ to the extent to which it compensates a revaluation decrease of the same assets, previously acknowledged as expenditure</td>
</tr>
<tr>
<td>Decreases</td>
<td>The decrease debits the account of ‘revaluation reserves’ and an expense account to the extent in which it exceeds the revaluation reserve detained following a previous revaluation of the same assets</td>
<td>The decrease will be subtracted from any revaluation surplus to the extent of which it does not exceed that surplus even as expenditure, but only for the difference that exceeds the revaluation surplus</td>
</tr>
</tbody>
</table>

Source: Authors

The accounting treatment of results from the tangible fixed-assets revaluation, for international regulations and standards, is similar to the treatment of the national regulations, except that the national
accounting regulations apply this treatment to the results of the revaluation of depreciable tangible fixed assets. The results of the revaluation of non-depreciable tangible fixed assets are treated, in compliance with national rules, as follows:

- as an increase in the revaluation reserve which is simultaneously transferred into the credit of the funds’ account where the revaluation result is an increase in the accounting value; and
- as a decrease in the revaluation reserve which is simultaneously transferred to the debit side of the funds’ account where the revaluation result is a decrease in the accounting value.

According to the national rules on the revaluation of tangible fixed assets, the revaluation reserve related to the depreciable tangible fixed asset is transferred onto the retained earnings when they are fully depreciated, decommissioned, sold, or transferred free of charge. The IPSAS 17 ‘Property, Plant and Equipment’ adds to the national rules regarding the surplus achieved from the revaluation of tangible fixed assets. It specifies that a portion of the surplus made while the fixed assets are being used can be transferred to the retained earnings and is calculated as the difference between the value of the depreciation, based on the revaluated accounting value of the assets and the cost-based depreciation.

As previously mentioned, the tangible fixed assets that are subject to revaluation are presented in the balance sheet as their revaluated value. The value of these assets as at the balance sheet date influences the value of the total assets as an increasing or decreasing trend, depending on the results of the reassessment. The financial position of the public institution is given by the value of its assets, liabilities, and capital. As the total asset value is influenced by the value of the tangible fixed assets resulting from the revaluation, conceivably the financial position equally depends on the results of the revaluation.

The value resulting from the revaluation will replace the initial value of the tangible fixed assets, and in the case of depreciable assets, the depreciation is calculated by taking the reassessed value into account. Therefore, the expenses incurred from the depreciation of the tangible fixed assets will be lower or higher depending on the depreciable value. The patrimony of public institutions is determined as the difference between the recorded revenue and the expenditure, including the depreciation expenses. Thus, the depreciation expenditure will influence the patrimonial result for the public institution.

In conclusion, the revaluation of the depreciable and non-depreciable tangible fixed assets affects the financial position, while the revaluation of depreciable tangible fixed assets influences the patrimonial outcome.

**Conclusion**

The Romanian accounting system has undergone a comprehensive reform. Consequently, the accounting system of the public institutions in Romania follows the accrual accounting principle and has largely implemented the provisions of the international reporting standards for the public sector. The adoption of rules on the revaluation of tangible fixed assets was part of the reform. The revaluation installs the present value of the tangible fixed assets owned by public institutions, providing an accurate and fair presentation of assets. Both, the national accounting regulations and the international standard on the tangible assets of public entities provide accounting treatments for determining the value of the assets as at the balance sheet date. The basic treatment by which the tangible fixed assets appear on the balance sheet as a cost below the depreciation value and the alternative treatment that allows the presentation of tangible fixed assets at their fair value on the balance sheet, both, provide a value resulting from the revaluation process. Public institutions can apply a single treatment to establish the balance sheet value of the tangible fixed assets. Unlike the international accounting standards for the public sector, the national rules on the revaluation of the tangible fixed assets, owned by public institutions, provide for the compulsory revaluation of land and buildings at least once every three years. There are divergences between the national rules on the revaluation of the tangible fixed assets owned by public institutions and that of the international accounting standards for the public sector. These concern who is responsible for determining the fair value resulting from revaluation; setting up the fair value; the accounting treatment of the revaluation results; and the revaluation surplus achievement. The revaluation of the tangible fixed assets plays a major role in determining the current value of assets, thereby presenting a true and fair image of the financial and patrimonial position of a public institution.
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Order of the Minister of Economy and Finances approving the methodological norms on the reassessment and amortization of tangible fixed-assets owned by the public institutions, no. 3471, art. 3-6, 2008

Order of the Minister of Public Finances for the approval of the methodological norms regarding the organization and management of the bookkeeping department of public institutions, the plan of accounts for public institutions and its enforcement instructions, no. 1917, 2005


Abstract: The authors of this article discuss the tourism development conditions in the municipalities of the Eastern Aukštaitija region, in Lithuania, and the Latgale region, in Latvia. The aim of the research is to explore tourism development conditions in the municipalities of the Eastern Aukštaitija region, in Lithuania and Latgale region, in Latvia. Objectives of the research are to characterize the factors influencing the development of tourism, to perform an analysis of the main factors of tourism development of the Eastern Aukštaitija region in Lithuania and the Latgale region in Latvia, and to define the major factors of tourism management in the municipalities of the Eastern Aukštaitija region, and the Latgale region. The scientific problem - the tourism development trends have not been studied in a local, municipality level in Lithuania and Latvia and tourism in districts is developed without a clear and long-term development strategy and consistent implementation of the program. The authors of the article apply the analysis of scientific literature, quantitative research – a survey and questionnaire data generalization. Six tourism specialists in the eastern Aukštaitija region, and 30 tourism specialists in the Latgale region, were interviewed. Tourism development issues are discussed and the results of the research (analysis of scientific literature and the questionnaire, analysis of strategic documents) are performed. The conclusions of article are: factors which influence tourism in the Lithuanian and Latvian regions most are the image of tourism destination/awareness, quality of tourism services, management of tourism destination, variety of tourism services and tourism infrastructure. Second conclusion: tourism specialists identified management of tourism destination, image of tourism destination/awareness, quality of tourism services in Lithuania region; cultural, natural and human resources and tourism services (travel organization, tourism information services, nutrition in the Latvian region, as tourism development strengths in municipalities of the Lithuanian and Latvian region; tourism diversity and tourist infrastructure in the Lithuanian region and tourism infrastructure and entertainments in Latvia region were identified as weaknesses. Third conclusion: tourism development in both regions is threatened by such factors as unplanned changes of the state economic development priorities, population migration to other countries and other factors. While, tourism development in the region can benefit from EU funds, and the growing demand for active recreation and health tourism products in the hospitality industry and etc. Tourism development at the municipalities of both regions in Lithuania and Latvia is influenced by such factors, as the development of the tourism planning and management system, adequate competence of human resources, cooperation between public and private sectors, planning and organization, legal tourism base, tourism projects development and implementation, tourism development strategy and research in the tourism development area.

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UDC classification: 35

Keywords: tourism, tourism development, factors, conditions, region, municipality, Lithuania, Latvia.

Introduction

Due to the influence of economic, social and political globalization processes tourism has become one of the leading industries in many countries. According to the data from the World Tourism Organisation (WTO), tourism, which has a direct and indirect impact on economics, on a global scale creates 9% GDP, 1 in 11 jobs, 6% of the world’s exports, and forecasts an increase of international tourists up to 1.8 billion for 2030. Over the last decade, tourism has become an important economic sector in Lithuania and Latvia - since 2009 each year inbound tourism revenue steadily increases. Many scientists have analysed tendencies of tourism development: Dwyer and Kim (2003), Gunn (2002), Dmitrijeva and Šenavičiauskas (2009) analysed tourism destination competitiveness factors, Dredge and Jenkins (2007), Sharpley and Telfer (2002), Hall (2007) - analysed tourism planning and development, and Go and Govers (2000) - analysed integrated quality management for tourism destination and others. In Lithuania, these issues were analysed: trends and development of modern tourism (Korniečiuk and Pipiriene 2015), assessment of the Lithuanian tourism potential (Andrulienė et al, 2011), conceptualization and trends of tourism development in Lithuania (Žilinskienė and Petravičienė, 2007), tourism development and management (Ligėkienė, 2003), management of tourism development in the regions (Žilinskienė and Skrodenienė, 2003) and others. Tendencies of tourism development at the municipality level were researched by Paulauskiene (2013), who analyzed perspectives of tourism management development in Lithuania and Dapkus and Gaižauskiene (2009).
reviewed tourism development at the municipality level. However, tourism development conditions at the municipality level have not been researched, only sporadic studies have been performed. For these reasons, tourism in many municipalities has developed without a clear and long-term development strategy and consistent implementation of the program.

The object of the research is tourism development conditions in the municipalities of Eastern Aukštaitija region, Lithuania and Latgale region, Latvia.

The aim of this research is to explore tourism development conditions in the municipalities of the Eastern Aukštaitija region in Lithuania, and the Latgale region in Latvia.

Objectives of the research are

- To characterize the factors influencing the development of tourism.
- To perform the analysis of the main factors of tourism development of the Eastern Aukštaitija region in Lithuania and the Latgale region in Latvia.
- To define the major factors of tourism management in municipalities of the Eastern Aukštaitija region and Latgale region.

**Research methods.** The authors of the article apply the analysis of scientific literature, quantitative research – as well as a survey and questionnaire data generalization. The research instrument (questionnaire) was developed by grouping questions into blocks related to the research topic for the qualitative and qualitative studies. Six tourism specialists, responsible for the tourism development in the Eastern Aukštaitija region (Anykščiai and Utena municipalities and specialists of Utena, Ignalina and Zarasai tourism information centres, Molėtai tourism and business information centre) in Lithuania and 30 tourism specialists in the Latgale region; in the municipalities of Daugavpils city, Daugavpils district, Rēzekne city, Rēzekne district, Aglona, Balintava, Balvi, Cibla, Dagda, Ilūkste, Kārsava, Krāslava, Līvāni, Ludza, Preiļi, Riebiņi, Rugāji, Vārkava, Viļaka, Viļāni and Zilupe districts, were interviewed.

Tourism development issues are discussed and the research results are presented.

**Literature review**

The WTO defines tourism as a type of travel, tour, when a person leaves his job and place of residence for more than one day and less than 12 months, and the aim of the trip is not recruitment or paid activities (www.unwto.org). For all countries, welcoming tourists is one of the most important conditions to preserve and develop their national identity. Tourism development is understanding the physical changes caused by increasing tourist interest in the area and this expression of interest in performance - increasing incoming traffic According to Ligeikienė (2003) tourism development can be seen as an assumption for the improvement of life quality of tourists and the local community. Tourism development goals in the overall economic structure have impact on and relate to strategies of other branches of the economy, their actions and measures, and the public sector, such as environmental protection, transport, agriculture, regions, development of small and medium businesses. Tourism and regional development are linked to each other in the national and even global context (WTO, 1980). Sharpley and Telfer (2002) state that tourism has a direct impact on national, regional and local economics, whereas tourism development has potentially beneficial economic effects, which in turn positively affects the destination’s economic development. Hall (2007) has stated that tourism development has a new tradition of sustainable development, formed in the last decades.

In many countries, the most popular tourist attractions are related with natural resources (the sea, beaches, climate, mountains, and so on). This shows that the development of tourism (as well as economic benefits) is based on the natural resources that are free, because they do not need to be built or created (Dredge and Jenkins, 2007). In order to determine the development of tourism destination, tourism resources of the destination have to be estimated.

Tourism attraction affects service development, which is composed of tourism resources (natural, cultural, social/human) and infrastructure; tourism industry components (accommodation, meals, transportation, entertainment, information, management, travel organization, training services); status of tourism destination (for example, a resort, a UNESCO world heritage site, etc.); image of tourism destination; activities of tourism interested agents; and location of tourism destination in the tourism.
network (Andrulienė et al, 2012). Table 1 summarizes various factors which influence tourism destination development.

<table>
<thead>
<tr>
<th>Author</th>
<th>Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indriūnas (2015)</td>
<td>Leisure (recreation) objects, infrastructure of services, infrastructure of passenger transport, engineering infrastructure of the tourism destination, organization of travel, tourism information and advertising</td>
</tr>
<tr>
<td>Andrulienė et al (2011)</td>
<td>Tourism resources and infrastructure, components of tourism industry, the flow of tourists, the image of the tourism destination, activities of tourism interested agents, the position of tourism destination in the tourism network.</td>
</tr>
<tr>
<td>Dmitrijeva and Šeniavskij (2009)</td>
<td>Political stability, the natural environment, safety, health and hygiene, transport infrastructure, information-communication technologies, price policy, personnel management, tourism infrastructure management of tourism destination, natural and cultural resources</td>
</tr>
<tr>
<td>Dwyer and Kim (2003)</td>
<td>Natural resources, artificial resources, special events, supporting factors, tourism destinations management, demand factors, factors of market performance</td>
</tr>
<tr>
<td>Ligeikienė, 2003</td>
<td>Conditions of globalization, integration, information technology and economic progress and changes in consumer behavior</td>
</tr>
<tr>
<td>Wöber (2002)</td>
<td>Cultural and natural resources, tourism, infrastructure, personnel competence, variety of tourist market, geographic environment, virtual environment</td>
</tr>
<tr>
<td>Sharpley and Telfer (2002)</td>
<td>Creation of job places, economic diversification, support for the development of public services, recreational services to tourists and so on.</td>
</tr>
<tr>
<td>Go and Govers (2000)</td>
<td>Access of tourism destination, availability of tourism destination, quality of service, government support for tourism, price policy, the image of the tourism destination, the climate and the environment and attractiveness</td>
</tr>
</tbody>
</table>

Source: Authors

As we can see, experts recommend assigning tourism resources, tourism infrastructure, variety of tourism services, tourism management, virtual environment, the quality of tourism services, the image of tourism destination, and the events to the development factors of a tourism destination.

Sharpley and Telfer (2002) note, that the contractual basis of operation of the private and public sectors of the economy, makes it possible to form a common approach to national, regional and local development goals and allows the necessary conditions to evaluate tourism by using a wide range of indicators, such as job creation, economic diversification, support for public services in the development of recreational services for tourists and etc.

In practice, the development of tourism is realized through plans and selected indicators. Gunn (2002) was one of the first scholars to describe tourism planning as a tourism destination development tool. According to Gunn (2002), the aim of planning is related with the increase of income and employment, conservation of resources and conditions for traveler satisfaction. It is noted that in insufficiently or under-developed tourism destinations, plans can become a serious support for further development of tourism, while in the developed countries (regions) they are often used as a tool to ‘revive the tourism sector and to maintain its viability in the future’ (WTO, 1994).
Results and Discussion

Table 2: Assessment of important factors, affecting Lithuanian and Latvian tourism development

<table>
<thead>
<tr>
<th>Factors</th>
<th>Assessment (5-point system in Lithuania region)</th>
<th>Assessment (5-points system in Latvia region)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tourism resources (cultural, natural, human, financial)</td>
<td>4.80</td>
<td>4.00</td>
</tr>
<tr>
<td>Tourism infrastructure</td>
<td>4.20</td>
<td>4.10</td>
</tr>
<tr>
<td>Tourism services</td>
<td>4.00</td>
<td>4.00</td>
</tr>
<tr>
<td>Virtual environment</td>
<td>4.80</td>
<td>4.30</td>
</tr>
<tr>
<td>Image of tourism destination/ awareness</td>
<td>5.00</td>
<td>5.00</td>
</tr>
<tr>
<td>Management of tourism destination</td>
<td>5.00</td>
<td>4.90</td>
</tr>
<tr>
<td>Quality of tourism services</td>
<td>5.00</td>
<td>5.00</td>
</tr>
<tr>
<td>Events</td>
<td>4.10</td>
<td>3.50</td>
</tr>
</tbody>
</table>

Source: Authors

As we can see, tourism specialists from both regions rated the same factors with similar points, such as image of tourism destination/awareness (5.00 points), quality of tourism services (5.00 points), management of tourism destination (Lithuania tourism specialists are evaluated as 5.00 points, Latvian tourism specialists – 4.90 points), tourism services (4.00 points), tourism infrastructure (Lithuania tourism specialists are evaluated as 4.20 points, Latvian tourism specialists – 4.10 points). Tourism specialists in the Eastern Aukštaitija region, rated image of tourism destination, virtual environment and resources quite high (see Table 2). Improvement of the image of the tourism destination and the popularization of tourism opportunities contribute to local social and economic issues and welfare. Evaluating the resources, the maximum score was given to the human and financial resources, a slightly lower grade was given to the natural and cultural resources (cultural resources are evaluated as 4.60 points, natural – 4.50 points, human and financial resources are evaluated 5.00 points each). Human resources in the tourism sector are very important, because employees of this sector create the country’s tourism and hospitality image and hospitality is an integral part of the competitiveness of tourism sector. In order to strengthen this potential, it is important to continuously develop professional competence of the tourism sector employees, i.e. to constantly improve their skills, knowledge of foreign languages, to improve the image, and develop intercultural competence. A country’s tourism resources are one of the most important competitive advantages to attract tourist flows and increase the economic benefits of tourism. Abundance and diversity of Lithuanian and Latvian natural and cultural tourism resources allows to create and develop products of recreation, cultural and educational tourism, ethnic, rural tourism and eco-tourism, focusing on the segments of respective market. Tourism specialists in the Latgale region rated quality of tourism services and image of tourism destination/ awareness quite high (see Table 2). Evaluating the resources, the maximum score was given to human resources, financial and natural resources (human resources are evaluated as 5.00 points, financial resources are evaluated as 4.90 points, natural resources are evaluated as 4.50 points. Cultural resources are evaluated as 4.00 points). Evaluating the cultural resources, for tourism specialists from the Lithuanian region, the highest score (5.00 points) was evaluated to homesteads and museums, folk crafts were evaluated as 4.70 points, urban heritage and folk traditions –4.30 points each, and arts and archaeological assets –4.00 points each.

For tourism specialists from Latvia evaluating cultural resources, the highest score (4.70 points) was evaluated to urban heritage, folk traditions (4.70 points) and folk handicrafts (4.60 points). Evaluating the tourism infrastructure, tourism specialists from the Lithuania region the highest score (4.80 points) were evaluated to asphalted roads, camping (4.60 points) car parking (4.60 points) and bicycle tracks (4.40 points). Evaluating the tourism infrastructure, tourism specialists from Latvia region the highest...
score (5.00 points) were evaluated to asphalted roads, car parking (4.90 points) and camping (4.20 points).

Tourism specialists, while evaluating management peculiarities in the tourism area in their municipalities, noted the development of the tourism planning and management system, adequate competence of human resources, cooperation between public and private sectors, planning and organization, legal tourism base, tourism projects development and implementation, tourism development strategy and researchers in the tourism development area.

According to the results of research, the following tourism types are developed in the Eastern Aukštaitija region of Lithuania: cultural sightseeing, leisure, recreation, rural, health tourism and ecotourism; leisure, recreation, rural, niche and adventure tourism are developed in the Latgale region of Latvia. The Eastern Aukštaitija region’s rich natural resources create preconditions for the development of all the above mentioned kinds of tourism, and the development of health tourism related to the activities of resort areas of the region. There is a variety of tourism services in the Eastern Aukštaitija region, and Latgale region.

Tourism services are developed according to the current need (conference organization, catering, water, entertainment, transportation and so on) or in accordance with the strategic documents (tourism information, travel organization, health, wellness and other services) in the Lithuania region; tourism services are developed according to the current need (catering, entertainment, accommodation, water services, transportation and so on) or in accordance with the strategic documents (tourism information services, tourism services, catering and other services) the in Latgale region, Latvia (see Figure 1). Tourism specialists identified management of tourism destination, quality of tourism services, image of tourism destination/awareness, the impact of virtual environment on the development of tourism, human and financial resources as tourism development strengths in the Eastern Aukštaitija region. Cultural, natural and human resources and tourism services (travel organization, tourism information services, catering) were identified in the Latgale region as tourism development strengths. Tourism specialists identified tourism diversity and tourist infrastructure (no bicycle path network, the lack of car parking spaces and hiking trails, poor quality of district roads, inadequate infrastructure of water ways) in the Lithuania region and tourism infrastructure and entertainment in the Latvia region, as weaknesses. There are such threats for tourism development in the Lithuanian and Latvian regions as unplanned change of state economic development priorities, population migration to other countries, the worsening demographic situation in the district and others. Tourism development in the Lithuanian and Latvian regions can benefit from EU funds, the growing demand for active recreation and health
tourism products in the hospitality industry, quality improvement and implementation of international standards and other options in domestic and foreign markets.

Conclusions

1. Factors which influence tourism in the Lithuanian and Latvian regions most are the image of tourism destination/awareness, quality of tourism services, management of tourism destination, variety of tourism services and tourism infrastructure.

2. Tourism specialists identified the management of tourism destination, image of tourism destination/awareness, quality of tourism services in Lithuanian region, while cultural, natural and human resources and tourism services (travel organization, tourism information services, catering services) were identified in Latvian region. Tourism development strengths were tourism diversity and tourist infrastructure in the Lithuanian region and tourism infrastructure and entertainments in the Latvia region were identified as weaknesses. Tourism development in the both regions is threatened by such factors as unplanned change of state economic development priorities, population migration to other countries and others, tourism development in the region can benefit from EU funds, the growing demand for active recreation and health tourism products in the hospitality industry and etc.

3. Tourism development at the municipalities of both regions in Lithuania and Latvia is influenced by such factors, as the development of the tourism planning and management system, adequate competence of human resources, cooperation between public and private sectors, planning and organization, legal tourism base, tourism projects development and implementation, tourism development strategy and research in the tourism development area.

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ECONOMY, theme of the issue: Tourism. UDC 338.467.6:338.48(470.13)


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Abstract: Nowadays, people are increasingly aware of the importance of a healthy lifestyle, which includes proper nutrition and engaging in sports activities. Sports and physical activity play an important role in all aspects of human life because they improve the quality of life and have positive effects on both mental and physical health. Anyone who is engaged in any sports activities reduces the risk of illness and has a more positive attitude towards life. Therefore, the existence of a fitness center is justified, and there is a growing interest in programs which can positively impact on a person in all aspects of their physical, mental, and social life. The purpose and the aim of this study is to find the most convenient way of communication of a fitness center with target groups of potential future clients. Current members’ preferences regarding the quality of training and possible improvements and means of advertising, were determined through a questionnaire along with how much they are willing to pay for the provided services. The analysis of the results pointed out the best direction to follow in the fitness center business to help to guide development, and ensure the satisfaction of present and prospective members. It was concluded that fitness centers underutilized the marketing activities needed to promote their activities and cement their position in the market.

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Keywords: attractions of studio sport, fitness, sales

Introduction
The role of marketing in sport is extremely important since without marketing as a characteristic feature of the modern way of thinking, it is not possible to push a company or any sports facility in the direction of a successful and profitable business.

Different authors provide different concepts of fitness. For example, in the dictionary of Vladimir Anić, fitness is described as a colloquial term meaning “various exercises to be performed in special centers for maintaining physical fitness” (Anić, 2004).

Certain cities in the Republic of Croatia, with the support of city authorities (Osijek and Zagreb), are converting parts of the city to fitness parks available to anyone who wishes to take care of their body and health. This points to the population’s growing awareness of the importance of a healthy lifestyle, wherein exercise becomes a lifestyle, not a useless effort. It is precisely this way of thinking and the interest of the population, which affected the opening of a large number of fitness or sports centers visited by people of all age groups, from adolescents to pensioners. Since a large number of fitness centers opened in recent years, greater efforts are needed to attract potential members. Therefore, the use of market surveys becomes a basis for designing the services or products that are in demand.

According to Sullivan (2004), the main objective of sports marketing is to meet the real need of customers for sports products and services which offer greater benefits than that of the competitors, and simultaneously achieve the highest sustainable profit. Additionally, Novak (2006) believes that: “Sports marketing is a management process, based on the social marketing concept in which individuals and society as a whole, by specific access and use of the business of sports, obtain what they need and want, with the help of an important set of activities which enable the market sharing of primarily sports products and services”.

Sports marketing is becoming an important tool of communication with the market through which one can learn the wishes and needs of stakeholders, and thus design the products and services required.

This study presents fitness centers’ marketing activities relevant to the market. A survey has been carried out with the aim of learning the fitness center users’ opinions on the provided quality, as well as information such as which marketing activities they think can encourage users to reach for their service, and thus improve the sales over an extended period.

Fitness Centre Marketing Activities and Goal Setting
Marketing activities attract potential customers, seeking to have their needs met, thus the aim is to make them satisfied with the provided service. Before designing the most appropriate tool for communication

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1 College of Applied Sciences “Lavoslav Ruzička” in Vukovar, mnedovic@vevu.hr
with prospective customers, it is necessary to conduct an analysis of the current situation and learn fitness center wants, i.e. what it wishes to become in the future.

For the objectives to be useful, there are several key criteria that must be followed, therefore we can talk about SMART goals (Lan & Ping, 2010):

- **Specific** – the objective must relate to a specific part of the activities
- **Measurable** – the objective must be susceptible to measuring
- **Actionable** – the objective must be able to be put into action
- **Realistic** – the objective must be achievable and appropriate to the market situation
- **Time framed** – the objective must have a completion date

Considering the set objectives, the fitness center goals can be defined more precisely:

<table>
<thead>
<tr>
<th>Table 1: Fitness Centre Goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Achieving the desired number of new users/current members of the fitness center (define a specific number)</td>
</tr>
<tr>
<td>2. Achieving the desired satisfaction of users/members of the fitness center (e.g. 95% of users should declare their satisfaction with the service provided)</td>
</tr>
<tr>
<td>3. Achieving increased sales of the fitness center service by 5% by the end of the year</td>
</tr>
<tr>
<td>4. Introduction of new exercising equipment (e.g. two cardio program machines)</td>
</tr>
<tr>
<td>5. Introduction of new exercise programs by the end of the year</td>
</tr>
<tr>
<td>6. Educating trainers for new programs by the end of the year</td>
</tr>
</tbody>
</table>

Source: Author

Table No. 1 lists the goals that should be defined in order to improve business. Only clearly defined goals can help the business to move forward and develop. Well defined objectives include effective management of the fitness center and contribute to its development, therefore they present a prerequisite for the survival in the market, provided that they really are defined so as to be attainable and achievable.

Advertising, licensing and promotional activities have been increasing steadily in the market, therefore it is necessary to invest additional efforts in finding new users and retain the existing ones who can, under the influence of competitors’ advertising, change fitness centers, current coach and reach out for the competition. Fitness center management must therefore make an extraordinary effort to retain the existing members by doing everything to fully satisfy them. This implies deliberate management and business planning. Thus marketing becomes a tool in the market with the help of which one can fight off competitors and secure the customers’ loyalty. However, it should be noted that regardless of the marketing activities, perhaps even aggressive ones, the users will not use fitness center services if they do not feature a certain level of quality of training and customer care provided by the staff.

Therefore, loyal customers are less likely to be lured by a competitor, regardless of the competitor's marketing efforts. Similarly, customers who are dissatisfied with a product are not likely to continue purchasing that product (Gray & Wert-Gray, 2012). Consequently, it is essential to learn more about the effects of various promotion techniques for better marketing planning (Irwin, Sutton & McCarthy, 2002).

A challenge with advertising communications is to fully understand beliefs driving people's reaction toward advertising. Successful implementation of sports communication needs a better understanding of the beliefs composing reactions toward advertising of sports (Aminirosdana, Sharifianb, & Siyadata, 2014).

**Research**

In March 2017, we conducted a survey for the collection of fitness centers users’ opinions. The survey allowed us to learn how marketing activities of the fitness center are received by the target group. We surveyed 40 participants. The questionnaire consisted of 8 questions divided into three segments:

1. Analysis of the basic set
2. Consumer perceptions about services
3. Service pricing level deemed acceptable by the respondents

Close-ended questions were used while creating this survey. The participants were surveyed based on whether they agreed or disagreed with certain claims by using a dichotomous scale (Yes or No).
Also, certain questions were multiple-choice and the participants circled the response which fit them best. The data gathered were grouped, graphically displayed, and analyzed by conventional methods of descriptive statistics using the Microsoft Excel program. Table 2 lists the questions used during the survey:

<table>
<thead>
<tr>
<th>Table 2: List of survey questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Which of the marketing activities would most likely convince you to go to a fitness center?</td>
</tr>
<tr>
<td>2. Do you think that a fitness center should employ a person assigned only to marketing and promotion?</td>
</tr>
<tr>
<td>3. Do you think that fitness centers in your area are advertised strongly enough?</td>
</tr>
<tr>
<td>4. What would motivate you to go to a fitness center?</td>
</tr>
<tr>
<td>5. In what way is visiting fitness centers useful for health?</td>
</tr>
<tr>
<td>6. Would the guarantee of a coach directing you to your desired result (following compliance with the instructions) motivate you to go to a fitness center?</td>
</tr>
<tr>
<td>7. How much would you be willing to pay on a monthly basis for a group exercise class/training?</td>
</tr>
<tr>
<td>8. How much would you be willing to pay for an individual training on a monthly basis?</td>
</tr>
</tbody>
</table>

Source: Author

**Results and Discussion**

After conducting the survey, we started processing the resulting data by using statistical tables, and the results were shown graphically. The research involved a total of 40 subjects (n=40) from Vukovar-Srijem County. Of the total number of respondents, 62% were female and 36% male (Figure 1).

Considering the fitness center advertising preferences, the participants believe that the most appropriate way of advertising is through TV and radio, 25%; closely followed by advertising on the Internet 24% (Figure 2).

70% of participants believe that a fitness center should employ a person assigned only to marketing and promotion because they think in this way the public can obtain more detailed information about the
services provided and the events taking place, while 30% of respondents believe that the employment of a person assigned to marketing activities only is not necessary (Figure 3).

![Figure 3: Do you think that a fitness center should employ a person assigned only to marketing and promotion?](image)

Source: Author

The majority of participants believe that fitness centers are not advertised strongly enough (75%), while 25% of participants believe that the advertising is sufficient (Figure 4).

![Figure 4: Do you think that fitness centers in your area are advertised strongly enough?](image)

Source: Author

According to data shown in the graph below (Figure 5), it is apparent that the biggest group of participants (38%) is willing to spend 200 HRK on a monthly basis for a fitness center program. 30% are willing to spend 300 HRK, 10% can spend 400 HRK or more, and 23% would spend up to 100 HRK on a monthly basis.

![Figure 5: How much would you be willing to pay on a monthly basis for a group/program training?](image)

Source: Author

**Conclusion**

Based on the results presented, it can be concluded that the frequency of use of particular forms of market advertising (TV/Radio and advertising via the Internet) attract the greatest attention of future and the existing users fitness centers. Today information is readily available on the Internet and the presented
advertising methods provide information to all interested parties in a quick way. It is indisputable that the successful development and market performance of a fitness center is dependent on employment of appropriate marketing activities along with offering quality service, and setting adequate prices. High-quality marketing activities will increase the attractiveness of fitness centers, improve business and sales, and positively affect the number of its clients. Furthermore, through research it can be concluded that fitness centers inadequately implement marketing activities in and presenting and promoting their services, and that this is also noticed by the existing customers. In fact, clients do not have sufficient information on the activities carried out and believe that the employment of marketing specialists would positively affect the attractiveness of fitness centers and increase sales. Following all of the above, it is suggested for the fitness centers to employ a person for carrying out marketing activities, developing marketing programs, intensive advertising, and ensuring continuous customer satisfaction.

References
FINANCIAL AND SOCIAL SUSTAINABILITY PENSION SYSTEMS IN THE FACE OF DEMOGRAPHIC RISKS
Alexander Nepp,\textsuperscript{1} James Okrah\textsuperscript{2}

Abstract: The ongoing distribution of the pension system is on the threshold of losing its sustainability, financially, which has produced a deficit in the budget of the Pension Fund of the Russian Federation and the deflection of pension funds to the distribution system in 2014. This situation was to some extent caused by demographic risks. Funded systems could become the main instrument for mitigating the demographic problem of the distribution pension system. But the problem is, these systems are unprotected to demographic risks as well. The paper examines the effect of demographic uncertainty on funded pension systems. It describes the process necessary for the financial sustainability of a funded pension system under the force of demographic and macroeconomic factors. It explores the conformity of Russian funded pension systems and that of OECD countries with the status of financial sustainability in the time from 1958 to 2012, making a prognosis for the financial viability prospects.

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UDC Number: 336

Keywords: Funded pension systems, unfunded pension systems, financial sustainability, social sustainability, demographic risks, retirement age, duration of pension payments

Introduction

Demographic risks of a benefits framework are heterogeneous and now and again include not just demographic factors. The examination of statistic dangers partitions all annuity frameworks into two gatherings: subsidized and dispersion (unfunded) benefits frameworks. The main gathering is influenced by such dangers as:

- An expansion in the future, which will influence the span of annuity installments;
- The expanding time of section into the work showcase, impacting the measure of benefits investment funds;
- Variances in the normal retirement age, which will influence both the length of benefits funds and the term of annuity installments.

Dispersion benefits frameworks are affected by statistic dangers to a more noteworthy degree. In this way, notwithstanding those officially recorded above, there are two different sorts of statistic dangers critical for dissemination annuity frameworks:

- An expansion in the quantity of nationals who are beneficiaries of benefits;
- A decrease in the number of the working populace whose commitments and expense installments subsidize benefits.

The impact of demographic risks on pension systems is estimated by considering their impact on such indicators as pension payments and replacement rate. In economics, these indicators tend to be considered as the most important targets of pension systems Vidal-Meliá et al. (2006). The International Labour Organization has made reports containing the recommended minimal and optimal values of the replacement rate.

Analysing the data of the countries, which met the following criteria, carried out the research of distribution pension systems:

- They have a distribution pension system or at least a part of the country's pension system is based on the distribution principle;
- In these countries pension contributions to the distribution pension systems are separated from the overall amount of taxes or mandatory insurance premiums;
- These countries can provide all the necessary statistical data.

For funded pension plans, the research sample included the countries, which meet the following criteria:

\textsuperscript{1}Ural Federal University, Ekaterinburg, Russia, anepp@inbox.ru
\textsuperscript{2}Ural Federal University, Ekaterinburg, Russia, Jokrah6@gmail.com
These countries have a funded pension system or at least a part of its pension system is based on this principle;

- Pension contributions to the pension system in these countries are separated from the overall amount of taxes or mandatory insurance premiums;
- These countries can provide all the necessary statistical data.

As a result, the research sample comprised Australia, Austria, Great Britain, Hungary, Germany, Italy, Canada, Luxembourg, Mexico, the Netherlands, Norway, Poland, Slovakia, USA, the Czech Republic, France, Switzerland, Sweden, Japan, Russia, on average in the OECD countries.

Impact of demographic risks on the financial and social sustainability of distribution pension systems

Practical Study of OECD Countries

This study of financial sustainability of distribution pension systems was based on the described systems Nepp (2017). The chosen periods were the one from 1990 to 2012 and the forecast period from 2012 to 2050. The study involved nineteen OECD countries meeting the following criteria: a) they should have a distribution pension system or at least a part of their pension system should be based on this principle; b) pension contributions into their distribution pension systems should be separated from the overall amount of taxes or mandatory insurance contributions; c) these countries should be able to provide all the necessary statistical data. Therefore, our research sample comprised the following countries: Australia, Austria, Great Britain, Hungary, Germany, Italy, Canada, Luxembourg, Mexico, the Netherlands, Norway, Poland, Slovakia, the USA, the Czech Republic, France, Switzerland, Sweden, Japan, and Russia.

This research focused on the dynamics of pension payments and the dynamics of the support ratio. Therefore, the rates of pension payments change were determined as the ratio of pension payments in 2012 and 1990:

\[
Temp_{..PS} = \frac{PS_{2012}}{PS_{1990}}
\]

(1)

The rates of support ratio were determined the following way:

\[
Temp_{..Kp} = \frac{Kp_{2012}}{Kp_{1990}}
\]

(2)

To maintain financial sustainability of distribution pension systems however, it is crucial to consider not only demographic factors but also the dynamics of pension contributions, which depend on the average salary and the pension contribution rates.

To achieve this, we compared the rates of change of pension payments (3) with those of the support ratio (15), which is illustrated by the formula:

\[
\Delta TempPS / Kp = \frac{TempPS - 1}{Temp.Kp - 1}
\]

(4)

Where:

\[\Delta TempPS / Kp\] is the excess of rates of pension contributions TempPS in comparison to the rates of the support ratio Kp.

The analysis of different pension systems done by applying the expression (5) led us to conclusions about the chosen countries' financial sustainability or the lack of it:
\[ \frac{\Delta TempPS}{Kp} = \frac{|TempPS - 1|}{|Temp\cdot Kp - 1|} \]

Lack of financial sustainability if \( \frac{\Delta TempPS}{Kp} \geq 1 \) \hspace{1cm} (5)

Financial sustainability if \( \frac{\Delta TempPS}{Kp} \leq 1 \)

The ability to maintain financial sustainability was checked by applying the system (6). If the rates of pension contributions growth exceeded those of the support ratio reduction, that is, the losses of funds as a result of a decrease in the number of employed population were compensated by pension contributions \( \frac{\Delta TempPS}{Kp} \geq 1 \), then the distribution pension system met the requirement of being able to maintain its financial sustainability. If \( \frac{\Delta TempPS}{Kp} \leq 1 \), then the country's distribution pension system became less financially stable, which meant that the growth of pension contributions did not make up for the losses caused by demographic risks or the reduction in the number of working population. The area of financial sustainability of distribution pension systems was, in its turn, divided into three subareas:

\[
\begin{align*}
\frac{\Delta TempPS}{Kp} &\in [1;3] \quad \text{......sufficient financial sustainability} \\
\frac{\Delta TempPS}{Kp} &\in [3;6] \quad \text{......good financial sustainability} \\
\frac{\Delta TempPS}{Kp} &\geq 6 \quad \text{......excellent financial sustainability} \\
\end{align*}
\]

(6)

The results of financial sustainability survey of the countries in question, calculated according to the formula Nepp (2017), are illustrated in Figure 1.

Figure 1: Demographic risks of distribution pension systems. Maintenance of financial sustainability from 1990 to 2012.

Figure 1: "calculated by the authors on the basis of statistical data OECD (Pensions at a glance 2011: retirement -incomesystems in OECD and G20 countries. OECD. 2011. P. 124")"
As it can be seen from Figure 1, the area characterized by the lack of financial sustainability in the period between 1990 and 2012 includes the distribution pension systems of such countries as Germany, Italy, Slovenia, Spain, the Netherlands, Israel, Estonia, France, Japan, and Greece. The rise in pension contributions compensates for the losses caused by demographic risks and the reduction in the number of working population. Importantly, in such countries as Canada, Sweden, Slovakia, the Czech Republic, Luxembourg, Hungary, Russia, Poland, Korea, Finland, Belgium, Switzerland, and Austria, it is the working population, which provides financial sustainability. As Figure 1 shows, there is a significant gap between the countries characterized by the lack of financial sustainability: these countries were divided into three groups. In accordance, the first group includes countries with excellent financial sustainability in distribution pension systems: the indicator exceeds 6. This group comprises Canada, Sweden, Slovakia, and the Czech Republic. The second group consists of countries with good financial sustainability: Luxembourg, Hungary, and Russia. The group with sufficient financial sustainability comprises Poland, Korea, Finland, Belgium, Switzerland, and Austria. (See Table 1).

As it has been mentioned above, the countries, which have managed to preserve their financial sustainability, achieved this through the increase in pension contributions, that is, the tax burden and/or an increase in wages.

<table>
<thead>
<tr>
<th>Pension contribution rates</th>
<th>Distribution pension systems of the countries which do not meet the requirement for financial sustainability (17)</th>
<th>Distribution pension systems of the countries which meet the requirement for financial sustainability (17)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changed in accordance with the actual situation</td>
<td>Germany, Italy, Spain, Slovenia, Netherlands, Israel, Estonia, France, Japan, Greece</td>
<td>Poland, Korea, Finland, Belgium, Switzerland, Austria</td>
</tr>
<tr>
<td>Were fixed at the level of 1990</td>
<td>Spain, Germany, Slovenia, Netherlands, Greece, Japan, Italy</td>
<td>Poland, Hungary, Estonia, Belgium, Canada, Switzerland, France, Austria, Russia, Finland, Korea</td>
</tr>
</tbody>
</table>

Source: Compiled by the authors based on the results of the calculations presented in Figure 1
Such measure as maintaining pension systems' financial sustainability by increasing the rates of pension contributions should not be underestimated. For instance, if pension contribution rates remained at the level of 1990, it would greatly affect financial sustainability (see Table 1). According to this table, with the tax burden staying at the level of 1990, such countries as Spain, Germany, Slovenia, the Netherlands, Greece, Japan, and Italy are bound to experience problems with financial sustainability. Unlike the actual situation (see Table on page 81 and its discussion), this group no longer includes such countries as Spain, Israel, Estonia, and France, which have become financially unstable due to the fall in pension contributions. Nonetheless, excellent and good financial sustainability with the taxation burden remaining at the level of 1990 is preserved only in three countries: Sweden, the Czech Republic, and Luxembourg. Thus, Canada, Slovakia, Hungary, and Russia have maintained their financial sustainability at high or quite high levels by increasing the rates of pension contributions. Otherwise, they would be in the group of countries with sufficient financial sustainability.

Analysing the brunt of demographic risks of the main indicators of pension systems, we assumed that it is essential to maintain financial sustainability of a pension system provided that there is no indexation of wages and growth of pension contribution rates. For Russia, the indicator will make 1.14 if pension contribution rates remain at the level of 1990, which brings to light the Russian pension system's weak financial sustainability and a small likelihood of its being maintained with the help of an increase in wages. The problem seems even more serious if we take into consideration the low replacement rate in the Russian pension system (0.34 as compared to 0.6, recommended by the International Labour Organization) Gurvich (2011). The deterioration of the Russian pension system's financial sustainability became even more evident when the budgetary allocations to the Pension Fund increased from 248 billion rubs in 2005 to 1,940 billion in 2013, Dmitrieva (2013).

<table>
<thead>
<tr>
<th>Country</th>
<th>Pension contribution rates in 2012</th>
<th>Growth of pension contribution rates to provide financial sustainability of the distribution pension systems in 2050</th>
<th>Pension contribution rates in 2050 which would provide financial sustainability of the distribution pension systems in 2050</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>22.8</td>
<td>1.399265431</td>
<td>31.90325182</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>16.4</td>
<td>1.639420659</td>
<td>26.82092198</td>
</tr>
<tr>
<td>Sweden</td>
<td>28.0</td>
<td>1.818623531</td>
<td>50.92150983</td>
</tr>
<tr>
<td>Hungary</td>
<td>22.8</td>
<td>1.490738119</td>
<td>33.98882911</td>
</tr>
<tr>
<td>Belgium</td>
<td>16.7</td>
<td>1.247939559</td>
<td>20.77819365</td>
</tr>
<tr>
<td>Austria</td>
<td>19.6</td>
<td>1.579136274</td>
<td>30.95107097</td>
</tr>
<tr>
<td>Spain</td>
<td>20.0</td>
<td>2.386874009</td>
<td>47.73748018</td>
</tr>
<tr>
<td>Finland</td>
<td>34.0</td>
<td>1.522481987</td>
<td>51.76438756</td>
</tr>
<tr>
<td>Greece</td>
<td>33.0</td>
<td>1.433550429</td>
<td>47.30716416</td>
</tr>
<tr>
<td>Poland</td>
<td>16.0</td>
<td>1.9755124</td>
<td>31.6081984</td>
</tr>
<tr>
<td>Italy</td>
<td>17.9</td>
<td>1.873396171</td>
<td>33.53379146</td>
</tr>
<tr>
<td>Germany</td>
<td>19.5</td>
<td>1.317743657</td>
<td>25.72235619</td>
</tr>
<tr>
<td>Netherlands</td>
<td>28.3</td>
<td>2.281373752</td>
<td>64.56287717</td>
</tr>
<tr>
<td>France</td>
<td>18.4</td>
<td>0.857253339</td>
<td>15.75631637</td>
</tr>
</tbody>
</table>

Fig. 2 Necessary changes of pension contributions rates to provide financial sustainability of distribution pension systems from 2012 to 2050

Note: the blue line corresponds to the rates of pension contributions in 2012; the red one, to those in 2050. As our analysis has revealed, when faced with demographic risks, the distribution pension systems demonstrate neither financial nor social sustainability (maintenance of the replacement rate). It is obviously impossible to raise the replacement rate only with the help of wages increase and without an increase in tax burden on enterprises.

Conclusion

1. When wages stagnate and pension contribution rates are non-estimated, financial sustainability of distribution pension systems will be determined predominantly by demographic factors, such as the number of retired people and the number of employed population or by the support ratio, which characterized the ratio of the number of working population to the number of pensioners.

2. The impact of demographic risks on distribution pension systems makes it impossible to maintain social sustainability of pension systems, that is, to maintain the replacement rate, provided that the distribution principles in most of the described countries remain the same.

Acknowledgement

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References


THE ROLE OF SOCIAL INSTITUTIONS
IN THE ACTIVITY OF ENTREPRENEURS IN THE CONSTRUCTION SECTOR

Sergey Oparin,¹ Nikolay Chepachenko,² Marina Yudenko³

Abstract: This paper reports on a study of the methodological principles and roles of social institutions in controlling business activities. The level of their administrative interference in business activities is analyzed, particularly regarding administrative barriers restricting business in the construction sector. The study concludes that social institutions, on the one hand, reduce economic risks of entrepreneurship and encourage the fulfilling of formal norms. However, on the other hand, they perform a restrictive function, increasing entrepreneurs’ transactional costs. The paper provides examples of informal norms that restrict entrepreneurial activity in the construction field, with a conclusion about non-systemic business support measures.

JEL Classification Numbers: M21, M48, B 52; DOI: http://dx.doi.org/10.12955/cbup.v5.948
UDC Classification: 338.246.025.2
Keywords: economic risk, entrepreneurship, social institutions, construction.

Introduction
The relevance of studying social institutions arises because of the significant risks associated with business activity in the construction sector. Social institutions are norms and rules that regulate and coordinate business activities, and reduce the risks of entrepreneurs. In principle, these business risks appear to be the bane of entrepreneurs in regards to their economic freedom. Such freedom coincides with that of others and thus, an entrepreneur’s risk will increase as their market relationships develop. Therefore, the logical question is whether social institutions can influence the level of risk in business activity.

Presently, existing institutions fail to meet market conditions of Russia and hence, fall short of the expected growth in productivity for business entities. This prevails because of a construction sector that is characterized by a low index of entrepreneurial confidence, a significant number of unprofitable organizations, and serious indebtedness of entrepreneurs to the state and counteragents.

This article presents a review of the social institution based on the view that it represents formal norms or a set of norms that are stable in relation to the interests of economic entities. These norms coordinate, regulate, and restrict institutional relations between economic entities that carry out organizational, production, and exchange functions, as well as create conditions for effective business activity. The article does not examine the concept of a social institution as such, since this topic has no current cause for special discussion among scientists.

Literature Review
The analysis of the institutions, institutional structures, and their interaction with the state is covered in the works of Nobel laureates (North, 1997; Stigler, 1995; Hayek, 2006). Hayek (2006) provides elements of institutionalism that deserve mention. Hayek (2006) notes: “Legislation, the intentional creation of laws was fairly called the most important invention by its far-reaching consequences, and even more significant than fire and gunpowder” (p.91). The scientist divides the institutions into formal and informal ones, though, not as a clear definition. He writes about informal rules as follows:

People learned to observe the rules of conduct (and to seek their observance) long before these rules have been expressed in words” (p. 97).

Auzan and Nikishena (2013) emphasize that formal and informal institutions differ by way of coercion and enforcement. An informal institution is one where any individual who believes that

¹ Head of the Chair of Economics and management in the construction Petersburg State Transport University Emperor Alexander I, Saint-Petersburg, Russia, oparing@mail.ru
² Department of Economics and management in construction Petersburg State Transport University Emperor Alexander I, Saint-Petersburg, Russia, nvchepachenko@mail.ru
³ Department of Economics and management in construction Petersburg State Transport University Emperor Alexander I, Saint-Petersburg, Russia, mmspb@mail.ru
the rule in question is to be carried out forces an individual to do so. Moreover, formal norms are specially developed rules of conduct that are codified in laws, decrees, and administrative documents.

Investigating the fundamental work of Knight (2003) within the concept of entrepreneurship, one should pause on an important aspect, i.e., the role of risk and uncertainty in entrepreneurship. From Knight's point of view, the existence of a unique future uncertainty may allow an entrepreneur to profit, despite the overall competition and long-term stability. Knight emphasizes the difference between the terms of ‘risk’ and ‘uncertainty.’ If uncertainty is countable, then such risks can be shifted to the shoulders of others through insurance. Such risks become a cost item that diminishes profits, but not their source.

Such Russian scientists as Polterovich (2012), Shastitko (2010), and many others, with interdisciplinary expertise suitable for examining the role of social institutions in the activities of entrepreneurs, should be noted here. Observation of their works provides the basis for the theory that the effectiveness of social institutions within a country mainly depends on the institutional environment in which it is developed, i.e., the restrictive links and motivations of the institution. According to Shastitko (2010), a new institutional approach allows the existence of an entrepreneurial function, though not exclusively within existing rules, but rather in connection with potential changes. Hence, in explaining a change in rules that mediate the interaction between economic agents, the term of institutional entrepreneurship is used.

In the framework of the research, it was considered important to extend the notion of ‘entrepreneurship’ and to consider it not in the usual, but in a generalized sense. Entrepreneurship in the generalized sense reflects the totality of economic, social, organizational, and institutional relations associated with the entrepreneurial business organization, producing goods (works and services) and obtaining the desired results in the form of profit. Such understanding makes it necessary to account the social component in entrepreneurial activity, i.e., the external environment in the form of social institutions. This then reduces the risk and uncertainty of business and creates conditions for achieving the goals of entrepreneurs in productivity growth and economic efficiency.

**Duality of the Social Institution's Impact on Entrepreneurship**

The final result of the activity of social institutions can be deemed as the creation of a clear status-role structure based on the norms and rules, socially approved by the majority of participants of this social process. However, it should not be considered that state regulatory and coordinate norms fully facilitate the life of an entrepreneur and exclude possible risks in economic activities. These norms also perform a restrictive function. For example, since 2016, quarterly reports to the Pension Fund of Russia have been replaced by monthly ones, causing the staff to learn new forms of reporting. Changes also relate to statistical reporting, as there are more than 300 federal statistical forms. These serve to collect information about the finances, number, and salary of employees, the commissioning of buildings and structures in the construction sector.

Due to the existence of informal norms, the results of implementing formal norms can be different. For example, where the majority of entrepreneurs denounce tax evaders, then with the same force of compulsion to pay, the percentage of tax defaulters will be lower than in a society where tax evasion is considered an imitation. Formation of a taxation institution is designed to reduce the transactional costs by its implementation. Such costs are associated with completing a tax return, queueing for its submission, visiting tax authorities, and the transparency of the rules. In Russia, a tax report with attachments includes about 100 pages of text and calculations, and a declaration for each tax has a volume of up to 20 sheets. Designers constantly change the tax declaration forms, because, in their opinion, all provisions of the Tax Code and all new documents regulating the payment of taxes should be taken into account in the form. Such an approach may not be the most justified. An example of transactional costs is evident where the position of taxpayers has been significantly complicated by the introduction of the twenty-figure budget classification codes. Each tax penalty or fine is assigned with a code that is constantly changed. Recording a wrong code when signing out a payment order or processing information in a tax inspection, results in the payment being categorized as ‘unclear.’ In this case, penalties are charged for each day a payment is allegedly delayed. To clarify the situation, a tax payer needs to reconcile their data with that of the tax inspectors, but due to work overload of
inspectors, it is almost impossible to carry out such reconciliation in time. Nevertheless, changes in the legislation will create an incentive to implement formal norms. The penalty for not providing or improperly presenting statistical data has increased tenfold. Previously, it was between 3 000 and 5 000 RUB. Now, legal entities have to pay between 20 000 and 70 000 RUB. For a repeated violation, this payment is between 100 000 and 150 000 RUB.

However, the current Russian legislation also provides such formal norms that exclude risks associated with the emergence of both transformational and transactional costs. For example, new rules governing entrepreneurial activity in 2016 will help business entities obtain additional profits and reduce the risks of bankruptcy and non-payment. Based on the simplified taxation system, such norms include the following:

- Local authorities can reduce the tax rate for entrepreneurs from 6% to 1%;
- Organizations and individual entrepreneurs may not include VAT in their income.

**Methodological Rules Determining the Activity of Entrepreneurs**

Any business activity directly depends on the methodological rules that determine it. These may include inadequate and changeable information, unfinished contracts, and the incomplete specification of property rights.

**Inadequate Information**

The market is far from flawless; transactions of entrepreneurs are worth certain costs, which are connected with the acquisition of information. Many economists believe that limited and useful information for economic entities gives grounds to classify it as a factor of production, along with land, capital, and labor. Scientists believe there are two principal reasons for inadequate information from an economic viewpoint. First, the selection of comprehensive information is possible, but not profitable. Second, the full information is impossible to obtain. Thus, the lack of profound information makes the activity of entrepreneurs risky and opportunistic.

The base of opportunistic behavior consists of information asymmetry and uncertainty. A business partner cannot know all the circumstances and intentions of another partner on the eve of the contract conclusion and, moreover, cannot know all the details of the partner’s behavior after the contract has been concluded. Therefore, opportunism is always based on the inadequate or distorted information that the subject of opportunistic behavior provides to a business partner before or after the start of the contract. The initial principle of the institutional theory is to pay for information. If all business entities had unrestricted access to information, then they would have full knowledge of their partners’ behavior and would be able to prevent any breach by partners, as well as avoid the risks of failure to comply with the entrepreneurial agreement. Then, the problem of opportunism would not be considered. However, due to the changeability and inadequate availability of information, monitoring compliance with the contract is difficult, and the parties attempt to obtain guarantees that are prescribed in the contract.

Stigler (1995) in Economic Theory of Information notes that:

> It is hardly necessary to remind scientists that information is a valuable resource: knowledge is power. However, in the city, which is an economic theory, information huddles in the slums. For the most part, it is ignored: the best technology is already known; the ratio between the goods and the preferences of the buyers is considered to be settled (p. 507).

**Incomplete Specification of Property Rights**

Specification of property rights assumes a legal authority’s security for each defined owner, rather than the single and absolute owner of the resource. The ownership right is fully specified when each authority has its exclusive owner, and access to it by other entities is limited. In Russia, 88.6% of the enterprises is private ownership, while 6.6% is state and municipality owned. The problem of property rights specification is regarded as a priority, and its relevance increases each year. The number of claims to the arbitration court about the right of ownership is steadily growing, as well as the number of applications for recognizing the right of ownership and reclaiming property from another. The dynamics of indicators confirm the conclusion that there is insufficient institutional security for the protection of property rights of entrepreneurs.
Unfinished Contracts

All business activities of an entrepreneur consist of transactions, the basis of which is an exchange, in which goods (works, or services) are transferred from one entrepreneur to another, subject to a counter flow of money (benefits) or a commitment to transfer in the future. Where the conditions of such exchange are known in advance, then the exchange becomes a contract. A contract assumes existing mutual expectations. However, in practice, implementing contracts has high risk and uncertainty that leads to the incompleteness of contracts or their non-fulfillment. In practice, economic entities operate in a highly competitive environment, and benefits from contracts are low. Moreover, in this case, a contract cannot be self-sustaining, and its execution creates huge risks. It is clear that incompleteness of contracts leads to a risk of invalidity of the contracts.

Administrative Barriers to the Activity of Entrepreneurs

One current problem of the Russian economy is a high level of administrative barriers affecting the business activities of entrepreneurs. These administrative barriers are the rules about conducting certain activities in the market that have been established by decisions of state bodies for compliance, which is an indispensable condition for conducting such. At the same time, it provides payments to fund bureaucratic procedures that are not always identified in the budget. Yudenko and Leontiev (2017) note that the system of administrative and legal regulation in construction remains unfriendly to small- and medium-sized enterprises and does not take into account the specifics of doing business in small forms of management. Business costs associated with the need to meet regulatory requirements are constantly growing.

The construction faces several institutional norms that limit the construction of residential and commercial real estate. Access to land for building, and obtaining approvals and permits for connecting infrastructure, distort the conditions of competition and affect the construction period of a facility. Land plots are often provided with no engineering infrastructure, and the technical conditions are unaffordable for investors. The absence of master plans does not allow a municipal formation to systematically determine how it will develop the territory where construction is to be carried out. This influences the number of orders for construction and repair works that are performed by small businesses.

According to Oparin, Chepachenko, and Yudenko (2016), the problems of estimating costs in construction of buildings and other structures are also an administrative barrier that does not allow economic entities to increase productivity and efficiency in general.

The Russian small and medium business forum was held in Russia in 2015. The forum (Panel discussion of the forum "Reducing administrative barriers for doing business," 2015, June) identified two main reasons limiting the development of small- and medium-sized businesses: 1) administrative barriers that ensure legalization of corruption flows; and 2) monopolization of markets through administrative resources. The costs for small business owners regarding the problems mentioned above are transactional. It was announced at the forum that the cost of administrative barriers was 7% of gross domestic product per year (i.e., 5 628 billion RUB or 125 billion USD).

In regards to the problems, in particular, administrative barriers that ensure the legalization of corruption flows, there are several issues. Payments, due to the existence of such barriers, are not directly related to taxes but remain legal payments for various certificates or documents confirming unnecessary compliance, i.e., legal business and technology for issuing certificates and confirmations. On this issue, there is some opposition between supporters of the introduction of new regulatory measures and those who, on the contrary, favor the weakening of state regulation of small businesses. In difficult economic times, the popularity of both parties and their solutions are growing. Business representatives complain about the lack of funds for obtaining various approvals and permits. The crisis pushes the business into obscurity, while the sector authorities believe that it is possible to resist this process due to certain new permitting procedures. It is clear that the new procedures, as a rule, only increase the administrative burden on businesses and may indirectly send them into obscurity.

The second factor limiting the activity of economic entities is the monopolization of markets through administrative resources. Administrative monopoly arises from actions of state bodies. On the one hand, it grants individual enterprises the exclusive right to perform certain types of activities. Competition, in this case, is absent. On the other hand, the remaining enterprises in the market receive
a high profit in favor of affiliated persons. Signs of monopolies or oligopolies in the housing construction market can be found in all major regions of the country where huge budget money is involved in construction in Moscow, the Moscow region, Saint Petersburg, the Leningrad region, and other regions. According to Kaplan (2016), the director of the Union of Construction Companies ‘Soyuzpetrostroy’, at present, the Northern Capital rates 29th (one of the last) as likely to enter the market of construction services.

Conclusion
In conclusion, costs of entrepreneurs usually have economic as well as ethical and political bases. Irrespective of the official goals of state and municipal bodies in relation to business, their daily activities are determined by decisions accepted by ordinary people through certain incentives, interests, and tasks. Likewise, one should be cautious about statements from entrepreneurs who attempt to convince society of their adherence to public interests, stating that their main criterion when formulating an enterprise policy is not the maximization of profits but the fulfillment of obligations to society. In addition to the above sources that determine costs of entrepreneurs, there is also the institutional dimension of business. Rationally created formal institutions should consider the ‘human nature’ of entrepreneurs and remain open to the growth of informal processes and mechanisms of insurance as entrepreneurs do not have effective mechanisms of insurance against formal norms of certain institutions (e.g., taxation, bankruptcy, and norms governing the process of obtaining a building permit). Gaps in the institutional space can lead to a situation of an official deciding upon the solution. Moreover, this choice may not be in favor of the entrepreneur and could be influenced by the relationship between the entrepreneur and the authorities. Such a situation is common in today’s society, opens the field to corruption, and increases uncertainty of the economic environment. Furthermore, in the absence of sufficient funds in the budget, possibly only the confidence of entrepreneurs and a favorable investment climate will attract private capital for small businesses in the economy. For promoting small business development, it is recommended that the state apply several basic institutional rules. First, the state could disallow property access rights to those who do not own the property by law. This rule would avoid entrepreneurs bearing the high cost of insuring against third parties access to their properties. Such costs can exceed the potential incomes of the economic entity. Second, where entrepreneurs do not accept official institutions, they could be guided by informal norms, depending on the state of the economic environment. Where the market economy is characterized by a predominance of personified norms, spontaneously formed institutions in the field of pricing, investment, construction, and exchange arise followed by institutional contradictions and confines. In this case, when the behavior of entrepreneurs is regulated by a volitional establishment of general norm, and not by a separate agreement of parties, entrepreneurs face a regulatory act or law. Therefore, a mechanism of norms for compliance is necessary, the action of which should not limit an entrepreneur’s profit and would be aimed at increasing efficiency. Third, abolishing unnecessary restrictions and permits, i.e., removing administrative barriers, would be an easy way to increase the value of an entrepreneur’s property (land, fixed assets, real estate, and objects of intellectual value) and allow the opportunity for his or her effective action. Currently, most of the adopted laws and regulations are beneficial only to one party, the legislator, and those supporting it. Finally, forming a single, complete mechanism for administering tax, customs, and other fiscal payments could eliminate inefficient controls. State bodies should consider counting the costs of entrepreneurs. Today, every 1 RUB of the legal wage of an employee incurs up to 0.55 – 0.60 RUB in taxes.

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THE DEBATE ON PRUDENCE IN ACCOUNTING

Hristina Oreshkova

Abstract: In support of the critical analysis targeted at substantiating the necessity of reintroducing “prudence” in the Conceptual Framework for Financial Reporting (CF), that is the primary author’s goal, the article provides further results as well as views and arguments, based on research, provoked by the International Accounting Standards Board’s decision to revise the CF (in September 2010) and remove “prudence” in favour of “neutrality” regarded as a qualitative characteristic. The author’s aim is not to discuss the role of the CF as a whole, or its objectives, but to contribute to the current debate on a complicated and highly controversial issue, raised in the Discussion Paper (DP), followed (in January 2014 and May 2015) by the Exposure Draft (ED) containing proposals for a revised CF.

The thesis held by the author, both before and now, is that for a considerable number of reasons it is imperative to restore “prudence” in the CF, subjected to revision at the moment (and yet expected) as an introduction to the International Accounting Standards (IAS)/International Financial Reporting Standards (IFRS), with a clearly defined content of its definition in order to avoid misinterpretation or misunderstanding, which, in my view, will not impair “neutrality”, but will support it.

On the basis of my long-lasting research alongside the thorough observation of the regulatory process, I would argue that as a supranational body, developing the accounting norms for many business entities operating in the EU and elsewhere, the EU accounting standards setter, who is responsible for the ambiguities or at least misconception, due to its prerogatives, has not been consistent in its policy with regard to prudence over the years. Probably one major reason is the influence of political, institutional and other factors in the global process of convergence. The development and deliberations as of December 2016 and January and February 2017 as to the revision of the CF have convincingly confirmed that once more.

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Introduction to the Debate on Prudence

Over the past decade, countries in Europe have experienced changes in financial reporting described as “a revolution”. Undoubtedly, the political decision on the IAS adoption by the EU Member States from January 1st, 2005 was a challenge for institutional and professional organizations, national and supranational bodies of authority, and many people at different levels of corporate governance and management. However, a year after the IAS adoption, an EC-sponsored study has found that the adoption of IFRS has proved to be ultimately successful. The study concluded that “there was widespread agreement that IFRS has increased the comparability of financial statements across countries, across competitors within the same industry sector and across industry sectors.”

Long before, and until now, prominent scientists in Europe and overseas have remained indifferent to the enthusiasm of that change even skeptical about its benefits. Insusceptible to the inspired rhetoric of others, Professor Jacques Richard accused EU regulatory institutions for non-applying, avoiding, or adapting accounting principles through compromises in regulations, in favor of particular interests (November 2005, Le Monde diplomatique, no.1:24-25). Now that countries are slowly and unsteadily recovering from the consequences of the last global economic crisis on an unprecedented scale it is unlikely for such an insight to remain unnoticed even by opponents.

In the dispute focused on the nature of the reasons for the profound changes in EU financial reporting, as well as on the essence of the factors that influence the rulemaking and regulatory processes and their efficiency, researchers, experts, specialists are not unanimous – the conclusions and forecasts point to more than one perspective while the estimates range from positive to extremely negative.

Since September 2010 the discussions have significantly intensified due to the fact that the IASB has revised the first chapters of the CF and replaced “prudence” with “neutrality” regarded as a qualitative characteristic. The crucial question was whether it was just a matter of linguistic means of expression

1 Hristina Georgieva Oreshkova, Associate Professor, D-r Hristina Oreshkova, Faculty of Finance and Accounting, University of National and World Economy, Sofia, Bulgaria, e-mail: hristina_oreshkova@abv.bg
3 In the present article ‘International Accounting Standards (IAS)’ and ‘International Financial Reporting Standards (IFRS)’ are used as equivalents.
or a change that undermines the essentials of financial reporting. Maybe under some political pressure, major progress was made at that point to the global consistency, or more likely towards the further erosion of “Prudence” in accounting.

Thus, the foremost author’s goal is to justify the necessity of restoring ‘prudence’ into the CF, and to consistently support that view by sound and cogent arguments. I should specify at this point, that ‘prudence’ should not be considered a qualitative characteristic of financial statement information even less a basic assumption as it was settled in previous texts of the CF. My key observation should be emphasized: ‘Prudence’ may be thought about as a fundamental principle, as a core principle, as a guiding principle, as a major requirement, as an essential theoretical concept underlying financial accounting. However, it should not be regarded as a qualitative characteristic of information provided by financial statements of general purpose as it was previously stated in the CF. It is deeply erroneous from a theoretical perspective, in my view. ‘Prudence’ is, and should be regarded as the primary principle amongst all the traditional accounting principles, to which professional accountants, predominantly analytical and conservative people, i.e., more pessimistic rather than optimistic, have been closely attached for centuries.

By design, not by chance, the article focuses on a rich palette of reasoning from various academic viewpoints. It is subordinate to the author’s objective to reveal in an explicit manner the fundamental and complex nature of the issue of prudence. Due to that circumstance, eminent authors of the past even of the present has dedicated fundamental research to ‘prudence’; that is an undeniable fact which cannot be overlooked; moreover, it should be emphasized, and regarded as an author’s observation of crucial importance for structuring the article, and for future surveys.

Another important objective is to differentiate the author’s view regarding ‘prudence’ as an overriding principle of accounting from opinions inclined to undervalue its importance, and from other more extreme interpretations.

The terminology of the article is mainly in the field of financial accounting and reporting under the Conceptual Framework, the IAS/IFRS, and the interrelated European Directives. The structure of the article is subordinated to the author’s objectives and the regular systematic requirements.

The heuristic methods of knowledge as analysis and synthesis, induction and deduction, comparison, analogy, observation, descriptive method etc. applied for achieving the author’s goal are generally accepted for research in that scientific field, and are commonly used due to their universal nature and the predictable results.

Different Even Conflicting Academic Views on Prudence: A Literature Background

“Give an estimation to the goods and for that does not value them more than they are worth, for it would be to make himself rich in idea.”

Jacques Savary (1675, p. 325)

“... the Superior Council of the OEC is very dedicated to preserving solid links with fundamental research, so that such association is able to avoid the brutal and systematic acculturation of our accounting standards ... The principle of prudence is the perfect illustration of this point. Indeed, this principle is linked to our style of governance, to our traditional manner of representing the activity of companies, based on a long term view of business life and not focused solely on their volatility.”

Joseph Zorgniotti (2010, p. 11)

The principle of prudence or ‘conservatism’ in accounting, as it is mostly understood in Continental Europe, for instance, Germany and France, or the concept or convention of conservatism as it is interpreted in the UK and the USA, respectively, has been the subject of a heated debate for decades now. I consider Professor Barker’s distinction to be valuable from a theoretical viewpoint, although I use both of the terms as it is done in the context of the relevant research depending on the author’s understanding. I believe that this is necessary for the sake of expression and clarity in order to attain precision, admitting that I lend priority to prudence. My motive is based on a solid foundation. The conceptual ideas of prudence have long been ingrained in our accounting system, culture and tradition as it has been developed under the influence of the Continental European accounting doctrine.

Perceived and defined either as a principle or a concept, it is more than obvious that ‘prudence’ raises a highly controversial issue for both researchers and practitioners. Due to a long-lasting thorough observation of the regulatory process, I can reasonably argue that the EU accounting standards settter,
who is responsible for the ambiguities or at least misconception by virtue of its prerogatives, has not been consistent in its policy with respect to prudence. The recent development and deliberations as of December 2016 and January and February 2017 as to the revision of the CF have convincingly confirmed that once more.

The fundamental research, dedicated to prudence or ‘conservatism’, reveal different even antagonistic academic views. Considerations are mostly focused on the concepts evolving over time, the essence of the traditional or ‘conventional’ prudence or ‘conservatism’, and the inherent rules that must be specifically applied in the process of valuation under the imperative of the prudence principle if it is embraced as a primary one. It should be noted that essential theoretical and practical issues of valuation and of entity’s accounting policy are mainly discussed with respect to prudence or ‘conservatism.’ Most of the surveys focus on the issues of recognition and subsequent valuation and disclosure of items which would create difficulties, since an estimation is necessary; in other words, the surveys predominantly treat complicated matters in which the recognition of an item implies an unbiased, unprejudiced, best possible estimate; usually this is due to an item’s specifics and significant uncertainties that give rise to measurement, methodological and disclosure problems. My understanding of ‘uncertainty’ in the case is that ‘uncertainty’ means that any carrying amount under consideration is (or should be regarded as) an estimate that would be difficult to verify, since there is a place for significantly subjective judgement in determining either the initial cost or the carrying amount (value) of an element at the balance sheet date. The subjective judgment can be carefully made; however, it is always hardly verifiable for authenticity as it may be presumed. It is a matter of expertise, professionalism including ethics, and responsibility.

Such problems usually arise in an attempt to look for the most appropriate treatment alongside the search for the most reliable evaluation of an element for its recognition in financial statement; they may refer to a wide range of items, varying in nature and types, as assets and liabilities, expenses and revenues or income, profits and losses, and others; to be specific, among the emblematic examples are: research and development (R&D) costs, also known as expenditure on R&D, costs of litigation, borrowing costs, advertising costs (or expenses), costs of luring new clients, some kinds of intangibles, internally generated goodwill, provisions for restructuring or of another type, contingencies, acquired goodwill and many others; the possible effects of a particular accounting approach or model of initial or subsequent evaluation on the carrying amount of (net) assets and income are mostly discussed in respect of the issue of the “hidden reserves”. The problem has been raised, and, in my opinion, has been exaggerated by opponents claiming to be against prudence or ‘conservatism’, who appear to be advocates of the “true and fair view” or “fair presentation” postulate; the appropriate level of being cautious from the perspective of accountants as practitioners is also often in the focus of researchers and discussions. For example, scientists investigate how the degree of accounting conservatism, reflected in the financial statements information of European companies, evolves over time during long periods, and how the adoption of IAS/IFRS has influenced the differences in the degree of balance sheet conservatism and earnings conservatism between European companies reporting under IAS/IFRS. Most influential authors like Sudipta Basu (2009) describe how their contemporary research on the origins of accounting, including Chinese accounting, is related to their search for an ultimate explanation for conservative accounting.

All these essential issues are exclusively identified with respect to ‘prudence’; thus they should be discussed not in a prejudiced or manipulative manner, but in a straightforward one, not forgetting the rationality that the traditional, i.e. ‘conventional’ prudence embodies. We confidently believe that the resilience of prudence to criticisms over time is due to its fundamental nature as a core principle and its crucial role in accounting as a unity of theory, methodology and social practice for centuries.

One major observation should be taken into consideration primarily. In my view, it is of great importance to underline that a difference should be made between two cases: the first case is when the creation of hidden reserves is being systematically made in a deliberate manner, on purpose; that is the case when one is not faced with whatever kind of uncertainty and can ascertain the actual facts or values without difficulty; the second case is when hidden reserves are created not deliberately, but accidentally, unintentionally, involuntarily, in the absence of any deliberate actions; that is the case when one is faced with some kind of uncertainty or unknown magnitudes. The deliberate creation of hidden reserves and ‘conservatism’ are mistakenly equaled, in my opinion; they seem to be similar,
but it is just ostensibly; such an interpretation implies a superficial view on the problem; however, there is a line that helps to differentiate between the two types of behaviour of accountants. Following that way of thinking, at this point it is appropriate to support our reasoning by Paton and Stevenson’s understanding that, in my view, is perfectly correct and truthful:

“Conservatism is a genuine, prudent response to uncertainty, whereas the “big bath” accounting is a deliberate attempt to mislead the users of financial statements information when there is in fact no uncertainty. W. A. Paton clearly pointed out that “a sheer understatement where it is possible to ascertain the actual facts is not conservatism but concealment” (1916, p. 237; Emphasis added).

Some present-day views on conservatism in accounting, and understandings existing for decades, do not seem to include or permit any deliberate, that is, intentional manipulations in valuation of items, or other abuses with opportunities in accounting as a system, which to be targeted at understating income in a current period, and overstating income in future periods, if there is no or there is just a little economic uncertainty surrounding transactions. In the USA, the accountants’ behavior in favor of the creation of hidden reserves in a prejudiced manner is known as “a big bath” accounting, and such behavior is thought about as inconsistent with the principle of conservatism. It is confirmed, for instance, by the US FASB’s view as of 1980 towards conservatism and hidden reserves exposed in the FASB Framework as of 1980. In that Framework, the US accounting standards setter emphasizes that ‘conservatism in financial reporting should no longer connote deliberate, consistent understatement of net assets and profits (FASB, para. 93)’. At the next point, in para. 95, the US FASB underlines that ‘conservatism no longer requires deferring recognition of income beyond the time that adequate evidence of its existence becomes available or justifies recognizing losses before there is adequate evidence that they have been incurred’ (US FASB Framework, 1980, para. 95).

The recent decades’ tendency of opposing conservatism, and of contradicting its supporters in some circles, in favor of the so-called ‘true and fair picture’ or ‘true and fair view,’ or ‘true and fair presentation’ is well known. It can be confirmed by a quote revealing the judgment of a Professor in finance: ‘Conservatism is under attack … some … even the FASB … are now suggesting it may be better to abandon conservatism … to show more unbiased financial statements.’ Besides that, it is the standpoint of eminent scientists in the field of accounting and economics from France, Spain, the UK, Germany, the USA etc., such as Professor Jacques Richard, Professor Jesús Huerta de Soto Ballester, Professor Stella Fearnley, Dr. Carsten René Beul, Professor Shyam Sunder; and many others, and at this point I will admit, that my perspective and opinion are the same as well.

However, on the grounds of my research so far, I confidently believe that, especially in Continental Europe, the principle of prudence or ‘conservatism’ has been an integral part of financial accounting essentials for a long period of time, and it can hardly be disproved, in my view. One major argument which is put forward by the adherents in this respect is that prudence or ‘conservatism’ serves well the needs of creditors. With a specific allusion to the German accounting system, Haller (2003, p. 92) states that the principle of conservatism is not understood as a sub-characteristic as it is understood in the USA⁶ and in the UK but rather as the core principle of accounting which stems logically from the objective of protecting creditors (following Hellman, 2008, p. 72). At this point, it should be noticed that conservatism also serves well many other stakeholders, such as potential and present investors, employees, and other people in employment, institutions of state authority, as well as the social interests of all society members and the society as a whole, due to its social significance and the favorable societal implications of its consistent application.

Haller (2003, p. 108) continues the explanation with the argumentation as follows: ‘The idea of safeguarding the company as a source of income generation … with the function of the balance sheet in calculating taxable income, leads to an emphasis on capital preservation … The concept of the preservation … of nominal equity … is also the reason for the importance of the principle of prudence, which, in line with the specific author’s wording, leads to the use of the so-called hidden or ‘secret’ reserves … counterproductive in an accounting model whose only objective is to give information

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⁶ However, Sterling (1967) argues that conservatism has historically been one of the most influential accounting principles even in the USA, where companies to a greater extent turn to the stock market for financing.
because secrecy is the opposite of information. However, it is admitted that: ‘In a model which stresses prudent income calculation with the objective of the preservation of capital and an underlying concept of creditor’ protection … it is a very logical approach’ (by Hellman’s notes, 2008, p. 97). In my view, the ultimate thought seems to be truthful and realistic. However, the hidden or ‘secret’ reserves in themselves cannot be regarded as an instrument or tool for deliberate manipulations aimed at understatement of value of (net) assets or income. Initially, in their origin, hidden reserves are rather the consequence or the effect that might be caused by non-professional approach to valuation process, lack of expertise, more or less impact of stakeholders at a higher management level, other factors of influences etc.; moreover, the biased misstatements of values of financial statement elements when it is not difficult to ascertain the real facts, should be regarded not as conservatism but simply as concealment of data, which in its turn can be misleading. But this is not always the case in practice.

Similar is the view held by Professor Hellman (2008, p.74). He reasonably argues that a long tradition of accounting conservatism exists, predominantly in code-law-based countries. Professor Hellman refers to Haller and Eierle (2004, p. 36), who suggest that it has been a received wisdom in Germany that conservative accounting is ‘... the best way to reach the objective of creditor protection’. Creditors’ preference for conservatism is explained as a way of protecting the priority of the creditors’ claims above the shareholder claims (J. M. G. Lara and A. Mora, 2004, quoted by Hellman; Emphasis added). For that reason, it is argued, that the determination of non-restricted equity, that is, funds which are distributable among shareholders, has been much emphasized on in code-law-based countries. With specific regard to Swedish legislation, K. Artsberg and C. Nilsson (1993, p. 37), suggest that the view, incorporated in the Swedish legislation, is that ‘a single good year should not result in dividends, but that profits shall be retained as reserves for the future’ (K. Artsberg and C. Nilsson, 1993, p. 37; quoted by Hellman; Emphasis added).

On the basis of my investigations so far it can be suggested that in Germany, France, Sweden and other European countries, for a long period of time conservatism was the overriding accounting principle. It still appears to be an essential theoretical concept especially in Continental European countries. Unfortunately, in Professor Jacques Richard’s view, the IFRS ... embody a systematic and all-out assault on a fundamental principle underlying accounting (already fairly well eroded throughout the 20th century) – the principle of prudence, which forbids statements of potential profits and prescribes disclosures of potential losses (by Professor Jacques Richard; Emphasis added).

Although the influence of the IASB’s policy has been powerful for decades, in practically oriented discussions, the principle of prudence is mostly deliberated on in respect of accounting issues arising from uncertainty. Debates on issues of how exactly the principle is being applied in reality regularly arise and they are usually focused on critical questions as, for example, whether particular accounting solutions can be regarded as enough conservative, i.e., prudent and sensible.

Hellman (2008, p. 74) reasonably argues that the strong connection between accounting and taxation in code-law-based countries also tends to work in favour of conservatism, and this is quite logical as it may be presumed that more prudent valuations of assets and liabilities would also lead to lower taxable income. It may be noticed here that it is not necessarily be always so. Taxable income can be calculated depending on specific rules of tax laws designed to regulate the process of transformation of reported financial results for the purposes of taxation. Even accounting losses, not only profits, are subjected to procedure of tax transformation, in order to counteract possible management propensity of creating hidden reserves, or, to neutralize to a certain extent the effects of such practice.

Conservatism is broadly considered to be a tendency of accountants’ behavior of preferring to choose, when faced with some kind of uncertainty as to specific events, to attribute lower estimates of values of assets and revenues, and conversely, higher estimates of values of assets and expenses. It is commonly deliberated that conservatism stipulates that expenses and liabilities are not understated in accounts and consequently in financial statements, and on the contrary, assets and revenues are not overstated in financial statements. In Sterling’s view (1967) conservatism seems to be closely related

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7 The hidden or ‘secret’ reserves are considered to be the feature of the German accounting and for the reason of that it has been criticized for long in an international context.

8 Moreover, in Hellman’s view, auditors also may have a conservative bias, since they are not expected to get sued on the grounds of financial statements, being too conservative (Hellman, 2008, p. 74).
to the concept of realisation, as conservatism implies that a profit should not be recognized, before it is realized. The approach of recognition of profit in advance, before it is realized, always poses to risks, more or less, and it may prove to be overly unrealistically optimistic. Thus, as early as 1967, Sterling reasonably suggests that conservatism may in fact be the root of the principle of realization. That view is supported by emeritus professors of accounting, such as the French Professor Jacques Richard and many, many others. The debate is still going on and has strongly intensified during the last global economic crisis. The distinction between realized and unrealized profits should be clear to all interested parties, and that view has been predominantly sustained over time.

Scientific and historical evidence confirms that conservatism has been one of the oldest and most important principles of accounting (Sterling, 1967; Watts, 2003a). However, a lot of researchers have found that it has been problematic to completely incorporate conservatism in the normative theory of accounting. Conservatism was a primary principle for the German supporters of the balance sheet approach, known as ‘statists’ (Forrester, 1993, Chapter V). Since 1908 and on, a different view and an income statement approach have been propounded (Schmalenbach’s theory, 1959, and Quire, 1965, emphasizing the ‘matching of flows of production and consumption in order to measure profit’).

Although Schmalenbach disagreed with the static theory, he agreed with the statists with regard to the primary role of conservatism. Schmalenbach (1959, p. 82) argued that an overstated profit is far more dangerous than an understated one. However, at the same time, Schmalenbach (1959) admitted that conservatism can be exaggerated and he also presumed that underestimation of profits can be harmful (Hellman, 2008, p. 74; Emphasis added). By Hellman’s specific wording, it is not clear-cut from reading Schmalenbach (1959) how the appropriate level of conservatism should be determined.

Researchers such as Paton and Littleton (USA, 1940) propounded an extremely different view. These authors intended to construct a framework of an accounting theory conceived as ‘a coherent, coordinated, consistent body of doctrine’ (1940, p. ix), of which conservatism should not be a part. They regarded conservatism only as an attitude to be added when interpreting the accounting numbers (Littleton, 1940, p. 128), and as ‘a rule of caution’ applied by users when interpreting the results of accounting measurements made according to ‘a coherent body of doctrine.’ However, that view has not been acknowledged in practice. In this respect Sterling (1967) argues that whenever conservatism clashes with a conventional accounting principle (for example, the valuation of inventory at the lower of cost or market value or simply at historical cost, in Sterling’s way of expression at the time) there is a preference for the more conservative policy in practice (by Hellman, 2008, p. 75), hence the more conservative accounting approach and method of valuation. A conclusion can be drawn that these differentiating views demonstrate problems of delimiting conservatism to some ‘appropriate’ level. Then the critical question immediately arises, which is the most ‘appropriate’ level of conservatism.

For researchers in the normative accounting tradition, the application of the principle of conservatism has been understood as theoretical (Hellman, 2008, p. 75). Hendriksen (1982, p. 81) argues that the general constraint arising from uncertainty has served as a basis for the traditional accounting concept of conservatism. However, the idea of systematically understating assets and overstating liabilities, recognizing revenues too late and of expenses too early has been interpreted by critics belonging predominantly to the Anglo-American tradition as a way of reducing the relevance of accounting information. In the words of Hendriksen (1982, p. 83) ‘conservatism is, at best, a very poor method of treating the existence of uncertainty in valuation and income. At its worst, it results in a complete distortion of accounting data.’ (Quoted by Hellman; Emphasis added). However, the views of eminent scientists in Europe and in the USA have proved to be far out of this opinion, even just the opposite.

In Hellman’s view, reliable reporting of past events, which implies that stewardship and the feedback function of accounting is emphasised, is often associated with the need for conservatism. Over time, the IAS have become increasingly future-oriented, pointing out decision usefulness as the primary objective of accounting (IASB Framework; 2006a), and that conservatism seems to have become less of a governing accounting principle (Hellman, 2008, p. 72). Other authors like Hendriksen s argue that it is generally stated, that the concept of conservatism is not a postulate of accounting, nor should it be one of the constraints. But in its operational form, as those authors claimed, it serves as a constraint to the presentation of data that may otherwise be reliable and relevant (Hendriksen, 1982 p. 81).

Hellman argues that the normative accounting research tradition went out of fashion in the 1970s, but that critical view on conservatism seems to have been adopted by the US standard setters. Although
the US APB (1970) acknowledged conservatism as ‘a modifying convention of financial accounting.’ FASB (1980) does not deliberate on conservatism as one of the desirable qualitative characteristics of accounting information in its framework.

Researchers like Basu9 (1997) and Watts (2003a) argued that conservatism has the effect of accelerating the recognition of economic losses, and, reversely, of deferring the recognition of economic gains, that is described by Basu (1997) as ‘the asymmetric timeliness of earnings’ (ATM). It (ATM) has turned out to be the basis for further research both empirical and theoretical (Watts, 2003b; Ryan, 2006). Authors argued that ‘the asymmetric timeliness of earnings’, as a feature (property) of conservatism as it is described by Basu, highlighted the intertemporal nature of conservatism – the recognition of unverifiable economic gains or of unrealised economic gains in earnings (and income) is delayed until the uncertain gains turn out to be verifiable or until they are realized. Therefore, in a normal, typical, usual company’s life cycle, earnings tend to lag behind the economic income over several accounting periods. In the early stages of the company’s life when the investment outlays tend to be higher and revenues lower, earnings tend to be lower than the economic income of the company; however, in the mature stages of the company, when its revenues are higher and more stable, earnings tend to get closer to the economic income or even exceed it (Monahan, 2005; Zhang, 2005). However, it should not be argued that accounting conservatism is not always “conservative” merely because it may lead to lower earnings in one period and to higher earnings in another one. The main purpose of conservatism is to create higher standard or, let’s say criteria, of verification for recognition of good news, as a mechanism of dealing with and overcoming economic uncertainties. Thus, the intertemporal properties of earnings are just a consequence of that main purpose of conservatism, rather than the reason for it (Richard, Z. W., 2009).

As to the inherent rule of the inventory evaluation – book value or carrying amount of an inventory should not be written up when market value exceeds cost (cost of acquisition), but it should be immediately written down when market value falls below cost, known as ‘the lower of cost and market value’ rule, according to the eminent historian R. H. Parker (1969), that practice was firmly established in the 19th century. George O. May claimed that by the time he entered the accounting profession (1892) in England, the rule had already been well established (R. Parker, 1969). This suggests that conservatism probably has been around since the 19th century at the latest, while other researchers argue that the time is even longer. Sivakumar and Waymire (2003) conducted a historical study into the accounting of US railroads at the beginning of the 20th century, using empirical methods. Their study demonstrates that the railroad companies in the US around the turn of the 20th century were not only conservative in methods and accounting policies but that their levels of conservatism also gradually increased, in response to changes in regulations and other factors (Richard, Z. W., 2009). This study provides some of the most considerable and persuasive empirical evidence that conservatism in accounting has existed for a long period of time, resonated the similar conclusion of historians based on mostly non-empirical methods (Richard, Z. W., 2009).

The influence of conservatism on accounting standards is pervasive, and examples can be found in many standards (Richard, Z. W., 2009). Apart from the ‘lower of cost and market value’ rule which still remains in the US (Richard, Z. W., 2009) and the international accounting standards at present, many rules exist that can be regarded as illustrative examples of conservatism, e.g., the impairment of fixed assets; the expensing of research and development costs, rules as to depreciation and impairment of some assets, provisioning, contingent liabilities, and many others.

Moreover, it is argued (Richard, Zhe Wang, 2009) that ‘empirical studies on conservatism in the second half of the 20th century have provided ample evidence that conservatism is a fundamental characteristic of financial reporting in virtually all the developed countries in the world, and also in many developing countries’ (Watts, 2003b; Ball et al., 2000; Bushman and Piotroski, 2006; Basu,

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9 Basu interprets conservatism as resulting in earnings reflecting ‘bad news’ more quickly than ‘good news’ that implies systematic differences between periods of bad news and periods of good news in the timeliness and persistence of earnings. Basu uses firms’ stock returns to measure news and finds out that the contemporaneous sensitivity of earnings to negative returns is two to six times that of sensitivity of earnings to positive returns, and that negative earnings changes are less persistent than positive earnings changes. Earnings response coefficients are higher for positive earnings changes than for negative earnings changes, consistent with that asymmetric persistence (Basu, 1997, p. 3-37). Basu argues that conservatism has been established for at least 500 years in Europe, supported by historical evidence that traces the ‘lower of cost and market value’ rule back to Italy in the 15th century and to France in the 17th century (Littleton, 1941; Emphasis added).
1997; Ball et al., 2003). As we have underline, this is a scientific area of profound research, and many studies have been embarked.

Beginning in the late 1930s, and until the 1980s, conservatism had been criticized by prominent accounting scholars, including Gilman, Hatfield, May, and Paton (Chatfield, 1996). According to Chatfield (1996), the most frequently used arguments against conservatism are: firstly, accounting conservatism is not consistent in that it produces lower income in one period and leads to higher income in another period; secondly, accounting conservatism is arbitrary and gives managers too much discretion for power over reporting, among other problems (by Richard, Z. W., 2009).

However, as Watts (2003a; 2003b) has noted, despite criticisms, not only has accounting conservatism survived numerous accounting reforms, regulations and economic crises in the past century, but also the average degree of accounting conservatism, in the US at least, even (slightly) increased during the past 30 years (Oreshkova, p. 277-292). This claim has been confirmed by empirical studies based on large samples of data from the US and worldwide. For example, with regard to the lower of cost and market rule, Parker observes: “The astonishing thing about the lower of cost and market rule is its ability to survive attack. G. O. May was probably right in suggesting that most accountants are ‘content to regard the demonstrated practical wisdom of the rule as outweighing any supposed illogicality’” (Parker, R., 1969, p. 257, Richard, Z. W., 2009, p. 13).

The inspiration of academics and researchers is to find out the rationale underlying conservatism, and, subsequently, to explain its inherent resilience of criticism even at the present time. “While the search for rational explanations of conservatism is still ongoing, it has already paid big dividends (Richard, Z. W., 2009, p. 13).” Referring to Watts (2003a) and summarizing a large part of the recent developments on the problem, Richard, Z. W. (2009) identified several explanations of conservatism, concerning: the litigation risk and reduction of litigation costs, the debt contracting, the managerial contracting, the political cost, and tax optimization or the tax incentive explanation (Watts, 2003a). These explanations have made conservatism, once unjustifiable in the eyes of Paton and Hatfield, significantly more justifiable (Richard, Z. W., Ibid.).

Due to an existing constraint, it is impossible in the present research to reveal the rich palette of views, considerations, and arguments focused on prudence and ‘conservatism.’ The literature dedicated to that fundamental problem is vast, since the debate has been ongoing for decades, if not for centuries, and we do not exaggerate. The phenomenon of prudence or ‘conservatism’ has challenged researchers since the very early periods of the development of accounting as a theory. Thus some academics (e.g. Richard, Z. W., ibid.) acknowledge that many of the arguments have yet to be resolved.

The erosion of prudence in accounting under the influence of international standards setters and other political factors, besides regulatory bodies, has provoked researchers, professional and institutional organizations, experts, practitioners. The international standards setters have attempted to abandon prudence in favor of “neutrality” regarded as a qualitative characteristic of financial statements information since 2006 (IASB, 2006a; FASB, 2006), and even earlier, I suggest. It was claimed that if neutrality was ensured, there would be no downward bias impact on the reported (net) profit or income, even though uncertainty may exist as to the amount of the profit and the question of whether it is realized or not. The motive of upholding that view was that ‘prudence’ and its inherent ‘conservatism,’ due to the bias it introduces, appears to be inconsistent with the qualitative characteristics of representational faithfulness. It was argued that neutrality in accountants’ behavior will lead to unbiased representation of the underlying economic performance of the entity, thus provide more reliable and relevant information to stakeholders. That way of thinking was very likely to be widely criticized and the ongoing debate has revealed and confirmed all this.

**Are “Prudence” and “Conservatism” Synonymous or Not?**

There has been an eclectic for long as well as a wide range of detached opinions. Semantic meanings were accumulated over time. Different authors used one and the same term, but attributed to it different meanings, and interpreted it in a different way. The strong impact of the accounting tradition and culture as well as the lack of linguistic equivalents created and still create difficulties, which impede the more comprehensive and productive debate. Although prudence and ‘conservatism’ are broadly used by the authors as synonymous, which circumstance, in my view, creates another prerequisite for ambiguity or misconception, we are inclined to support the opinion that a theoretical...
distinction is necessary to be made. It is of importance for achieving precision in defining prudence and in formulating the definition on the grounds of a clear understanding of its essence.

Professor Barker (2015, p. 515) explains that ‘conservatism’ refers to any method of accounting that leads to book value being less than economic value, while he determines ‘prudence’ as a specific type of conservatism arising from a ‘cautious’ response to uncertainty. Barker attains theoretical merit, differentiating between prudence and ‘conservatism,’ which is needed in setting out distinct theoretical concepts that would otherwise be mingled. His first observation is that conservatism cannot be defined in absolute terms, but it must be defined in relation to something. The consideration is that an outcome can only be described as conservative in comparison with an alternative outcome that is not conservative (and which might be described as ‘neutral’).

In the case of conservatism, the term ‘economic value’ is employed as the neutral benchmark. Barker’s idea is that a comparison should be made between the estimated worth of the reporting entity in economic terms and the representation of its worth in accounting terms on the balance sheet. “This ‘straw man’ comparison, in Barker’s words, is important in explaining why financial accounting is not a system for the neutral measurement of economic value, and why conservatism is thereby an intrinsic system property.” However, it is not the purpose of annual financial statements to construct models of economic value (Tracey, E., p. 540-542). Specifically, conservatism is defined as: ‘Accounting is conservative if the economic value of an entity’s equity exceeds its book value’ (Barker, 2015, p. 516).

In Barker’s definition, ‘economic value’ refers to the present value of expected cash flows attributable to holders of equity claims, and ‘book value’ refers to the carrying amount of net assets. In practice, of course, economic value is an estimate, depending as it does upon the forecasting and discounting of future cash flows. No claim is made that economic value can be ‘known’ in practice, and in that sense the benchmark of neutrality employed in the quoted research paper is hypothetical, being invoked to identify conceptually the nature of conservatism in accounting.

At this point, it is appropriate to note that Barker’s major argument is that financial accounting is inherently conservative, and I think it is apparent that I totally support it. A neutral application of the International Accounting Standards Board’s definition of (net) assets leads to book value being less than economic value (Barker, 2015, p. 514). The English professor emphasizes the existence of both conceptual and practical reasons for this, neither of which, in his view, can be explained by an intention to be conservative, by an asymmetry or bias, designed to lead to a conservative outcome.

Financial accounting is not a system for the neutral measurement of economic value, and it is one major observation. Book value and economic value are conceptually different, with conservatism resulting from that difference. This inherent conservatism seems to have been overlooked both by the IASB and by its critics (Barker, 2015, p. 514, p. 515). On the pretext of convergence and under political pressure, after vigorous deliberations, the IASB has removed prudence from the Conceptual Framework (CF) and has been criticised by academics, practitioners and professional organizations. In Barker’s viewpoint the challenges to the CF implied by adopting an agency-based, contracting demand for prudent accounting are criticisms of a problem that for the most part does not exist (2015, p. 514).

Strong disagreements exist between the International Accounting Standards Board, on the one hand, and, academics and practitioners, on the other hand, on the question of prudence. On the basis of my previous and current research I tend to believe, that persuasive arguments exist in support of the view that accounting should be conservative. In my view, financial accounting as a system is designed to be a conservative one. Barker also concedes that the research literature is broadly supportive of the notion that accounting should be conservative. Furthermore, he comes up with empirical evidence which suggests a market demand for conservatism as well as an economic theory to explain that demand.

With respect to this, the literature is aligned with accounting practice, which has long embodied a prudent approach to financial reporting.

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10 Professor Barker argues that IFRS will always result in such differences, not because of applications of conservatism but because of IFRS’s definitions of assets and its measurement rules. These make gain recognition less likely than loss recognition and impairment losses more likely than revaluation gains (Richard Barker, 2015).

However, in conflict with academics, many institutions and practitioners’ perspective, “prudence” was removed from the CF (2010) since the Board did not consider it a desirable quality of the financial reporting information. It should be emphasised that prudence may be thought about as a fundamental principle, as a core principle, as a guiding principle, as a major requirement, as an essential theoretical concept underlying accounting and financial reporting, but it should not be considered a qualitative characteristic of the financial reporting information, as it was previously stated in the Framework. It is deeply erroneous, in my view.

The orthodox view of the financial reporting integral role in the financial system that is of ‘bedrock importance to capital markets’ is often emphasized (Wallace, UK, 2011) as well as the increased complexity of reporting. As main areas of critical issues in financial reporting are identified valuation, disclosure and comprehension, mostly discussed with reference to the present-day question of whether financial reporting reflects what a business does in reality. It is well known that efforts have been made for the increasing complexity of transactions and business to be reflected in the standards’ rules. However, there is now a lack of connection between financial reporting and the entity’s business model. For that reason, it is quite logical, the critiques to be primarily linked to the long absence of prudence in the CF that in experts’ opinion has been lost as a fundamental concept even in the UK.

I believe that accounting is a powerful practice that shapes and influences social and economic processes. For instance, Baker and Barbu (2007) point out that accounting has been an integral part of human civilization for 4000 years. Soll (2015) proves that accounting practices have played a remarkable impact on the rise and fall of great nations. The founders of modern economic thought – from Adam Smith to Karl Marx – saw accounting as essential to the development of successful economies and modern capitalism. For this reason, Weber (1947) repeatedly insisted on the necessity of studying economy and society together. That view of accounting perceived as a social, political and institutional practice has resulted in a wide range of studies (e.g. Burchell et al., 1985; Napier, 1989; Carnegie, 1993; Dillard et al., 2004). The European Commission also acknowledges that “accounting is not neutral”. Indeed, it affects a great variety of stakeholders, not only companies, investors, bankers and auditors, but also citizens, employees and states, since financial information serves as a basis for determining not only economic but also social rights. Accounting, for instance, serves to set the limit for distributable profits, to calculate taxes and to define the public budget to which social welfare is parametrized (by Palea, 2015).

In my view, conservatism should be understood in a broader sense than prudence. As a core principal that underlies financial accounting and reporting, traditional prudence is considered to comprise some essential rules, which accountants should follow if encouraged to represent the basic economic performance of an entity in a fair-minded, unbiased and unprejudiced manner, and thus provide truthful, sound and verifiable information to stakeholders. Conservatism must be conceived as a wise, prudential philosophy and strategy, the long term benefits of which to entity, state and society should be profoundly considered by each corporate governance and management. It is acknowledged that they, being mostly inspired by extortionately optimistic expectations, and having the prerogatives to influence accountants’ decisions, predetermine their behavior, entity’s results and performance. As a matter of fact, following the rules of the traditional prudence, accountants having their professional expertise and ethics, strive for the viability, durability and sustainable growth of entities.

The Normative Perspective: An IASB’s Exposure Draft Introduces Prudence

Does the Debate on Prudence End or Does It Not?

My long-lasting observation of the development of the debate on prudence has given me grounds to argue that the International Accounting Standards Board (IASB) has demonstrated a policy of inconsistency regarding its approach towards ‘prudence’. Without difficulties I can provide ample proof for that. Even Macintosh has publicly admitted recently that they, IASB’s members, have experienced the influence exerted by the US Financial Accounting Standards Board (FASB). “At the

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12 Even the UK Statement of Accounting Practice (SSAP) 2 included the fundamental accounting concepts of going concern, accruals, consistency, and prudence. Then in 2010 the IASB published a revised Conceptual Framework for Financial Reporting which favoured “neutrality” over “prudence” or “conservatism”.

time – the IASB Vice-Chairman admits, “I didn’t think it should have been taken out. But there were people who thought it conflicted with neutrality. There are still people who see things that way. But I don’t.” Further on, Macintosh admits that the influence of the United States Financial Accounting Standards Board (FASB) is less strong than it has been that is slightly compromising, in my opinion (ICAEW Economia, 2015).

Further on, answering the question of why it is worth bother setting prudence back into the Framework (CF), Mackintosh explains that prudence gives people some comfort. He argues that some investors equate prudence with the “true and fair” view, as they believe it will give auditors a tool to help counterbalance management optimism and aggressive accounting policies. Singleton-Green, a manager in ICAEW’s Financial Reporting Faculty and his supporters, are quite pleased to see prudence back into the Framework (CF), but others are not, particularly those who see tension between prudence and the concept of neutrality, which, in my view, does not actually exist and this issue is artificially inflated. Professor Stella Fearnley from Bournemouth University (UK) rhetorically questioned opponents and comments further on: “What’s neutrality? It’s rubbish. Accounts can never be neutral because there are so many judgements in them.” As a final point, Mackintosh concludes: “This is an exposure draft. So people can comment again about whether prudence should be in.”

However, on the IASB’s meeting as of May 18th, 2016 the Board tentatively decided to confirm its previous decision and belief, namely that the Exposure Draft ‘should’ propose to reintroduce an explicit reference to the notion of prudence. However, once again the Board admitted, after prolonged persistence, that: ‘2.18. Neutrality is supported by the exercise of prudence, which is my thesis and view I have been standing up for since the outset of the debate, specifically, since the debate was triggered. The proposed definition is as follows: ‘Prudence is the exercise of caution when making judgments under conditions of uncertainty. The exercise of prudence means that assets and income are not overstated and liabilities and income are not understated. Equally, the exercise of prudence does not allow for the understatement of assets and income or the overstatement of liabilities and expenses’ (emphasis refers just to the ‘newly’ added extension of the definition). I have discussed in my previous research on this problem the reasoning that underlies the change (Oreshkova, 2014, p. 282); the notion (idea) is that such kind of misstatements can lead in future periods either to the overstatement of income or to the understatement of expenses. That was the notion of prudence after the decision to change the definition as of May 21st, 2014 (IFRS Foundation IASB Meeting, May 2014, 20th to 22nd).

In the BC two types of prudence are distinguished: ‘cautious prudence,’ defined as ‘need to be cautious when making judgments under conditions of uncertainty, but without needing to be more cautious in judgments relating to gains and assets than those relating to losses and liabilities. It is in this sense that the Board proposes to reintroduce prudence in the Conceptual Framework; and ‘asymmetric prudence,’ defined as ‘need for systematic asymmetry: losses are recognized at an earlier stage than gains are.’ The Board upholds the opinion that the Conceptual Framework should not identify ‘asymmetric prudence’ as a necessary characteristic of useful financial information. However, it explains that accounting policies which treat gains differently from losses could be selected in accordance with the proposals in the Exposure Draft only if:

- they are selected in a manner that is not intended to increase the probability that financial information will be received favorably or unfavorably by users of financial statements (i.e. neutral accounting policies are selected); and
- their selection is intended to result in relevant information that faithfully represents what it purports to represent.

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16 On May 21st, 2014 the IASB tentatively decided: to reintroduce a reference to prudence in the CF. The description was – the exercise of caution when making judgments under conditions of uncertainty. Contrary to the previous description of prudence, it was acknowledged, for the first time, that the exercise of prudence is consistent with neutrality and should not allow the overstatement or understatement of assets, liabilities, income or expenses; secondly, to discuss in the Basis for Conclusions the significance of prudence for preparing financial statements and for the IASB in setting Standards.
On 18th May 2016 the Board decided to confirm that the revised CF should include a reference to prudence described as the exercise of caution when making judgments under conditions of uncertainty, as proposed in the Exposure Draft. The Board tentatively decided that there is no need to explain in the Basis for Conclusions on the Conceptual Framework that the notion of prudence cannot be used by preparers to override the requirements in IFRS because the Conceptual Framework already includes a statement that it is not a Standard and does not override any specific Standards. In addition, it shouldn’t be overlooked that the Board directed the staff to explore further whether and how the Conceptual Framework should acknowledge that asymmetric treatment of gains (or assets) and losses (or liabilities) could be selected if such selection is intended to result in relevant information that faithfully represents what it purports to represent.

The Board tentatively decided (September 22nd, 2016) that the main body of the revised Conceptual Framework should acknowledge that, in some cases, income may need to be treated differently from expenses and assets differently from liabilities. The Board directed the staff to develop the wording for such an acknowledgement for discussion at a future Board’s meeting. On 18th October 2016 the Board tentatively decided that Chapter 2 – Qualitative characteristics of useful financial information of the revised Conceptual Framework should acknowledge that the exercise of prudence does not imply a need for asymmetry – for example, a need for more persuasive evidence to support the recognition of assets than of liabilities or to support the recognition of income than of expenses. Nevertheless, it is admitted that in financial reporting standards such asymmetry may sometimes arise as a consequence of requiring the most useful information.

I tend to argue that with its most recent proposals endorsed as of January 2017, the confusion will reign over everything. The Board differentiates between ‘cautious prudence’ and ‘asymmetric prudence,’ purporting that this would contribute to more clarity, or at least would diminish the ambiguity but specialists and academics, including myself, are afraid that the effect will be just the opposite. One observation is, that way the Board will prescribe the appropriate level and type of prudence. Regarding this reasoning and the above-mentioned proposals IASB is once again criticized because of academic and institutional disagreements.

Authoritative professional institutions like ICAEW thoroughly comment on that issue claiming that the conflict between the CF and the essentials of some IAS/IFRS will be intensified and that is true. The view of AAT is also worth to be supported. They believe that while a principles-based approach to standards prevails, prudence provides a greater degree of assurance than neutrality does, and it is supportive of the inclusion of prudence within the CF.

However, the conceptual idea of prudence is embedded into already existing IAS/IFRS to a certain extent and in different ways; the notion of the so-called by the IASB ‘asymmetric prudence’, for example, can be seen in the standards themselves; as per IAS 11 Construction contracts, losses on a contract are recognised as soon as they are foreseen, i.e. predicted or expected; specifically, when it is (highly) probable total contract costs to exceed total contract revenue, the expected loss should be immediately recognised as an expense.

In this respect, some disclosure requirements seem to be prudential. As per IAS 11, an entity discloses any contingent liabilities and contingent assets in accordance with IAS 37 Provisions, contingent liabilities and contingent assets. It is specified that contingent liabilities and contingent assets may arise from such items as warranty costs, claims, penalties or possible losses. For example, IAS 37 requires disclosure, in specified circumstances, of major assumptions concerning future events affecting classes of provisions. IFRS 13 Fair Value Measurement requires disclosure of significant assumptions, including the valuation technique(s) and inputs the entity uses when measuring the fair values of assets and liabilities that are carried at fair value.

In compliance with IAS 37 Provisions, contingent liabilities and contingent assets full provision must be made for all the expected losses on onerous contracts, regardless of whether these items have been delivered or not. IAS 37 prescribes asymmetric treatment of contingencies as it differentiates between positives and negatives. Contingent assets can only be recognized if their receipt is virtually certain, whereas contingent liabilities must be recognized if the outflow of resources is more likely than not.

The IFRS criteria prevent recognition of items such as internally generated intangibles (for example, internally generated goodwill) or provide greater thresholds of probability regarding some items
recognition as it is the case with capitalization (or not) of development costs. Non-financial and non-current assets are initially recognised at historical cost, and the basic rule is that a decline in value (carrying amount) must be recognised immediately as an impairment loss for the period over which the entity incurred the loss, whereas increases in values are not recognised until the asset is sold (in case that the cost model of valuation is preferred as a component of the entity’s accounting policy).

The depreciation charge for each period should be recognized in profit or loss unless it is included in the carrying amount of another asset, while the revaluation surpluses (excesses) are treated in a more prudential manner, as components of other comprehensive income. Some disclosure requirements as to the notes, designed to reveal the policies relating to sensitivity of evaluations to changes in assumptions, can be seen as prudential. The so-called by the Board ‘asymmetric prudence’ can be seen in variable consideration in IFRS 15 Revenue from contracts with customers. However, in the area of financial instruments, there is basically no asymmetric recognition.

No doubt that there can be found many examples of non-prudential approach in the IAS/IFRS. For instance, provisions shall not be recognised for future operating losses, since future operating losses do not meet the definition of a liability (in paragraph 10, IAS 37) and the general recognition criteria set out for provisions (in paragraph 14, IAS 37); this is a big question and a key issue; the reasoning is that an expectation of future operating losses is an indication that certain assets of the operation might have been impaired; and what's next, an entity should test these assets for impairment under IAS 36 Impairment of assets, the application of which is highly complicated and creates problems in practice.

ACCA’s members, whose view is always interesting, also do not agree with the way prudence has been dealt with in paragraph 2.18. The approach to prudence regarded as ‘a quality (caution in the face of uncertainty) which should be followed in the preparation of financial statements’, is risky, ACCA argues as it encourages earnings management by giving companies the freedom to reduce profits by applying prudence in the preparation of the accounts when it is convenient.

Further Considerations and Inferences

In general, the policy of pursuing prudence in accounting, especially in an enterprise operating in the real (non-financial) sector of the economy, can manifest itself in a number of management decisions, which, different in nature as they might seem, are targeted at achieving the same goal – not to overstate neither understate the value(s) of (net) assets of the entity. Keeping up with that way of thinking we can give a lot of examples including primarily the following:

- Well-grounded classification and/or re-classification of the different assets and liabilities in interrelationship with the opportunity of choosing the model of valuation, and of allowing change if necessary (only in case the alternative model turns out to be the most appropriate);
- Searching for a sound judgment on the matter of the useful life of each depreciable asset supported by its most appropriate estimation;
- A reasonable choice of the method or methods of depreciation based on thorough preliminary analysis;
- Allowing for changes of a useful life and/or a method of depreciation as an exception in order to observe consistency (only if these changes are necessary for the faithful representation);
- Sound determination, including the use of unbiased expert assessment, of the residual values of all depreciable assets;
- Well-grounded judgement as to the presence of all criteria for recognition of an existing obligation as a provision; this is an important issue since if one of the criteria is not met, a disclosure of a contingent liability should be made unless the possibility of an outflow of resources embodying economic benefits is remote; and this is in regard to the necessity of providing sufficiently transparent information in the supplementary notes in order to enable users to understand the nature, timing, and amount of the provisions;
- Provisioning which should be more future-oriented rather than past-oriented;
- Capitalization of research and development expenditure only if it is certain that the prescribed criteria have been cumulatively met;
- An urge for recognition in the financial result for the reporting period of sufficiently highly liquid profits primarily;
• Creation and maintenance of sufficient highly liquid reserves taking into consideration the scale of the enterprise, the nature of its operating activities and all inherent risks to which it could be exposed at present or in the future;
• Identifying precisely the amount of borrowing costs that are eligible for capitalization in relation to acquisition, construction or production of assets adequately determined as qualified;
• Sensible choice of adequate approaches to the recognition of revenues; it is well known that in the process of applying the entity’s accounting policies, management makes various judgements, apart from those involving estimations, that can significantly affect the amounts recognised as items of the financial statements; for example, professional judgements are needed for determining whether particular sales of goods are, in substance, financing arrangements, and if so, they do not give rise to recognition of revenue;
• Continuous observation of the process of collecting receivables from the contracting parties; determining a criterion (threshold) for the amount of receivables in arrears embodying high risk, beyond which the supplies to the counterparty should be suspended;
• Substantiated classification of all lease contracts (particularly in cases of uncertainty and necessity of judgment as to whether the contract in its nature is a finance lease or operating lease (until the effective date of the new IFRS 16 Leases);
• And many more to follow.

For now, we shall not comment opinions, which do not support the idea of ‘neutrality’ in accounting, and not consider it a qualitative characteristic of financial statements information. However, we do not argue that this specific understanding is devoid of good sense or judgment, rather just the opposite. In my opinion strong arguments exist in support of the thesis I maintain not from that moment: the use of fair value valuation raises an important problem with respect to the “going concern principle” and “the liquidation basis” of accounting. Under the going concern basis, the assets are or should be treated together as a unit, as the essential elements for implementing the business model, and as such they are only considered from the point of view of their utility as opposed to their sales values. The “going concern principle” supports measurement at historical cost and justifies the existence of goodwill that comprises and therefore recognizes a part of the unrealized profits associated with the acquired assets whereas under the liquidation basis, this unit is broken down into a series of individual assets that can be liquidated separately. The liquidation principle supports fair value measurement of each individual asset but appears inconsistent with the recognition of goodwill. However, the IAS, developed and issued by the IASB, seem to reflect a certain opportunism, in which they allow ‘fair value’ and ‘goodwill’ to coexist. It is also worth acknowledging something else, which is important; even the most accurate and detailed descriptions or definitions would be inadequate if the necessity of exercising policy of prudence in accounting were not perceived as a priority or as an essential prerequisite for resilience and viability of the enterprise, as well as a vital social necessity.

I confidently maintain the view that financial accounting is a powerful tool for sharing the wealth among all members of society, for its fair distribution between present and future generations, between short- and long-term perspectives. Unfortunately, through the accounting standards high priority has been given for many years to the short-term rather than the long-term performance. From an academic standpoint I argue that criticism from researchers and other specialists are based on sufficiently reasonable arguments. It reveals significant management weakness and errors made under the influence of short-sighted policies and decisions aimed at ensuring the best results of the present at any cost without particular concern for the future that the CF and IFRS apparently have been allowing, in many cases in conflict with the philosophy of prudence in accounting. In my view, many empowered people belonging to various managerial, regulatory and other authorities of different hierarchical levels from many countries across the world are responsible for admitting grave errors, and having unreasonable behavior as officials, executives, administrators etc. The need for a paradigm shift in financial reporting has been increasingly discussed by leading scientists in Europe and overseas.

Conclusions
My belief is that the principle or the concept of prudence, not just the term even less ‘the word’, should be considered to be of the highest priority among all the traditional accounting principles as it
has been inherent in the philosophy and unique technique of double-entry procedure and accounting ever since its inception as a social practice, later gaining the status of science. In my view, prudence is consistent with neutrality rather than in antagonism with it. It is hard for me to agree that the foundational idea of prudence, if it is correctly understood, is incompatible with neutrality as it was previously stated.

In my view, the re-introduction of prudence would not obscure the transparency of financial reports information nor would it weaken their ability to represent the economic essence of a transaction or process in a credible way.

‘Prudence’ should be restored into the CF and its importance as an integral part of financial accounting and reporting essentials should be emphasized. The description should be sufficiently distinct and explicit to avoid misunderstanding or misinterpretation. A thorough description would contribute to greater clarity and consistency. If not, the CF prescriptions would not comply with the essence of a number of standards which embody the conceptual idea of prudence (for example, IAS 36 Impairment of Assets, IAS 16 Property, Plant and Equipment, IAS 37 Provisions, Contingent Liabilities and Contingent Assets, IAS 38 Intangible Assets, IAS 2 Inventories etc.). If restored, it would provide for a reasonable and balanced judgement under conditions of uncertainty and would contribute fair estimates to be achieved in the process of valuation.

My earlier hypothesis for the presumable existence of types of conservatism has been confirmed. The understanding varies across countries, accounting systems and cultures. We tend to consider that despite its decades-long development, convergence has not significantly advanced. The major differences still exist due to the clash between traditions and long-lasting influences (historical, legal, political, institutional, economic, social, cultural, linguistic, psychological etc.) under which the accounting models (for example, Anglo-Saxon or Continental) have developed. The prevailing factors contribute to the establishment of approaches which have dominated the accounting model. The principle of prudence is closely related to the European continental style of governance, the traditional manner of representing companies’ activity which is based on the long-term vision of business life. Scientists claim that the assumed conceptual superiority of IFRS reflects a strong Anglo-American bias in describing continental European accounting models and reasonably question the assumption that the Anglo-American accounting model is superior to other accounting paradigms.

The CF contains the basic concepts, assumptions, key definitions etc., and the way they are interpreted in practice impacts the quality of financial statements information. It is explicitly stated in the CF that it is not a standard, hence a comprising part of the international normative base, therefore of the regulations as regards the financial reporting in the EU member-states and other jurisdictions, and cannot override any standard; However, the Framework is assigned the role of a political chart which is supported and endorsed by all the member-states and their political leaders; so, the problem regarding its relevant importance and conformity to accounting standards should not be compromised. However, the CF is an introduction or a prelude to the IAS/IFRS and for that reason it is illogical for the core concepts not to be consistent with basic precepts, embodied in the accounting standards.

The moral of the probably subsiding crisis is that transparency, based on commonsense, optimally combined with prudence, must become a priority in financial reporting and the presentation and disclosure of relevant financial and non-financial information, both historical and prospective. For that purpose, the approaches, models and rules for recognition and measurement of assets, liabilities and capital components, of costs and revenues/income must be designed, developed and implemented in the spirit of this underlying philosophy.

First of all, we need to restore confidence in the quality of corporate reporting and the information it provides as well as to reestablish trust in the respective bodies and people, authorized to be responsible for its credibility and verifiability.

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Key Abbreviations
Accounting Principles Board (APB); American Institute of Certified Public Accountants (AICPA); Association of Accounting Technicians (AAT); Association of Chartered Certified Accountants (ACCA); Autorité des Normes Comptables (ANC); Basis for Conclusions (BC); Conceptual Framework for Financial Reporting (CF); European Commission (EC); European Financial Reporting Advisory Group (EFRAG); Expected loss Model (ELM); Financial Reporting Council (FRC); Incurred-loss Impairment Model (ILM); Institute of Chartered Accountants in England and Wales (ICAEW); Institute of Chartered Accountants of Scotland (ICAS); International Accounting Standards (IAS); International Accounting Standards Board (IASB); International Financial Reporting Interpretations Committee (IFRIC); International Financial Reporting Standards (IFRS); U.S. Securities and Exchange Commission (SEC); US Financial Accounting Standards Board (US FASB); US Generally Accepted Accounting Principles (GAAP);

1 Pauline Wallace, Head of Public Policy and Regulatory Affairs at PricewaterhouseCoopers, reasonably argues that there is increasingly voluminous reporting relating to mandatory disclosure, but limited disclosure in key areas such as financial risk and volatility. ‘With a growth in the volume of reporting and its complexity coupled with a lack of comparability between different GAAPs (UK versus US in a non-uniform world), there are questions over the usefulness of reporting to stakeholders and their comprehension of what is reported, leading to a consequently reduced reliance on financial statements.’

2 ‘Prudence also seems inherently inconsistent with neutrality, so, prudence cannot be incorporated within that concept’, in the ACCA’s view, and we definitely cannot agree with that understanding specifically.

3 Mackintosh (2015) admitted that ‘when prudence was taken out, the concepts were being developed jointly. The US didn’t have it and didn’t see why it should be in there, so that probably swayed the IASB at the time. After the Framework became an IASB-only project, a door was opened for prudence to walk back through’ (Mackintosh, 2015; Quoted by Lesley Meall).

4 For example, if an asset’s carrying amount is increased as a result of a revaluation under the revaluation model the increase must be recognised in other comprehensive income and accumulated in equity under the heading of revaluation surplus. However, the increase must be recognised in profit or loss to the extent that it reverses a revaluation decrease of the same asset previously recognised in profit or loss. If an asset’s carrying amount is decreased as a result of a revaluation, the decrease must be recognised in profit or loss. However, the decrease must be recognised in other comprehensive income to the extent of any credit balance existing in the revaluation surplus in respect of that asset. The decrease recognised in other comprehensive income reduces the amount accumulated in equity under the heading of revaluation surplus.

5 In the ACCA’s view, when there is significant uncertainty with regards to an asset or a liability then that should be reflected in the risk premium or adjustment made in reaching either an assessment of any impairment of a historical cost element or one at fair value. It is often the case that external parties may place more weight on downside rather than on upside risks in valuing assets and liabilities. ACCA see an important role for what could be termed prudence in standard setting, particularly in the possibility that there should in some cases be asymmetric recognition of assets and liabilities and gains and losses. This possibility of asymmetry is confirmed in the Basis of Conclusion but being so important, in their view, it should be dealt with in the CF itself as a possibility (not a necessity) in Chapter 1 and under the recognition criteria in Chapter 4.
MODEL FOR ASSESSMENT OF HEALTHCARE INSTITUTIONS’ COMPETITIVENESS

Vadim Pashkus,1 Natalie Pashkus,2 Asya Chemlyakova3

Abstract: This article discusses competitiveness of public health institutions, which relates to their market position as ranked by various entities (including government). For this purpose, a model of competitive positioning is designed for assessing healthcare organizations. This model allows one to assess the level of competitiveness of a medical organization, evaluate its market positioning, and develop a strategy for furthering its development using features of their position provided by the model.

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Keywords: healthcare institutions, strategic positioning, matrix of competitive positioning.

Introduction

The functioning of a public health policy requires clear priorities for its strategic development. It is necessary to rank healthcare organizations based on their contribution towards goals in the framework of the current economic policy and financial priorities. These priorities include, but are not limited to, improving the health of the nation and providing a high quality of life for the population of Russia (Altunyan & Kotcofana, 2016). Some institutions are better at coping with the tasks assigned and demonstrate high-performance indicators. Identifying those institutions is important for implementing the healthcare policy (Lyakin, 2015). It is also important to identify those healthcare institutions that are unable to provide the proper level of quality in medical services, including perceived and actual quality (Starobinskaya & Andrianova, 2010). Monitoring of competitiveness indicators and the ranking of quality should be carried out both in terms of prioritizing financing and the timely implementation of regulatory and anti-crisis measures (Rybakov, Lyakin, & Cisko, 2013; Plotnikov, Vertakova, & Polozhentseva, 2015).

Healthcare markets are highly competitive. Institutions compete for consumers and financial resources in the markets of paid services and those related to compulsory health insurance. Healthcare organizations are interested in identifying their market position and determining a promising strategy for reaching leadership. Therefore, it is important to have a tool to determine the competitive status of a healthcare institution in order to rank such institutions for financial assistance in funding medical facilities and projects, and other financial transactions (Lanska & Hartz, 1998). In using such tools, healthcare organizations could find problem areas in their strategic development and then correct their market strategy.

Assessing the competitive status of a healthcare institution requires linking information about the positioning of a medical organization on the market with the competitive strategy that it implements. Matrix strategic methods are designed to identify structures needed in the positioning of health organizations according to their competitive potential and competitive environment.

This paper describes a model for assessing the competitive positioning of healthcare organizations. This modified model makes it possible to assess and compare the competitiveness of healthcare based on the competitive strategy implemented and the characteristics of the competitive environment of the medical organization. At the same time, assessments should take into account the impact of a number of external positive and negative trends that affect the competitive status of the healthcare organization.

The modified methodology allows not only comparison of the competitive positions and competitive strategies but also the development of specific strategic recommendations.

Data and Methodology

An analysis of the competitive status of public health organizations was constructed based on a modified McKinsey model of strategic positioning (Pashkus & Pashkus, 2011). It involved an assessment of the strategic potential of health institutions and building an effective strategy to ensure their

1 St. Petersburg State University. v.pashkus@spbu.ru
2 Herzen State University. nat.pashkus@gmail.com
3 Russian State Hydrometeorological University, priemgpa@mail.ru
competitiveness. The McKinsey methodology works mainly with profitable processes and involves an evaluation of competitive advantages of the product in the context of changes in the appeal of the selected industry. The features of the healthcare market impose a need to modify classical techniques.

The modified McKinsey model for assessing competitiveness under changing environmental factors involves the setting of two integral indicators, which serve as axes for constructing a positioning matrix. Factors of the first indicator, the competitive potential of healthcare institutions, include resource and strategic potential and are plotted along a horizontal axis (X). This integral indicator includes factors that depend on the actions of management in response to changes in another indicator: the competitive environment (Y). The factors of this latter indicator affect the functioning and competitiveness of the healthcare organization and the synergistic effects that can develop under such influence. Estimations of risks are used as correction coefficients to evaluate and select priorities for the competitive strategy of healthcare organization (Kliestik & Dengov, 2015).

Figure 1 shows the matrix designed for the competitive positioning of healthcare institutions. The entire positioning plane contains nine identical zones. Each competitive position requires separate approaches to the strategy for developing resource potential and implementing various actions aimed at improving both actual and perceived quality of health services. The aim is to prioritize the competitive strategies to develop the resource potential and achieve a competitive position for the healthcare organization by responding to a specific set of conditions about the competitive environment.

![Figure 1: Matrix of competitive positioning of healthcare institutions](source)

**Results and Discussion**

Healthcare organizations placed on the plane of coordinates (X, Y) yield three types of competitive positions according to the model. The first type is competitive, the second parity, and the third noncompetitive. Each has three specific positions. The following provides the characteristics of each competitive position in brief.

**Competitive Position One**

This position denotes a high potential of competitiveness with a high level of influence for synergetic effects of the competitive environment.

It is a priority area for the strongest and most well-known organizations that can effectively implement innovative, competitive strategies, including breakthrough strategies to promote health services and healthcare organizations as part of their competitive strategies. Medical services of such healthcare organizations are distinguished by high actual and perceived quality. The consumer aspires to select a priority regarding these aspects, both for services included in the list of compulsory health insurance and for paid medical services. At the same time, in such health organizations, as a rule, there are high barriers to accessing medical services under compulsory insurance (Lyakin, 2015). This position presupposes the preservation and strengthening of the competitive status and priorities in the investment from the state and as well as from stakeholders.
Competitive Position Two

This position had average attractiveness, average synergetic effects, and high competitive potential. This strategic position is quite strong and stable. At the same time, the healthcare organization is not the leader in terms of competitiveness, but it is relatively promising and attractive. Its medical services have reasonably high levels of actual and perceived quality. The consumer audience is wider than in others. As well, access to medical services under the compulsory health insurance is slightly less complicated (Rybakov, Lyakin, & Cisko, 2013). As a rule, the development of the resource potential of such a medical institution has been uneven. Therefore, it needs development directed at its resource potential and investment targeted at overcoming weaknesses and consolidating strong points.

Competitive Position Three

This position in the matrix denotes average competitiveness potential and high levels of external effects. It is somewhat unstable; even slight change in the competitive environment can cause the fall of an organization into a parity zone or even exit into an uncompetitive zone. Position requires a clear identification of the most promising areas for quality resource development (Chesnokova & Ermakov, 2013). Usually, the services of such organizations do not differ in their actual quality from the average level of the market, but their perceived quality is significantly higher than those of competitors.

Parity Position One

This position signifies high competitive potential and low influence of synergetic effects of the environment. These institutions, as a rule, have a high ‘actual’ quality of services. They are characterized by advanced skills in certain areas, but their image potential is not well developed. Such organizations have alternatives. One is to transition to high competitiveness through creating and developing an organizational forte or a forte in selected areas of its activities. This would require implementing activities targeted at improving the resource potential and proper positioning within the healthcare market.

Such a medical organization should focus on optimizing financial and information flows. This would mean the rational use of financial resources from consumers and stakeholders. In particular, it includes carrying out investment targeted at developing priority areas and programs and in the formation of the image. The lack of a developed image prevents the attraction of additional resources.

Another alternative growth strategy in terms of competitive potential is to descend to the uncompetitive zone. This competitive position is unstable. Therefore, in the long term, such organizations will either rise to the competitive zone or lag. It should be noted that underfunding of healthcare organizations in this cluster can lead to an unfavorable alternative trend. This area is most promising for parity organizations due to the high potential of the health organization itself. However, further weakening of image and associated low financing can lead to loss of initiative and, therefore, in the foreseeable future, to further loss of competitiveness. Thus, the state policy of underfunding healthcare organizations within the competitive position will be not only economically inefficient but also unethical concerning the future of the organization, its consumers, and the healthcare system as a whole.

Parity Position Two

This position denotes average competitiveness potential and the average level of synergetic effects of the environment. It fits the mediocre healthcare organization in all respects with medical services that have average actual or perceived quality. Consumers choose such organizations for their medical services where no other alternative is available. Such medical organizations are highly available, but not all of their current patients are interested in returning to these same healthcare organizations. The health organizations in this competitive zone can only have a highly selective investment in greatly promising and least risky activities. Financial resources are at the minimally acceptable level for state subsidies and are restricted by other stakeholders. Thus, the exit from this position in the direction of increasing competitiveness is limited by its budget. Therefore, the most important direction for developing the resource potential for this organizations is the introduction of new financial instruments aimed at optimizing the internal financial structure. A long duration in this position leads to further decline in the competitive status and decrease in the actual quality of medical services.

Parity Position Three

This one depicts low competitive potential and a high level of synergetic effects of the competitive
environment. With a low competitive potential, even an extremely high level of positive environmental effect would not ensure an increase in the efficiency of the organization and high level of actual quality of services. Such health organizations, due to the positive influence of competitive environmental factors, experience astounding short-term improvement in their image. However, this increase in attractiveness is not justified by actual actions of the healthcare organization (Chesnokova & Ermakov, 2013).

The flow of investment associated with image appeal will most likely be inopportunely used by the organization to strengthen its resource potential. Under qualified or unreceptive staff will not be able to carry out the necessary procedures, the purchased equipment will be idle, and cutting edge medical materials will not be used efficiently. Thus, financial resources attracted in the short term are likely to be spent in an unplanned manner and most likely wasted by management. This zone has the most strategically unpromising positions among the other middle zones.

Only effective short-term investments are possible for such healthcare organizations. There is a high probability of abrupt closure of programs and activities. These organizations require tools to control the expenditure of public and stakeholder-provided funds. It is important for such organizations to focus on the organizational, economic, and managerial effectiveness of these processes to form a more open management structure and ensure activation of their resource potential. Therefore, where the healthcare organization can use their latent attractiveness and potentially increase funds by devoting all resources to developing and strengthening the resource capacity, it has a chance of improving their competitive position (Lyakin, 2015). Otherwise, such a healthcare organization will lose its parity position after a certain period, which can be lengthy and possible with a general drop in the quality of medical services and lack of activities on the part of the main competitors.

Nevertheless, actions targeted at developing their resource potential provide a chance for a breakthrough and ensure competitiveness. The organization has the means to act, though there is not always the motivation or ability to effectively use their full potential.

Noncompetitive Position One

This position displays potential for average competitiveness and synergy of an insignificant but positive competitive environment. These factors are mediocre in terms of competitiveness of the organizations; their image is not fully developed. There may be a generally negative opinion about such a medical institution. The strategy of the organization should be aimed at developing areas with a minimum level of risk and obtaining a feasible (minimum) competitiveness and acceptable quality of services based on their strengths. Changing from this position is difficult since the organization does not have the necessary resources, nor the motivation or ability to implement activities targeted at building the resource potential. It is typical for such organizations to choose a niche strategy where they can achieve some success and strengthen the competitive status through campaigns promoting their image.

Noncompetitive Position Two

This position entails low competitiveness potential and medium influence of the competitive environment. As a rule, it involves weak organizations with the inadequate level of quality. Their image is not appealing but rather average for the market. These organizations need to concentrate on reducing risks and protecting positions in some of their most promising areas. Changing from this position is even less likely than from the previous one since the potential of the organization is extremely low.

Noncompetitive Position Three

This position depicts low competitiveness potential and low influence of a competitive environment. These are the weakest healthcare organizations; they barely survive. They require practical measures to change position but have difficulty implementing these as an independent.

Overall, to implement the proposed methodology, it was necessary to specify two sets of factors for assessing the specific positions of a healthcare organization according to two indicators: competitive potential and the competitive environment, in which the organizations operate. As noted in Starobinskaya and Andrianova (2010) and Chesnokova and Ermakov (2013), a faulty system of indicators can destroy all advantages of the model.
Conclusion

The analysis of competitiveness and the identification of positions in the healthcare market allow an organization to outline the most effective path of further development and determine crucial strategic priorities. An understanding of stakeholder involvement, the development of resource potential, the creation of a positive image, and the brand building of a healthcare organization are all possible following a comprehensive analysis of competitiveness.

References


THE PROBLEM OF QUALITY CORRELATION AND EFFICIENCY OF MEDICAL SERVICES AS A FACTOR OF HEALTH ORGANIZATIONS COMPETITIVENESS

Vadim Pashkus,¹ Natalie Pashkus,² Asya Chemlyakova³

Abstract: In the present day, in the context of the toughening of global competition in the field of health care and the efforts that different countries of the world spend on improving the efficiency of the public sector of economy, the problems associated with determining the factors of competitiveness of healthcare organizations come to the forefront. The research conducted by the authors showed that assessing the competitiveness and development potential of medical companies with the Keigan-Vogel positioning map often gives incorrect results. The study showed that a significant part of errors (22-28%) is due to an incorrect evaluation of the quality and effectiveness of medical services, which necessitates a clear delineation of these concepts. The work shows how these indicators effect the competitiveness of organizations in the health sector and what happens if we do not distinguish between these two concepts.

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Keywords: medical services; Keigan-Vogel positioning map; quality; effectiveness; competitiveness; public health policy.

Introduction

Today, the health sector plays a crucial role in the state's economic and social policies. In modern conditions, increasingly more stringent requirements are imposed on healthcare institutions, both on the part of the society interested in improving the quality of life, on the part of the state that finances health development programs, and the work of budget institutions within the framework of the current economic policy. (Altunyan & Kotoofana, 2016) In this way, healthcare institutions find themselves in a highly competitive environment, and even in global competition, because modern consumer of health services can choose not only between private and public institutions, but also between domestic and foreign ones. (Rybakov et al., 2013) One of the key issues in this area is the correlation of the quality and effectiveness of medical services, which often are mixed by many researchers. To date, there is no single methodology for assessing the quality of medical services - as a rule, quality is replaced by compliance with standards, and the standards themselves are developed either arbitrarily or based on the amounts allocated to the health care system. Therefore, if we ignore the problems of medical services’ quality in modern studies, research gaps arise. In modern works a concept is used that is expressed in the classical work of Lanska and Hartz (1998). However, to analyze the competitiveness of organizations in the healthcare sector this, as the authors' research has shown, is clearly not enough.

Methodology

To analyse the competitive position of companies providing medical services, the breakthrough positioning model proposed in 2000 by Jonathan Keigan and Craig Vogel was chosen (Cagan & Vogel, 2013) With this model, we can determine the competitive position of the organization, the priority directions of building the company's strategy, and the matching of available resources and capabilities. All companies providing medical services can be divided into 4 types depending on the level of technology, design, and ability to "close" the SET break (generic, kitsch, high-tech, breakthrough). For every type of company, there are winners and losers (in accordance with the modified GE / McKinsey matrix). At the same time, when researching medical companies (unlike universities, museums and other social organizations), a big error arises: research conducted by the authors of the work and the Department of Economic Theory and Economic Policy of St. Petersburg State University in 2007-2016 showed that in the assessment of competitive positions of medical companies, in about 22-28% of cases there are distorted results because of an incorrect evaluation of the quality of medical services.

This problem is increasing as the state, which sets priorities for the development of the health care system and the ranking of the funding for specific projects and the organizations doing them, and the

¹ St. Petersburg State University. v.pashkus@spbu.ru
² Herzen State University. nat.pashkus@gmail.com
³ Russian State Hydrometeorological University.
society that sets a high standard of quality of medical services, often make very contradictory demands. (Lyakin, 2015) This problem arises from the fact that the aspiration of healthcare institutions for high competitiveness and service demand is not always consistent with their high quality and efficiency from the point of view of the society. (Lanska & Hartz, 1998) Consequently, it becomes necessary to clarify the concepts of the quality and effectiveness of medical services in their relationship to the competitiveness of the medical institution and the quality and effectiveness of the health system as a whole.

**Quality and effectiveness of medical services as factors of competitiveness**

The quality and effectiveness of the provided medical services are the main indicators of their competitiveness in the market and one of the most important indicators of the consumer preferences of medical services, both in the domestic and global markets. It should be understood that the quality and effectiveness of medical services are indicators of consumer preferences only if the consumer is able to understand that they are really high and that they affect the value of their medical service. (Lifits, 2009) The degree of influence on the value of a medical service must be considered both from the point of view of the consumer and from the point of view of its involvement in shaping the further value of a higher-level service, in particular, the quality of the functioning of the health care system. Usually, consumers tend to pay attention to the perceived qualities of the medical service (Fleming & Asplund, 2009, p. 96), based on its perceived consumer characteristics and the prestige of their provider. These indicators cannot be completely correlated with real indicators of the quality and effectiveness of medical services. They may not depend on the high value of medical services for direct and indirect consumers (for example, hospitals, or polyclinic complexes, etc…) of medical services. (Lanska & Hartz, 1998)

The image and prestige of a health care institutions can be created according to a number of external signs of medical services that cause certain attractive associations in the minds of their consumers. This can be a beautiful, sonorous, mysterious name of a service, its technical support, the appearance of the reception rooms, treatment rooms and laboratories, specific image personalities with whom this medical service is associated, an attractive, bright complementary activity of the healthcare institution that involves directly the consumers and many other image indicators (Chesnokova & Ermakow, 2013). But all of them are not directly related to the quality and effectiveness of the medical service, which can be assessed only by specially trained consumers or by the representatives of health organizations or health authorities themselves.

Moreover, even employees of all kinds of health management organizations and services cannot separate actual quality and performance indicators from their perceived counterparts. For example, the ideal workflow of medical institution, the absence of formal complaints and the exact observance by the medical staff of the service provision rules are associated with the high quality of management of the health care institution and the high quality of the medical services that it teaches. At the same time, in practice it can only testify to the smooth functioning of the bureaucratic system and the full compliance of the declared complex of services, formal requirements, and standards imposed on them. Thus, it is quite difficult to separate perceived quality characteristics from real ones.

The quality and effectiveness of health care services is usually seen as a single and inseparable inherent in them (Valievich & Parola, 2008, p. 28). At the same time, a situation can be realized when the service will be effective, but will not be high quality, or will be of high quality, but not effective. Therefore, it is necessary to introduce concepts of the quality and effectiveness of medical services and to explore different approaches to their evaluation.

It should be noted that the medical service is a typical public service, and the quality of public services is a set of service characteristics that ensures:

- high value for their consumers;
- possibility of public service consumers participation in the further chain of values formation;
- achieving a high net return from the public sector of the economy for a dedicated cluster of services;
- Low individual consumer risks and risks of the integrity and efficiency of the functioning of the public system, which determine the high level of the population life quality, the growth of human capital and the wealth of a society.
Consequently, the indicator of the quality of health service is a high level of prevention and recovery of patients without further relapse of diseases with a low level of individual risks of consumers associated with side effects of treatment. This high availability of medical services for all segments of the population, as well as a high level of prevention of serious diseases, aids in the development of a healthy lifestyle and medical culture of the population. The quality of medical services and the quality of the functioning of the healthcare system in general also means a high degree of coherence in the activities of institutions of all types in the timely and full provision of medical services that ensure a high life expectancy and expand the boundaries of the working age of the population.

Medical services are closely associated with a particular institution and even with a specific specialist. At present, medical institutions in Russia are only indirectly linked by the chain of health of the individual. These links are manifested mainly in the availability of regulations for the provision of referrals from polyclinic institutions to obtain routine medical services by hospitals. In addition, some medical services are provided by other medical institutions. For example, ordering specific analysis by one medical institution from another specialized agency for their patients. In fact, there is no effective system of comprehensive provision of medical services, as there is no well-developed system of prevention and detection of serious diseases. Most of the medical services are exclusively of a consumer nature.

However, due to the implementation of a system of compulsory and supplementary medical insurance, an indirect consumer of medical services became the organization which provides the health insurance. Insurance companies that carry medical insurance, on the one hand, assess the quality, formal requirements and completeness of medical care in the customer’s case, and on the other hand, regulate the admissible costs under the insurance contract and the patient's actions in obtaining medical care. When implementing health insurance services by several healthcare institutions consistently involved in the provision of health services, the degree of coordination between institutions of different types in the detection, prevention and treatment of patients' diseases is not actually taken into account. As much as possible within the framework of insurance medicine, this problem is taken into account when allocating funds within the allotted sum insured between the various institutions involved in the procedure of medical care. At the same time, if we consider the quality of medical services not from the point of view of insurance conditions but from the point of view of society's needs and ensuring a high quality of life for the population, the problem of coordinating the actions of various medical institutions in the process of identifying, preventing, and treating patients' diseases becomes more important. Indeed, each specific medical service can be provided to the patient in the proper amount, the formal and visible characteristics of the quality of services taken into account by insurance companies are met, and the patient's quality of life not only improves, but may even worsen. Thus, there is a clear discrepancy between the quality of the medical service and its effectiveness, as well as between the quality of a particular service and the quality of comprehensive medical care for the population, i.e. quality of the health system.

It should be noted that a number of medical services are directed not so much to treatment as to the prevention of diseases. In combination with medical measures, preventive measures have a direct impact on the quality of life of the population and the quality of human capital of all economic entities of the country, since only a healthy person can effectively realize his labor functions and take an active vital position necessary for prosperity in the modern economic environment. (Gregova & Dengov, 2015) Thus, the quality and effectiveness of health services and especially the quality of the functioning of the health care system in a complex has a strong impact on the level of wealth of society. The evaluation of the quality of medical services should take into account the degree of influence of the institution in the characteristics of the human capital of Russian society. At the same time, the effectiveness of medical services has a clearer structure. The effectiveness of medical services is the maximum level of the ratio of the effectiveness of the service (the ability to achieve the stated goals of the implementation of the medical service) to the costs of its creation and implementation.

(Lanska & Hartz, 1998) It should be noted that this ratio should be realized while maintaining the performance indicators of the health care institution within the given (and normally accepted) limits. In addition, the health services’ effectiveness of the service is considered subject to a high degree of satisfaction of the consumers and society with the activities of the health system as a whole.
Already from the definitions it can be seen that the indicators of quality and efficiency track different characteristics of health services and health system activities. The quality of the medical service is an indicator of the compliance of the service with the requirements and wishes of the consumers (basic and indirect), the compliance of the service with formal requirements and standards, and achieving controlled characteristics of the patient's condition and the results declared by the health care institution in the service certification. At the same time, the effectiveness of the work of a medical institution is the degree to which the goals of the medical institution or the health care system are achieved, with no more than the costs of achieving these results. (Donabedian, 1988) This is why the effectiveness of achieving the goal can be high in the absence of real quality, because the purpose of the service may be different. At the same time, a high quality of service can be achieved, but its effectiveness, both from the consumers of medical services point of view, and from the society’s point of view will be low or simply unacceptable. Insurance companies and controlling organizations regulate the formal components and outcomes of providing medical care and providing specific types of medical services. Thus, the quality of the service can meet all the necessary criteria, but it can have only a short-term effect or even no impact on the health and well-being of the patient. Moreover, to justify that the quality of the medical service was inadequate if the formal requirements and visible indicators of its delivery are met is rather difficult, as the examination of the results of medical intervention is also limited by an understanding of all aspects of the quality and effectiveness of the service. The moral and physical costs of the patient, as well as missed opportunities for the timely provision of medical care in the proper amount and composition, are generally not accepted for consideration by either health care institutions or the entities that control their activities.

Correspondence of the quality and effectiveness of medical services is possible only if the targeted services of the health care system are targeted at improving the quality of life of the population, increasing the wealth of the society and strategic priorities for ensuring public health and quality of life, raising human capital, and social orientation of the service, taking into account all possible risks, including in the social sphere. (Kliestik & Dengov, 2015) Evaluation of these indicators also faces serious problems. This is due to the fact that most of the results of the implementation of medical services are of a qualitative nature and cannot be directly quantified. When assessing these indicators, we must refer to an evaluation system specially developed for them. The method of evaluation will depend on the selected evaluation system, and the choice of the characteristics of the evaluation system depends on the type of information available about the socio-economic system indicators in which the service is being implemented and the service itself. (Chesnokova & Ermakov, 2013).

Paradoxically, the evaluation of the quality and efficiency of a paid medical service appears simpler if the evaluation criteria do not pursue the global goals of achieving the individual's overall health. If the goal of the medical service is to be effectively sold, that is, to attract the maximum number of consumers who will be satisfied with this purchase, then this case can be approached from the point of view of the ratio of the costs of promotion (creating the image and prestige of the service and health care institution) and the profit received from its implementation. But in this case, there are no positive effects for the society and strategic priorities for improving the quality of the population’s life, there is no question, as it is not necessary to observe the real quality of the service. There is a product that needs to be best sold and the same marketing approaches apply to it, which are applicable to any other similar products. In this case, it is necessary to focus exclusively on the perceived quality of medical services and the formation of associations with it that are necessary for the health care institution. Here you can go to profitable indicators, which greatly simplifies the assessment and does not require the construction of integrated quality assessment systems.

In fact, such a situation is possible in which the real and imaginary quality of medical services will be presented in the complex, and the services being implemented will demonstrate high efficiency. But most often, the implementation of such situations in the public sector of the economy is unintended. Usually it is typical for organizations that are recognized leaders in their class. Their image is formed not in the course of specially implemented procedures for promotion, but over a long period.

The positive image of such organizations is formed due to the consumer's evaluation of the value of the results of their activities and the long-term impact of the results of the provision of health services on the health of consumers, which is an important indicator of the real quality of the services of these organizations. Although even for such organizations of the healthcare system, the real quality of
medical services is estimated by the consumer over a long period of time and extrapolated to the future without changes, which seems unacceptable, since in real life the real quality of services undergoes significant changes without remaining unchanged.

**Conclusion**

The analysis showed that the concepts of quality and efficiency, commonly used as synonyms, with respect to medical services, have essential differences. In assessing the competitiveness of health care institutions and in implementing programs for the advancement of health services and institutions themselves, the focus is primarily on the perceived quality of the service and its apparent differences, but only partly on their effectiveness. At the same time, the state health policy is nominally oriented towards achieving the real quality of medical services, but does not explain which priorities in the field of health care are paramount. The guidelines of the state health policy do not explain how the real and perceived quality of medical services, the effectiveness of the results of services provision, the health of the population in the long term, the activities in the health sector, and the quality of life of the population should be agreed upon. Therefore, in order to ensure their competitiveness, healthcare institutions are oriented only to consumers of medical services and are trying to raise the level of the perceived quality of services, following the same requirements of the state, they are forced to focus only on the real quality and efficiency of services, but do not have effective incentives to do so.

As a result, healthcare institutions find themselves in a very complex and contradictory situation, which makes them, in order to survive, give preference to the perceived quality of services, with formal observance of real quality and efficiency. This situation seriously harms not only the health system and its consumers, but also society as a whole and the Russian economy. Thus, it demands acknowledging that the situation in the healthcare sector is rather complicated and contradictory, and it requires serious rethinking and overcoming.

**References**


EVALUATING WORKPLACE HEALTH PROMOTION PROGRAM

Melita Peršolja¹

Abstract: Due to the complexity of health promotion interventions, uneconomical evaluation indicators are recommended. The purpose of this study was to determine the effects of multi-component workplace health promotion intervention. The goals were to study the association of health promotion with health status. In a controlled study trial, 278 workers of primary schools and municipal administration had the chance to participate in six-month workplace health promotion program. Employees have fulfilled a questionnaire at baseline and then again after completion of the program. The results showed that in the test group, the incidence of problems with health significantly declined, but the rating of health status decreased and the average absence days increased over time. The higher working hours per week correlated to obesity and high blood pressure. It can be concluded that workplace health promotion activity could support a change in health status and therefore contribute to higher quality of life.

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Keywords: management, evaluation, quality of life, evidence-based practice

Introduction

Problem statement

Health promotion includes many meanings under which are hidden all the activities and programs that support human health (Development, 2004). In Europe, organizations introduced health promotion mainly due to pressures from laws, requirements of workers and their health problems, and in order to raise their reputation. The European model treats the individual and his environment includes a wide range of work methods and tries to integrate into the existing structure of the organization. Europe is therefore somewhat less focused on the risk factors in an individual and more on the quality of working life and working environment (O'Donnel, 2002). As is clear from the research, there are many potential benefits of health promotion in the workplace (Aldana et al., 2005; Baxter et al., 2014; Goetzle & Ozminkowski, 2008; Rongen et al., 2013): improved satisfaction with work, increased loyalty, increased involvement of employees, improved interpersonal relationships at work, enhanced self-esteem, creativity, employee productivity, improved organizations’ reputation, smaller turnover, easier recruitment of new personnel, improved health of employees, reduced absenteeism, tardiness, and injuries at work, less use of health services, reduced treatment costs, amongst many others.

Health is determined by changes in which a person can consciously make decisions and achieve the best in given circumstances. Understanding health as a complex entity, therefore, sets health promotion as intricate, and health interventions as difficult to synthesize (Waters et al., 2006). Workplace health promotion efficiency evaluation is crucial for managers to support these activities in organizations. Process evaluation provides an analysis of the development during implementation of the program and measures the ratio between the result and the expectations. The program evaluation measures the changes that have occurred in connection with the activities carried out. A cause-effect relationship between health promotion and its outcomes could be revealed with evaluation research (Thorogood & Coombes, 2010). In this study, it was assumed that a workplace health promotion program would improve the health status of employees.

Methods

The population consisted of eleven organizations in public administration and elementary schools. The organizations were divided into tested or control groups according to their involvement in health promotion activities. The subjects from test groups were included due to their voluntary participation in workplace health promotion programs. The control group subjects were selected with simple random sampling. The data were collected in two time periods (T1, T2), with a six month time interval.

The instrument for the current study was a combination of research questions implemented by the Clinical Institute of Occupational, the Traffic and Sports Medicine of University Medical Centre Ljubljana (Strgar & Urdih Lazar, 2005), the Tri fit Organizational Health Audit (Tri Fit, 1998), and

¹ Melita Peršolja, Faculty of Health Sciences, University of Primorska, melita.persolja@fzv.upr.si
other questions developed for the purpose of the actual study. The questionnaire consisted of 14 questions divided into three sections, namely sample characteristics and health outcomes.

IBM SPSS Statistics, version 20.0 was used for data analysis: A paired, independent samples, one-way ANOVA T-test was used to examine the differences between organizations, and follow the changes within groups over time. Correlation and regression analyses were performed to find associations within variables.

The researched population consisted mostly of women, with an average age of approximately 40 years, and who were married. Most respondents had attained a higher education degree. Employees worked mainly morning schedules and in average 40.64 hours per week. Two observed groups differed significantly in autonomy at work.

**Findings & Results**

**Program activities**

Program activities included obtaining management support, preparing health education materials and newsletters, online specialist support, measurements of health risk factors, six two-hour health education workshops including risk factors, physical activity, stress management, and healthy meals. Employee participation in workplace health promotion activities was in general low. The sum of 341 (20.4%) employees from the tested group participated in all health promotion activities. Minimum participation was for the Walk test (n=2, 0.72%), and the highest participation was for the Risk factors educational workshop (n=187, 67.0%)

**Health status descriptors**

Most of the respondents rated their health in general as "good" (average 3.85±.68 on the scale from 1 to 5). In a tested group, the trend of average self-perceived health decreased over time (by .15 points). The average number of days absent in 6-months caused by health problems decreased in control but increased in the tested group. The changes within and between the observed groups were not significant.

The majority (81.4 to 100%) of employees expressed that they had some problem with their health in the last six months. This proportion significantly declined over time for 15.0 in the test group (t=-2.23, Df=67, Sig.=.03) and increased for 4.1 in the control. According to the data, the employees’ health problems consisted mostly of headaches, neck and low-back pain. In the test group, the pain incidence persisted over time, but in the control low back pain decreased significantly (t=2.212, Df=102, Sig.=.02). The differences between groups were not statistically significant.

The proportion of people with elevated blood pressure in control group significantly decreased (t=2.14, Df=81, Sig.=.03), and in tested group retained below ten percent (Table 1).

Average body mass index (BMI) slightly increased with time in both groups. In a tested group, the proportion of people with BMI above the recommended value of 25 kg/m2 increased 1.3%, average body weight for 0.9 kg, and abdomen circumference for 1.94 cm. In control group, the proportion of excessive BMI increased by 3.1%, the average body weight of 2.1 kg, and the average value of abdomen circumference increased for 4.6 cm. The differences between groups were not statistically significant.

**Health status correlations**

Good health status was positively correlated with the level of education. Self-perceived health was not significantly correlated to socio-demographic variables, but it was higher in younger, single, highly educated men, those with fewer children and working fewer hours per week. Women often indicated to have more health problems than men, while men had more problems with obesity. The abdomen circumference was significantly associated with age, male gender and long working hours. The analysis showed that higher working hours per week correlated to obesity, high blood pressure, but connection with health issues and absenteeism was not significant (Table 2).

A regression model showed that health status index, could be defined by abdomen circumference (r=.39, p<0.01), health problems (r=.38, p<0.01), blood pressure (r=.35, p<0.01), BMI (r=.33, p<0.01), absenteeism (r=.29, p<0.01), and self-perceived health (r=.28, p<0.01). The proposed variables define nearly 90 percent ($R^2=.88$) of the health statuses.
Table 1. Employee health status

<table>
<thead>
<tr>
<th>Variable / Group</th>
<th>Test</th>
<th>Control</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdomen circumference more than</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>recommended, % (average cm ± SD)</td>
<td>n=37</td>
<td>n=41</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>21.9 (82.6±9.5)</td>
<td>15.0 (84.5±11.2)</td>
<td>.72</td>
<td></td>
</tr>
<tr>
<td>Absenteeism in last 6 months,</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>average days ± SD</td>
<td>n=44</td>
<td>n=64</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.22±6.55</td>
<td>6.75±17.4</td>
<td>1.58</td>
<td></td>
</tr>
<tr>
<td>Blood pressure elevated, %</td>
<td>8.1</td>
<td>8.8</td>
<td>31.4</td>
<td>12.5</td>
</tr>
<tr>
<td></td>
<td>8.8</td>
<td></td>
<td>.52</td>
<td></td>
</tr>
<tr>
<td>BMI* 25 or higher, %</td>
<td>25.0</td>
<td>26.30</td>
<td>.51</td>
<td>.61</td>
</tr>
<tr>
<td>Body weight, average kg ± SD</td>
<td>65.9 ± 13.2</td>
<td>66.88±12.5</td>
<td>.31</td>
<td>.75</td>
</tr>
<tr>
<td>Chester pain, %</td>
<td>3.4</td>
<td>5.0</td>
<td>9.3</td>
<td>8.1</td>
</tr>
<tr>
<td>Has health problems, %</td>
<td>100</td>
<td>85.0</td>
<td>81.4</td>
<td>85.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>.07</td>
<td>.95</td>
</tr>
<tr>
<td>Headache, %</td>
<td>55.2</td>
<td>47.5</td>
<td>39.5</td>
<td>35.5</td>
</tr>
<tr>
<td></td>
<td>47.5</td>
<td></td>
<td>1.21</td>
<td>.23</td>
</tr>
<tr>
<td>Insomnia, %</td>
<td>20.7</td>
<td>17.5</td>
<td>25.6</td>
<td>27.4</td>
</tr>
<tr>
<td></td>
<td>20.7</td>
<td></td>
<td>1.15</td>
<td>.25</td>
</tr>
<tr>
<td>Low back pain, %</td>
<td>37.5</td>
<td>25.0</td>
<td>57.1</td>
<td>35.5</td>
</tr>
<tr>
<td></td>
<td>37.5</td>
<td></td>
<td>1.11</td>
<td>.27</td>
</tr>
<tr>
<td>Neck pain, %</td>
<td>37.9</td>
<td>27.5</td>
<td>48.8</td>
<td>35.3</td>
</tr>
<tr>
<td></td>
<td>37.9</td>
<td></td>
<td>.84</td>
<td>.41</td>
</tr>
<tr>
<td>Self-perceived health rate,</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>average rate± SD (1-low, 5-the highest)</td>
<td>4.05±.52</td>
<td>3.90±.58</td>
<td>3.75±.72</td>
<td>3.76±.77</td>
</tr>
</tbody>
</table>

Legend: Test group=subjects from the organization included in the workplace health promotion program; T1=data collected before starting the program; T2=data collected 6 months after starting the program; n=number of subjects; %=percent; t=t-test analysis coefficient, two independent groups at T2; SD=standard deviation; Sig.=statistical significance; * calculated from weight and height, related to gender; BMI=body mass index.

Source: Author
Table 2. Correlation of health status with socio-demographic variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Gender</th>
<th>Age</th>
<th>Education level</th>
<th>No. children</th>
<th>No. Working hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdomen circumference</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>r</td>
<td>- .376**</td>
<td>.442**</td>
<td>- .131</td>
<td>.180</td>
<td>.317**</td>
</tr>
<tr>
<td>Sig.</td>
<td>.000</td>
<td>.000</td>
<td>.153</td>
<td>.100</td>
<td>.004</td>
</tr>
<tr>
<td>n</td>
<td>121</td>
<td>113</td>
<td>120</td>
<td>85</td>
<td>79</td>
</tr>
<tr>
<td>Absenteeism</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>r</td>
<td>.038</td>
<td>.049</td>
<td>- .101</td>
<td>.100</td>
<td>- .016</td>
</tr>
<tr>
<td>Sig.</td>
<td>.612</td>
<td>.523</td>
<td>.174</td>
<td>.229</td>
<td>.852</td>
</tr>
<tr>
<td>n</td>
<td>184</td>
<td>175</td>
<td>183</td>
<td>147</td>
<td>138</td>
</tr>
<tr>
<td>Blood pressure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>r</td>
<td>-.015</td>
<td>-.238**</td>
<td>.187**</td>
<td>-.050</td>
<td>-.218**</td>
</tr>
<tr>
<td>Sig.</td>
<td>.855</td>
<td>.004</td>
<td>.021</td>
<td>.590</td>
<td>.023</td>
</tr>
<tr>
<td>n</td>
<td>154</td>
<td>145</td>
<td>153</td>
<td>117</td>
<td>108</td>
</tr>
<tr>
<td>BMI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>r</td>
<td>-.192**</td>
<td>.359**</td>
<td>-.109</td>
<td>.186**</td>
<td>.332**</td>
</tr>
<tr>
<td>Sig.</td>
<td>.010</td>
<td>.000</td>
<td>.149</td>
<td>.027</td>
<td>.000</td>
</tr>
<tr>
<td>n</td>
<td>179</td>
<td>171</td>
<td>178</td>
<td>142</td>
<td>133</td>
</tr>
<tr>
<td>Has health problems</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>r</td>
<td>.208**</td>
<td>-.098</td>
<td>-.174**</td>
<td>-.023</td>
<td>-.118</td>
</tr>
<tr>
<td>Sig.</td>
<td>.006</td>
<td>.211</td>
<td>.022</td>
<td>.787</td>
<td>.170</td>
</tr>
<tr>
<td>n</td>
<td>174</td>
<td>165</td>
<td>173</td>
<td>144</td>
<td>136</td>
</tr>
<tr>
<td>Self-perceived health rate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>r</td>
<td>-.117</td>
<td>-.135</td>
<td>-.135</td>
<td>-.017</td>
<td>-.067</td>
</tr>
<tr>
<td>Sig.</td>
<td>.111</td>
<td>.074</td>
<td>.067</td>
<td>.835</td>
<td>.433</td>
</tr>
<tr>
<td>n</td>
<td>186</td>
<td>177</td>
<td>185</td>
<td>148</td>
<td>138</td>
</tr>
</tbody>
</table>

Legend: r= Pearson correlation; Sig.= statistical significance, *p<0.05; **p<0.01; n= number units

Source: Author

Discussion

The link between health status and the health promotion program was not significant. In this study, the health status of employees’, which was included in the workplace health promotion program, did not change significantly over time. Surprisingly, the trend of average self-perceived health in the tested group decreased after six months of the health promotion.

The perception of one’s own health is an important indicator, as it is correlated to the number of days absent due to sickness. Self-perceived health rating depends on leisure-time physical activity, occupational workload, gender, age, stress and many other factors. However, it seems, that the strongest connection of health-related self-report comes from physical activity, which increases resistance to physical and mental health problems (Bogaert et al., 2014; Kaleta et al., 2006; Paulik, 2010).

A health promotion strategy that aims to encourage healthy behaviors compel participants to think critically and responsibly (Cancelliere et al., 2011) but hardly impacts perceived self-efficacy which determines whether an individual will implement and insists on the healthy lifestyle (Babnik & Štemberger Kolnik, 2013). In fact, the tested group tried to take care of health and implemented exercising at the workplace, but failed to insist on regular physical activities. The result achieved did not comply with the aim of the workplace health promotion program, and raised concern about the complexity and the importance of self-regulation in life style.

Organizations in public administration and elementary schools offer good working conditions, but in this study, the highly educated had longer working hours.

Abramowitz (2016) stated that 10 additional hours spent working are associated with an increase of 1.13 kg for women and 0.63 kg for men. Similarly, Berniell (2012) has found that working time
reduction positively affects individuals’ health behaviors. This study showed that the increase in BMI and body weight was lower in the tested group than in the control group and that visceral obesity was more common in older aged men with greater working hours per week. It could be that the study observation time could not find a direct effect because the health promotion activities were too short.

But considering that obesity is a serious health risk factor and that its’ prevalence is constantly increasing in developed countries, the slowdown in weight gain of the tested group should not be ignored.

The majority of employees indicated to have some health problems in both researched groups and at both observation times. The most common health problems of respondents were headaches, low back-pain, and neck pain. Women reported more health problems, but in general, their health status indicators were not worse. A larger indication of health problems in women is partly a reflection of the culture, stereotypes and increasing congestion of informal work compared with men (Toš & Malnar, 2002). In addition, fewer women participate in regular exercise and thereby lose the direct benefits of movement on one’s welfare and health (Zaletel-Kragelj & Fras, 2004).

Studies have shown that musculoskeletal disorders are the most common cause of sick leave and disability, and that neck pain is very common in the general population (Aas et al., 2011). However, it is important to explore the history of employees’ past work, lifestyle, health assessment and domestic work (Ravnik, 2012), this is not the aim of health promotion program. A workplace health promotion program mostly used traditional methods and was prepared considering organizations’ but not individual employees’ specific needs. Nevertheless, the proportion of health problems in a tested group significantly decreased over time and in general employees of the tested group always felt better. Similarly, some researchers indicated that overall well-being of participants was the most common effect of health promotions (Kumar & Preetha, 2012), even though the course and the interactions of agents are still a mystery.

The health issues and the absenteeism variables were not correlated in this study and the average absence days caused by health problems increased in the tested group over time. The cause is probably reduced presentism, as previous studies have demonstrated that the number of days of sickness absence from work correlate to critical and responsible assessment of health (Cancelliere et al., 2011), to perception of one’s own health (Paulik, 2010), to self-perceived job strain and to social support at work (Magnavita & Garbarino, 2013). Social support is conceptualized as the resources provided to an individual in a difficult situation (Yayan & Celebioglu, 2017). Health promotion activities support interpersonal relationships since it operates through cooperation, promotion of informal contacts, warmth and friendly relations (Peršolja, 2012).

**Conclusion**

In this study, the association of health promotion activities with a change in employees’ health status was not confirmed. Despite describing fewer health problems, the tested employees expressed lower health rating and were absent more frequently compared to control group. Workplace health promotion can, therefore, be beneficial but can give atypical outcomes which are not always congruent with the program’s objectives.

Future research should be built with a long-term perspective in order to accurately assess the impact of programs on employee health management. The data should be maintained by more organizations and a representative sample.

**Conflict of interest:** None declared.

**Funding:** This research was not funded.

**Ethical approval:** Approval was obtained from the organization’s management and informed consent from employees. The study was conducted in accordance with the code of Ethics of the World Medical Association (Declaration of Helsinki)
References
Abstract:

Objective: In the study conducted accentuated personalities related to daily cigarette smoking in college students were investigated.

Material of study consisted in a case-sample of 349 daily smokers (49.3% females, 50.7% males) and a control-sample of 880 non-smokers (65.3% women, 34.7% men) from an initial group of 1364 (aged 19-30 years) surveyed students.

The method was an observational case-control inquiry with two questionnaires applying: Health Questionnaire (60 items-8 items for smoking) and Accentuated Personalities Questionnaire (88 items, alpha-Crohnbach index-0.823). Statistical analysis (chi square and gamma correlation) was performed by SPSS 20 Program.

Results: Three accentuated personalities were more prominent in daily smokers in comparison with nonsmokers and were related to daily-smoking with statistical significance: IV-unruly (answers to items: S30-χ²=14.73, γ=0.23; S42-χ²=30.25, γ=0.36; and S52-χ²=32.71, γ=0.35; Sig.0.000), I-demonstrative (S7-χ²=18.89, γ=0.27; S44-χ²=16.24, γ=0.27; and S88-χ²=20.05, γ=0.27; Sig.0.000) and VII-cyclothymic nature (S72-χ²=32.24, γ=0.35; Sig.0.000).

CONCLUSION: a relation between accentuated personalities and cigarette smoking is suggested.

UDC Classification: 614, 159.94; DOI: http://dx.doi.org/10.12955/cbup.v5.953

Keywords: cigarette smoking, accentuated personality, college students

Introduction

The traits of accentuated personalities exhibited at high-intensity levels affect human personality, and when they are emphasized even more, they can disrupt the structure of the personality. The direction of this disruption could be negative (psychiatric disease – personalities’ disorders) (APA, 2013) or positive (accentuated personalities) (Leonhard, 1972). In this study, Leonhard analyzed both clinical cases and characters and typologies described by authors in fiction. Accentuated personalities questionnaire (Schmieschek, 1970; Nestor, 1975) explore the inner world of the person (feelings, intentions, attitudes, desires).

Personality structure through motivation (Bonilha et al., 2013), attitudes and self-efficacy (Mee, 2014; Ford et al., 2013) depression (Mee, 2014), and impulsivity (Balevich et al., 2013) was confirmed in recent research as being related to cigarette smoking.

Cigarette smoking inhibits the secretion of monoamine-oxidase (MAO), decreases hunger, anxiety, depression, and anger (Hughes, 2000), increases concentration capacity and stimulates Dopamine secretion (Robins & Regier, 1991). In another study, the most robust indicator of vulnerability to high levels of self-reported smoking dependence was a general vulnerability to depression and negative emotions (Kahler et al., 2010). Cigarette smoking is a behavior that has become a growing problem among college students.

The aim of this study was to investigate the relation between accentuated personalities and daily cigarette smoking in college students.

Material and method

Participants

This study was performed on a sample comprised of 1364 college students (60.7% females and 39.3% males, aged 19-30 years) chosen from 13 universities through stratified random sampling. From the initial group 2 samples were selected (cluster sampling): the case-sample (349 daily smoker students, 49.3% females and 50.7% males) and the control-sample (880 nonsmoker students, 65.3% females and 34.7% males). I did not consider occasional smokers (9.9% students).

Material and procedure

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1 “Victor Babes” University of Medicine and Pharmacy Timisoara/ Romania, cpetrescu64a@yahoo.com
The method was a case-control observational inquiry applying two questionnaires: Health Questionnaire (60 items from which 8 items for smoking were selected) and Accentuated Personalities Questionnaire (PA - 88 items).

The reliability of the Health Questionnaire (HQ) was good for couples of questions: q36, q37 - alpha-Crohnbach index = 0.702 and q41, q42 – alpha Cronbach's index = 0.844. These items referred to: q36 “How often do you smoke at present, in a month?”; q37 “How often have you smoked in the past, in a month?”; q41 “How frequently do the family members smoke in a month?”; q42 “What is your motivation for smoking?”.

The reliability of Accentuated Personalities Questionnaire (PA – “H. Schmieschek” Questionnaire) (Schmieschek, 1970; Nestor, 1975) was good – alpha-Crohnbach index = 0.823. The items (marked with S) refer to symptoms of 10 accentuated personalities: I-demonstrative (12 items), II–hyperexact (12 items), III-hyperperseverant (12 items), IV–unruly (8 items), V–hyperthymic (8 items), VI–dysthymic (8 items), VII-cyclothymic (8 items), VIII–exalted (4 items), IX–anxious (8 items), X–emotive (8 items). The application of both questionnaires was: individual, anonymous, 1 hour and a half long; with free consent and with an explanation of the aim of the study. Accentuated personalities profiles (Schmieschek, 1970; Nestor, 1975) of daily smoker and nonsmoker students were built and accentuated personalities between daily smokers and nonsmokers were compared. Roman numerals indicating each of accentuated personalities were kept in the same form in the profiles built. Statistical analysis (chi square, Fisher tests and gamma correlation) was performed by SPSS 20 Program.

**Results**

Smoking behavior among college students

Daily smoking behavior was present in the past (25.3% students) and maintained in the present (25.6% students). A gender difference of daily smokers in favor of males (33% males and 20.8% females) was registered. A percentage of current nonsmokers (5.92%) were in the past occasional smokers (16.12%). The pattern of daily cigarette smoking was offered mainly by the father (29.1%), the partner (33%) and the mother (17.9%) for the entire sample, and equally by the father (40.1%) and the partner (40.1%) and less frequently by the mother (30.1%) for the daily smokers. Although the investigated students entirely agree that smoking is an unhealthy habit (48.5% -entire sample, 59.3% -daily smokers), they also totally agree that smoking calms them when they are nervous (15% -entire sample, 41.8% -daily smokers) and that it is a way to relax (14.9% -entire sample, 45.6% -daily smokers). The students’ age when they began to smoke was 15 years (median=15, mean=15.25 with SD=3.35 years). They used to smoke half a pack of cigarettes/day (mean=10 cigarettes). 47.44% of smokers tried to give up smoking and only 9.26% affirmed that they did manage to do so. A real difference of 5.9% between the present and the past non-smoker students was found.

Accentuated personalities of daily smoker and nonsmoker students

Most symptomatic (frequency of symptoms higher than 50%) accentuated personalities (V- hyperthymic, III-hyperperseverant and X-emotive) were similar for the initial group and daily smoker students and different for the initial group and nonsmoker students (V, X and III) (figure 1).

Three accentuated personalities were more symptomatic in daily smoker group than they were in nonsmoker students: IV-unruly (75%/50%), I-demonstrative (66.4%/49.8%) and VII-cyclothymic nature (62.5%/50%). The IX-anxious (37.5%/12.5%) and VI-dysthymic (25%/12.5%) were not accentuated personalities (under 50% of symptomatic answers) (figure 1).

Three other accentuated personalities were more symptomatic in nonsmoker than in daily smoker students: II-hyperexactly (58.1%/49.8%), VIII-exalted (75%/50%) and X-emotive (87.5%/75%). Still, daily smokers were symptomatic as emotive nature, too (figure 1).

Significant statistical differences were found between daily smoker and nonsmoker students for three accentuated personalities and one accentuated personality between nonsmoker and daily smoker students:

- **IV-Unruly nature** - There is a significant statistical difference (table 1) between the frequencies of positive answers of daily smokers and nonsmokers to the items: S30 – “Are you quickly angry?” (Yes - 56.44% daily smokers and Yes - 44.32% non-smokers); S42 – “Did you ever run away from home, when you were a child?” (Yes - 34.39% daily smokers and Yes
- 19.57% for nonsmokers); S52 – “When someone upset you a lot and intentionally, are you likely to lose control and start a fight?” (Yes - 61.03% daily smokers and Yes - 31.60% non-smokers).

- **I-Demonstrative nature** - A significant statistical difference (table 1) was also found between the rate of positive answers of daily smokers and nonsmokers to the items: S7 - “Usually, in a friendly meeting, are you in the center of the others’ attention?” (Yes - 60.11% daily smokers and Yes - 46.14% non-smokers); S44 – “Has it ever happened to you that you became so troubled by conflicts or grievances that it became impossible for you to work?” (Yes - 33.91% daily smokers and Yes – 22.73% non-smokers); S88 – “If you were involved in acting in a theatrical production would you become so involved in the role you were playing on a stage that you could completely forget you were actually someone else?” (Yes - 54.31% daily smokers and Yes - 40.23% of nonsmokers), and S51 – “Would you dislike to give a speech in public?” (No - 64.65% daily smoker and No - 54.20% in nonsmoker students).

- **VII-cyclothymic nature** - A statistically significant difference (table 1) was noticed between the answers of daily smokers and nonsmokers to the item S72 – “Can you change your mood by alcohol consumption?” (Yes - 66.95% in daily smokers and Yes - 48.51% in nonsmokers), too.

- **X-emotive nature** – A significant statistical difference (table 1) was found between the “Yes” answers of nonsmoker and daily smoker students to the items: S3 – “Do you burst into tears easily?” (78.69% - nonsmokers and 21.03% - daily smokers), S13 – “Are you very merciful?” (75.57% - nonsmokers and 24.42% - daily smokers), S57 – “Can a tragic movie affect you so much that you burst into tears?” (76% - nonsmokers and 24% - daily smokers), S79 – “Are you very affected by the suffering of other people?” (63.31% - nonsmokers and 36.87% - daily smokers), and between the “No” answer to the item S25 – “Are you able to sacrifice an animal?” (66.66% - nonsmokers and 33.33% - daily smokers).

A positive gamma correlation between the answers to specific items of IV-unruly nature, I-demonstrative nature (except item S51 where the “No” answer is rated as positive), VII-cyclothymic nature and daily cigarette smoking sustains these results (table 2). A negative gamma correlation was found between the “Yes” answers to the questions of X-emotive nature and cigarette smoking (table 2).

**Figure 1: Accentuated personalities profiles in daily smoker and nonsmoker students**

<table>
<thead>
<tr>
<th>B</th>
<th>V</th>
<th>III</th>
<th>X</th>
<th>IV</th>
<th>V</th>
<th>VII</th>
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<td>1</td>
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<td>150</td>
<td>180</td>
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**Daily smokers**

<table>
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<th>B</th>
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<th>X</th>
<th>IV</th>
<th>V</th>
<th>VII</th>
<th>VIII</th>
<th>IX</th>
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<td>Percent</td>
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</tbody>
</table>

**Nonsmokers**

Source: Author
Table 1: Chi square and Fisher’s test of accentuated personalities between daily smoker and nonsmoker students

<table>
<thead>
<tr>
<th>Accentuated personalities (PA)</th>
<th>Statistics by PA items</th>
<th>Pearson Chi-square</th>
<th>Fisher's Exact Test(a)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Value</td>
<td>df</td>
<td>Asymp. Sig. (2-sided)</td>
</tr>
<tr>
<td>IV-Unruly S30</td>
<td>14.734(b)</td>
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</tr>
<tr>
<td>S42</td>
<td>30.257(b)</td>
<td>1</td>
<td>0.000</td>
</tr>
<tr>
<td>S52</td>
<td>32.712(b)</td>
<td>1</td>
<td>0.000</td>
</tr>
<tr>
<td>I-Demonstrative S7</td>
<td>18.896(b)</td>
<td>1</td>
<td>0.000</td>
</tr>
<tr>
<td>S44</td>
<td>16.246(b)</td>
<td>1</td>
<td>0.000</td>
</tr>
<tr>
<td>S88</td>
<td>20.052(b)</td>
<td>1</td>
<td>0.000</td>
</tr>
<tr>
<td>S51</td>
<td>10.751(b)</td>
<td>1</td>
<td>0.001</td>
</tr>
<tr>
<td>VII-Cyclothymic S72</td>
<td>32.245(b)</td>
<td>1</td>
<td>0.000</td>
</tr>
<tr>
<td>X-Emotive S3</td>
<td>39.893(b)</td>
<td>1</td>
<td>0.000</td>
</tr>
<tr>
<td>S13</td>
<td>27.553(b)</td>
<td>1</td>
<td>0.000</td>
</tr>
<tr>
<td>S57</td>
<td>25.869(b)</td>
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<tr>
<td>S25</td>
<td>13.025(b)</td>
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<td>0.000</td>
</tr>
<tr>
<td>S79</td>
<td>16.795(b)</td>
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</table>

a. Computed only for a 2x2 table; b. 0 cells (0%) have expected count less than 5.

Source: Author

Table 2: Gamma correlation between symptomatic accentuated personalities and smoking behavior

<table>
<thead>
<tr>
<th>Accentuated personalities (PA)</th>
<th>Statistics by PA items</th>
<th>Value</th>
<th>Asymp. Std. Error(a)</th>
<th>Approx. T(b)</th>
<th>Approx. Sig.</th>
</tr>
</thead>
<tbody>
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<td>IV-Unruly S30</td>
<td>Ordinal by Ordinal Gamma</td>
<td>0.366</td>
<td>0.061</td>
<td>5.106</td>
<td>0.000</td>
</tr>
<tr>
<td>S42</td>
<td>Ordinal by Ordinal Gamma</td>
<td>0.366</td>
<td>0.061</td>
<td>5.106</td>
<td>0.000</td>
</tr>
<tr>
<td>S52</td>
<td>Ordinal by Ordinal Gamma</td>
<td>0.351</td>
<td>0.057</td>
<td>5.762</td>
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<td>I-Demonstrative S7</td>
<td>Ordinal by Ordinal Gamma</td>
<td>0.271</td>
<td>0.060</td>
<td>4.381</td>
<td>0.000</td>
</tr>
<tr>
<td>S44</td>
<td>Ordinal by Ordinal Gamma</td>
<td>0.271</td>
<td>0.064</td>
<td>3.828</td>
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<td>S88</td>
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<tr>
<td>VII-Cyclothymic S72</td>
<td>Ordinal by Ordinal Gamma</td>
<td>0.356</td>
<td>0.058</td>
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<tr>
<td>X-Emotive S3</td>
<td>Ordinal by Ordinal Gamma</td>
<td>-0.383</td>
<td>0.055</td>
<td>-6.311</td>
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<tr>
<td>S13</td>
<td>Ordinal by Ordinal Gamma</td>
<td>-0.345</td>
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<td>-4.923</td>
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<tr>
<td>S57</td>
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<td>-0.322</td>
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<td>0.000</td>
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<tr>
<td>S25</td>
<td>Ordinal by Ordinal Gamma</td>
<td>-0.271</td>
<td>0.063</td>
<td>-3.909</td>
<td>0.000</td>
</tr>
<tr>
<td>S79</td>
<td>Ordinal by Ordinal Gamma</td>
<td>0.234</td>
<td>0.063</td>
<td>3.493</td>
<td>0.000</td>
</tr>
</tbody>
</table>

a. Not assuming the null hypothesis; b. Using the asymptotic standard error assuming the null hypothesis.

Source: Author

Discussion

College students aged between 19-30 years (young adult - intimacy/isolation stage of human psycho-social development (Erikson, 1968) were approached in this study. Cigarette smoking is a risk behavior that starts and becomes an addiction at this age group. The smoking habit appears and continues due to behavioral problems manifested in early adolescence (Brook et al., 2008). A real danger of cigarette smoking in young adults is that they become perpetual smokers (McLure et al.,
2013). In this study daily smokers in the past are daily smokers at present. Daily smokers proved to have frequent positive responses to active smoking-related cues which may play an important role in maintaining smoking behavior (Haight et al., 2012). Family pattern (the father daily smoker and the partner daily smoker) was significant in this study. The smoking patterns could be associated with parenting styles (Bottorff, 2010) and with the perceived family life (Foxcroft & Lowe, 1995). In the conducted study the students chose relaxation and calming when they are nervous as the main motivations for cigarette smoking. The nicotine interacts with all levels of motivation (West, 2009), therefore dealing with stressful situations (Fields et al., 2009) can influence decisions to smoke. Other studies found that young people with low confidence in their ability to avoid smoking would have higher levels of smoking intention and smoking behavior (Hassandra et al., 2011). Combating cigarette addiction requires attention to the predictors of cigarette smoking (Burris et al., 2013) and to the role of gender in preventive actions against smoking (Lotrean & De Vries, 2012).

I found differences in cigarette smoking between male daily smokers and female daily smokers. In research literature smoking continues to be more frequently found in more masculine populations (Mahfouz et al., 2014) possibly due to a relation between smoking and masculinity (White et al., 2012) than in more feminine populations, where female subjects reported concerns about their weight (Morgenstern et al., 2010).

In research literature, cigarette smoking was approached in relation to personality traits (Patton et al., 1997). In this study, the profiles of the accentuated personalities in daily smokers and nonsmokers were different. The statistical results of this study reveal that certain accentuated personalities (IV-unruly, I-demonstrative, VII-cyclothymic) are more frequent and more symptomatic in daily cigarette smokers than in nonsmokers, in a population of healthy young adults. Therefore, IV-unruly nature presented significant statistical differences between daily cigarette smokers and nonsmokers. The increased anger (S30), the tendency to run away from home in childhood and breaking the rules (S42) and the lack of control of aggressive behavior and fighting (S52) found in the daily smokers in this study argue for the role of smoking in decreasing anger, impulsivity, hostility and the presence of sociopath behavior that is mentioned in literature (Hughes, 2000; Patton et al., 1997). Another study (Littlefield & Sher, 2012) demonstrated that from ages 18 to 35, changes in smoking involvement are significantly associated with changes in impulsivity. Other studies reveal more frequent engagement of smokers in antisocial behaviors (Alloy et al., 2009) and a strong association between antisocial personality disorder and smoking (Zvolensky et al., 2011).

This study found that I-demonstrative nature was more symptomatic in daily cigarette smokers than in nonsmokers. The tendency of daily cigarette smokers to be in the center of attention (S7), to display emotion openly (S88) and to like being on a stage (S51 - negative answer was considered symptomatic) is sustained by literature through extraversion personality characteristic in cigarette smokers (Ferguson, 2013). Yet, demonstrative nature, as Karls Leonhard affirms, is difficult to compare with present-day literature research, which refers especially to extraversion personality characteristic. However, extraversion in combination with neuroticism increases the risk of cigarette smoking dependency (Kleinjan et al., 2012).

Frequent changes of mood (VII-cyclothymic accentuated personality) were more frequently found in daily cigarette smokers than in nonsmokers in this study. Cyclothymia means stable feeling at a baseline level with the shift to an emotional high (symptoms similar to mania but less severe) or an emotional low (symptoms similar to depression but less severe). The greater tendency in daily smokers to change their mood by alcohol consumption (S72) – emotional high – was found in this study and it is supported by the way mania is approached in research literature. Research literature indicates impulsiveness as shared personality vulnerability for bipolar spectrum status in adult individuals (Alloy et al., 2009). Regular smoking also correlated with borderline personality disorder, that correlation being explained by common genetic factors (Distel et al., 2012).

This study showed that nonsmokers were much stronger in X-emotive responses than daily smokers and a statistically significant difference was found in favor of nonsmoker students. Therefore, easily touching and expressing of his/her emotions (S79, S3), compassion (S13), easy changing of his/her disposition depending on external events (S57, S25) are more prominent in non-smokers over smokers.
Two accentuated personalities remained constant in this study as being powerfully symptomatic and without significant statistical differences between smoker and non-smoker students: **V-hyperthymic** and **III-hyperperseverant**. They are specific for the investigated stage of development intimacy-isolation (young adults aged 19–30 years) (Erikson, 1968) and for the professional forming and performing.

A limitation of this research is that it is a qualitative one and the relation between daily cigarette smoking – and certain accentuated personalities is therefore only suggested.

**Conclusions**

This study offers a new perspective through which to look at daily cigarette smoking in young people – in relation to accentuated personalities. The main outcomes of this study showed profiles of different personalities in daily smokers and nonsmokers, an association of daily cigarette smoking with the traits of accentuated personalities (IV-unruly nature, I-demonstrative and VII-cyclothymic nature) and several aspects of smoking phenomena met in investigated populations. Therefore, the tendency of cigarette smoking to become an addiction, the role of the family pattern, gender differences, and relaxation and tranquilization as primary or important motivations for cigarette smoking were found.

Two accentuated personalities (V-hyperthymic and III-hyperperseverant) were similarly high symptomatic in the initial study group, case-sample and control-sample. X-emotive nature was more symptomatic in nonsmoker than in smoker students.

Knowing the accentuated personalities of young adults, practitioners can help them to avoid starting to smoke or can help daily smokers stop their smoking habit. This study suggests the existence of a relation between the traits of accentuated personalities in young adult daily smokers – and cigarette smoking.

**Acknowledgements**

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**Conflict of interest**

Author declares she has no conflict of interest.

**Informed consent**

According to opinion no. 285/05.08.2013 issued by the Ethics Committee of the Institute of Anthropology „Francisc I. Rainer” research meets ethical standards stipulated by Act No. 206/2004, as amended by Ordinance 28/2011 on good practice in scientific research and technological development and innovation. All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000 (5). Informed consent was obtained from all students for being included in the study.

**References**


REGIME CHANGE AND TREND PREDICTION FOR BITCOIN TIME SERIES DATA

Osamu Kodama,1 Lukáš Pichl,2 Taisei Kaizoji3

Abstract: Bitcoin time series dataset recording individual transactions denominated in Euro at the COINBASE market between April 23, 2015 and August 15, 2016 is analyzed. Markov switching model is applied to classify the regions of varying volatility represented by three hidden state regimes using univariate autoregressive model and dependent mixture model. Causality extraction and price prediction of daily BTCEUR exchange rates is performed by means of a recurrent neural network using the standard Elman model. Strong correlations is found between the normalized mean squared error of the Elman network (out-of-sample 5-day-ahead prediction) and the realized volatility (sum of minute returns squared throughout the trading day). The present approach is calibrated using simulated regime change in standard econometric models. Our results clearly demonstrate the applicability of recurrent neural networks to causality extraction even in the case of highly volatile cryptocurrency exchange rate time series data.

UDC Classification: 004.8, 33; DOI: http://dx.doi.org/10.12955/cbup.v5.954

Keywords: Bitcoin, BTC, Elman model, Hidden Markov Model, HMM, recurrent neural network.

Introduction

Bitcoin is a cryptocurrency released as an open-source software in 2009, which represents a transaction payment system as well as a sort of digital commodity (Bohme et al., 2016). The bitcoin market capitalization as of early 2017 has reached USD 20 billion (CoinDesk, 2017). Free of any interventions from regulatory authorities, such as central banks, the distributed block chain system on which Bitcoin is based meets varying levels of demand for transaction settlement, and the Bitcoin exchange rate series to major currencies such as USD, EUR or GBP are known to highly fluctuate – it is not uncommon that gains or losses in tens of percent occur within a week, if not during a single day. There exist various Bitcoin exchange markets, such as BitBay, Btcde, Kraken, LocalBtc, or Rock for EUR currency, to name just a few of the currently active BTCEUR exchanges. The highly volatile nature of the exchange rate represents an ideal environment for the study of the extreme events in the field of financial time series. Prediction of extreme events is a key issue not only in economics, but also in climatology, geosciences, civil engineering, space technology, etc. In spite of its importance, the topic is rather under-studied, in our opinion.

In this work, we explore the applicability of computational intelligence methods from financial analysis to the series of Bitcoin exchange rates (data shown in Fig. 1). Since the Bitcoin price process is not stationary but exhibits an appreciation trend, we transform the time series data to the logarithmic returns. If the absolute value of the log return is large, it corresponds to an extreme event (bullish or bearish, based on the sign). Next we adopt the Hidden Markov Model to categorize the market regime into 3 modes: stable, intermediate, and volatile. This approach is excellent in ex-post analysis of the data, however lacks in the predictive power for future trend prediction. Consequently, we add the realized volatility as an intraday indicator of market stability, and develop a recurrent neural network configuration, which uses the past log return history in a moving window to predict the next week’s log return behavior. Since the market process mixes both deterministic and stochastic modes, it is not a priori clear where the limit of the predictive power of the recurrent neural network is bound. This paper shows as the principal result that the mean squared error of the prediction is only limited by the level of the realized volatility.

This paper is organized as follows. Following the literature review in the next section, in Section 3 we explain the dataset and outline the methods of its analysis. Section 4 wraps up our results and discussions, which are followed by the concluding section.

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1 International Christian University, Mitaka, Tokyo, Japan, deep86.osa@gmail.com
2 International Christian University, Mitaka, Tokyo, Japan, lukas@icu.ac.jp
3 International Christian University, Mitaka, Tokyo, Japan, kaizoji@icu.ac.jp
Figure 1: Time series of BTC exchange rate to EUR at COIN-Base market (upper panel). Daily log return and realized volatility (on minute scale) for the same trading period (lower panel).

Source: Authors (data retrieved from COINBASE market)

**Literature Review**

Among the notable attempts to model the prediction of extreme events in a systematic way are those of Hallerberg et al., (2008) assessing under what circumstances the extreme events may be more predictable the bigger they are, or the recent work by Franzke (2012) who develops a nonlinear stochastic-dynamical model. In the economic context, extreme events mean a bubble formation or a bubble burst, and their precursors are of vital importance in risk management. To extract the causal extent (deterministic segment) buried in the noisy data, various techniques have been proposed, for instance recurrent neural network with memory feedback (Elman, 1990) or support vector machines (Cortes and Vapnik, 1995). A survey of recent methods can be found in the work of Akansu et al. (2016). Binary classifiers separating the upward and downward trend (positive or negative sign of logarithmic return), which easily evaluate against the dataset in terms of hit ratios (precision of binary classifier output), are common.

**Data and Methods**

The dataset of BTCEUR tick data between 2015-4-23 and 2016-8-5 contains 809,489 records in 478 trading days transacted at COINBASE market. All data analyses were performed on a Dell PowerEdge T420 server, with 2 Intel Xeon E5-2407 2.2 GHz processors and 8 cores, running the GNU/Linux Fedora 23 operating system.

Figure 1 shows the EUR exchange rate data of BTC, including the logarithmic returns on daily scale ($R_t=\log(P_t/P_{t-1})$) and the realized volatility (RV), which is computed as the sum of the logarithmic...
returns squared on minute sampling scale during the trading day. The higher the realized volatility, the bigger are the uncertainty and spread of trading values typically observed during the day. The probability density of these two quantities is depicted in Fig. 2.

Figure 2: Density functions for the log return and realized volatility from Fig. 1

The first approach to classification of the market trend regime is the state switching model based on Hidden Markov Model (HMM). The observable quantity is the sequence of the logarithmic returns. We set the number of hidden states to equal to 3, that is a stable, non-volatility regime, highly volatile regime, and an intermediate state in between the two. The extraction of the underlying state probabilities is performed using the R-packages depmixS4 and MSwM (https://cran.r-project.org/). The theoretical approach closely follows that of Kirikos (2000). While the categorization results are quite reasonable, which can be seen in Fig. 3, namely the 3-states are correctly classified in regard to the magnitude of the logarithmic return, the predictive power of this approach is quite low (i.e. if we assume that the state for the next day is the one for the current day computed by the HMM model). We have to therefore resort to a more powerful causality extraction model. See (Gyorfi et al., 2012) for a list of possible candidates in the field of machine learning algorithms.

Figure 3: 3-state HMM for data of Fig. (1) (State #1: stable, #2 intermediate, #3 volatile)
In order to account for the time series correlations accurately, we have decided to apply the recurrent neural network (RNN) in Elman configuration (Elman, 1990). We have adopted two different topologies, one with a single hidden layer (8 units), and another one with two hidden layers (each from 5 to 8 units). The contents of the hidden units are fed as an extra input to the network in a feed-back loop, thus implementing the concept of the state memory. The implementation is that of the Stuttgart Neural Network Simulator, available as an R-package RSNNS. The main research question is whether the RNN model can extract the causal extent of the time series, and how it relates to the series of realized volatility, which are a measure of the stochastic content of the time series data.

Results and Discussions

The main result of the study is given in Fig. 4 for the configuration with two hidden layers, each containing 8 units. Thus there are two feed-back loops in the network configuration of RSNNS. The following procedure has been used: the RNN model is trained on the past 40-days of input data, and evaluated using a 5-day ahead prediction. The possible error outcome is therefore the precision set from \{0.0, 0.2, 0.4, 0.6, 0.8 and 1.0\}. The subset of \{0.0, 0.2, 0.4\} – that is majority-winning correct classification of the binary trend (sign of the logarithmic return) – has the frequency of 70.5\%, attesting to the causal content of the series. More importantly, we evaluate the RNN model using the standard measure of the Mean Squared Error of the logarithmic return for the 5 predicted values. Because of the 40-day moving window, this indicator is unavailable for the first 40 days (zero-level flat start in Fig. 4), and the curve is further 5 days shifted, in order to compare with the realized data of the 5-day ahead prediction window. In addition, normalization is used, i.e. the neural network receives data standardized to zero-mean and unit standard deviation; these units are applied to the evaluation of the MSE. The resulting curve (thick line in Fig. 4, red color in online version) shows an almost perfect coincidence, enveloping properly scaled graph of the realized volatility. Since the realized volatility measures the noise in the system, i.e. the unpredictable component of the time series, we can infer, based on Fig. 4, that the underlying deterministic content, i.e. the causal behavior mode, has been extracted properly using the RNN model. The results in Fig. 4 practically do not depend on RNN topology within the limit described above.

To further substantiate the scope of the validity of the RNN model, we have simulated econometric series of ARMA model (auto-regressive moving average model) with a single propensity parameter on the scale of 0.1 to 0.9. The RNN model reacts to the model discontinuity by the increase in the MSE, thus detecting the regime change. The bigger the parameter change, the better the chance is that the model change is discovered by means of an MSE increase.

Figure 4: Learning power of the RNN model: comparison of MSE vs. realized volatility

<table>
<thead>
<tr>
<th>Source: Authors</th>
</tr>
</thead>
</table>
Conclusion
This work has established the applicability of the Recurrent Neural Network (RNN model) to the time series of Bitcoin exchange rates denominated in EUR currency. We have derived the average time series for each day in a 478-day-long sample of tick data from the COINBASE market, computed the realized volatility, and analyzed the causal extent of the daily time series using both the standard HMM model and the RNN model. The HMM is a poor predictor of the regime changes as well as market trends. The RNN model, on the other hand, showed a predictive power related to the spikes of the MSE value. Using the realized volatility, we could see that the model performs up to the theoretical bounds of its applicability, capturing the full scope of the deterministic contents, with MSE therefore closely following the distribution of the stochastic error given by the RV distribution. The present results show a good agreement of the MSE curve and RV distribution. This agreement is the better the higher the volatility spike is, which would conform to the model “the bigger the extreme event is, the better predicted it can be.” Nevertheless, the presented results are still confined to a relatively short period and a single market, and thus further investigation is required to make a more general conclusion. We also plan to study the effect of market-making information using open access texts (cf. Kim et al., 2016). The present findings may also be useful in considerations of the design of future cryptocurrencies other than Bitcoin (Extance, 2015). The presented work is also relevant and interesting due to the limited number of available data analysis papers on the Bitcoin subject, although the situation has improved recently (Houey, 2016; Kim et al., 2016, Kristoufek, 2013; Lahmiri, 2011; Ron and Shamir, 2013) as new cryptocurrency journals are introduced and technical reports of central banks all over the world start to pay attention to this still relatively young phenomenon.

Acknowledgement
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References
PRICING MODELS IN A CAPTIVE MARKET: A CASE STUDY OF LCC DORMITORIES

Dragomir Popov, Femi Odebiyi

Abstract: The purpose of this study is to identify the residents’ preference among three pricing strategies: a la carte pricing strategy, limited choice pricing strategy, and bundled pricing strategy. The study analyzes the correlation between the year of study of the dormitory residents and the preferred pricing strategy. It uses an online survey for LCC International University students who were enrolled for the 2015-2016 academic year. A fixed choice set analysis is performed to analyze 126 valid responses. The results show that 42.4% of the respondents prefer an a la carte pricing strategy, contrary to the currently limited choice pricing strategy employed by LCC residency halls. Additionally, the study finds out that the residents are more likely to switch their preference from a bundled pricing strategy to an a la carte pricing strategy the higher their year of study is. Resident preferences for pricing strategies can provide dormitory operators with valuable information on establishing best pricing structures.

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Keywords: Pricing strategy, Accommodation sector, Dormitory, Bundle pricing, Partition pricing, Captive market

Introduction

Price is the primary concern for the majority of people facing the decision of renting a temporary place of residence. According to a study by Repetti et al. (2015), customers prefer bundled pricing strategies in the hospitality industry. A possible explanation for this behavior is the “inferred bundled saving effect” which states that consumers generally believe that bundles involve a discount (Heeler, 2008). However, all-inclusive packages do not always imply a discount. Kaitlyn Wells (2014) states that customers choosing an all-inclusive vacation package may not be any cheaper than a standard version. A study conducted by Gillian Naylor finds the anecdotal evidence that “consumers would rather pay more for an all-inclusive package than deal with separate charges, even if the total bill is less” (2001). This represents a paradox from the standard economic model, which assumes that people behave rationally and selfishly. Yet, the same research concludes that this effect does not apply for repeat guests because they have the knowledge to pick the bundle that fits best their needs and expectations (Naylor, 2001).

This research paper aims to find out if the existent economic models about pricing strategies and customers’ choice in the hospitality industry apply in the accommodation sector as well. The logical assumption of the study is that since the accommodation sector is part of the eight branches of the hospitality industry then the theories developed in the hospitality industry should apply in the accommodation sector as well. There are no other known research papers that attempt to answer this question.

Research Questions and Hypothesis

In order to find out if the existent theories about the pricing strategies and customers’ preferences in the hospitality industry hold in the accommodation sector as well, the research will focus on the case study of LCC International University dormitories. There are two dormitories located in Klaipeda, Lithuania which accommodate students who study at LCC. These dormitories have a total capacity of 360 beds. Two research questions have been formulated to provide richer insight on the issue:

- RQ1: What pricing strategy (all-inclusive, limited choice, a la carte) is preferred by most of the LCC students?
- RQ2: Is there a correlation between the LCC students’ year of study and the pricing strategy preferred?

Consequently, two hypothesis have been concluded after analyzing the existent literature:

- H1: Most of the LCC students will prefer the present limited choice pricing strategy.
- H2: The longer the time a resident lives in the dorm, the more likely s/he is to switch from a bundled fee to a partitioned pricing strategy.

1 LCC International University, dragomir.popov93@gmail.com
2 LCC International University, fodebiyi@lcc.lt
Literature Review

Lockyer and Roberts (2009) found that the price is an important trigger point in the hospitality industry. Hence, it is critical for both managers and customers to understand the reasoning of pricing strategies in this industry. Repetti et al. (2015) found that hotel consumers prefer bundled pricing over partitioned pricing in a report of 2 to 1, favoring the former. Similar findings are reached by Bambauer and Gierl (2008) in a study about purchasing decisions in commerce. They state that “The overall effect of price partitioning on product evaluation proved to be negative compared to using total prices.” They sum up their results by advising marketers to avoid partitioned prices because the disadvantages of this technique outweigh the advantages. Furthermore, Johnson et al. (1999) conducted a study about the psychological processing of bundled or de-bundled price information. They find out that consumers prefer “to integrate losses, in the form of price information, into a single bundled price.” Again, the outcome is that consumers prefer price bundling over price partitioning.

The reasons why the consumers prefer price bundling over price partitioning are explained by Johnson et al. (1999). His research study proves the existence of heuristics such as mental accounting and framing effects. Mental accounting is defined by Cartright (2014) as “the process of coding categorizing, and evaluating choices and outcomes.” In other words, mental accounting refers to the fact that people assign any sources of spending or income into different accounts for separate purposes. In the context of the hospitality industry, mental accounting is present when a tourist divides the budget for his vacation in separate accounts. Johnson (1999) concludes his study by acknowledging that consumers tend to segregate gains and integrate losses. Consequently, tourists are more likely to book an all-inclusive vacation package and feel one big loss instead of having to deal with a la carte pricing where there is uncertainty about the gains and losses they might encounter during their vacation.

Another reason consumers prefer price bundling over price partitioning is that most of the time, people estimate that the bundle is cheaper than the actual price. A study by Heeler et al. (2007) finds the existence of an “inferred bundle saving effect,” that assumes that generally, consumers believe that bundles involve a discount. Furthermore, the study suggests that the inferred bundle effect is a better theory than mental accounting and framing effects found in the study by Johnson (1999). Inferred bundle saving effect implies that customers have a reference point (anchoring effect), which was not present in the study conducted by Johnson et al. (1999), where “the bundled and unbundled prices were treated as losses regardless of whether inferred bundle discount exists” (Heeler et al., 2007). The study by Heeler et al. (2007), provides further evidence that “the inferred bundle saving effect is real, and is a probable explanation of pre- and post-purchase bundle effects.”

Another study suggests that the complexity of the pricing strategy cannot explain the customers’ evaluation of the offer. Thaler’s (1999) theory of “integrated outcomes,” which states that people prefer to segregate gains and integrate losses. For example, a customer buying an all-inclusive vacation package would evaluate the offer more positively if she knows how much money she saves on each service (segregate gains). However, the same customer buying a partitioned vacation package will evaluate the offer less positively if it is too complex (integrate losses).

Price bundling loses its “inferred discounting” effect with repeat customers. A study by Naylor and Frank (2001) found that first time guests prefer to pay more for an all-inclusive package than deal with separate charges, even though they could pay less choosing a partitioned package. Naylor and Frank (2001) explain this paradox that “consumers perceive that there are psychological, or hassle savings with an all-inclusive package that outweigh monetary savings.” The same study, finds that this is not true for repeat customers, because “they have the knowledge to pick the bundle that suits best their needs” (Naylor et al., 2011). This finding is consistent with the “discovered preference” hypothesis that states that over time people make choices that are consistent with the standard economic model.

Cartright (2014) attributes this effect to the “ample opportunity to learn from experience.” Therefore, the price bundling strategy becomes less effective for repeat guests, if the client’s initial reference point is lower than the price paid for the all-inclusive package.

Dormitory pricing strategies across countries

In order to acquire a better perspective on pricing strategies in the accommodation sector, the authors analyzed the pricing strategies across various dormitories in different countries. The dormitories are
from the following countries: Lithuania, Latvia, United States of America, Romania and Moldova. The universities were chosen randomly to provide a general impression of pricing strategies in different dormitories. The results are presented in the following table:

<table>
<thead>
<tr>
<th>Country</th>
<th>Pricing Structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latvia</td>
<td>Limited choice. <em>Stockholm School of Economics in Riga, Latvia, has an identical pricing strategy for the dormitories to that employed by LCC. The residents pay one fee per semester in the form of a limited choice fee.</em></td>
</tr>
<tr>
<td>Lithuania</td>
<td>Limited choice. <em>At Vilnius University, Lithuania, the dormitories are charged a fixed fee each month. The fee includes only the rent and the utilities.</em></td>
</tr>
<tr>
<td>Moldova</td>
<td>Limited choice. <em>The Musical College “Stefan Neaga” in Chisinau, Moldova, charges a single payment per year. The residents pay for rent and utilities in one price. However, the fee does not include other expenses such as Wi-Fi, parking, or storage options.</em></td>
</tr>
<tr>
<td>Romania</td>
<td>A la carte fee and limited choice fee. <em>The State University of Pitesti has a partitioned pricing strategy. The dormitory residents pay each month a rent fee and consumption fee based utility fee. However, in Bucharest at SNSPA University, a monthly fixed fee is paid that includes both the rent fee and the utilities.</em></td>
</tr>
<tr>
<td>United States of America</td>
<td>All-inclusive fee. <em>At NYU, the residents pay one all-inclusive fee. The fee includes the rent expenses, the utilities and all the amenities including WiFi and access to gym. Similarly, at Alfred University, NY, the dorms are charged one all-inclusive fee that includes WiFi and gym membership. The fee is charged each semester.</em></td>
</tr>
</tbody>
</table>

Source: Authors

The majority of dormitories apply an a la carte pricing strategy and a limited choice fee. Only in the United States of America, the dormitory included many amenities all bundled together in an all-inclusive price.

**Methodology**

To find out what preferences LCC dormitory residents have, it is required to formulate several realistic pricing scenarios. The first questionnaire was pilot tested before administering it to students. With a population size of 309 and 126 responses, the margin of error for the survey is 6.7% on the 95% confidence level (‘Sample size calculator’, n.d.). The survey had a response rate of 40.8%. When asked to choose the two most valuable amenities that the dormitories have to offer, the respondents picked WiFi (99 responses) and Access to Storage Room (49 responses). The mean value for all options was 34.1 EUR per semester and the median value was 27.5 EUR. Therefore, the student residents’ willingness to pay (WTP) was 30 EUR per semester for the amenities most valuable to them.

When asked to choose two amenities they would like to pay in the form of a bundled rate, the respondents picked: laundry tokens (60 responses) and the meal plan at the cafeteria (52 responses). The mean value for all options was 86.5 EUR per semester and the median value was 59.5 EUR. Therefore, the student residents would be willing to pay on average 80 EUR per semester for the extra amenities most valuable to them.

However, the authors observed that 80 EUR per semester for a meal plan and laundry tokens is not a realistic scenario that could be implemented successfully at LCC University because the estimated fee is too low. According to the employees of the LCC cafeteria and the meal plan of LCC Basketball

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3 The authors approximated the value of the identified amenities to the average value of the median WTP and mean WTP.
team, a more appropriate figure for the student meal plan would be 161 EUR per semester. As for the washing tokens a value of 14 EUR⁴ per semester is an acceptable figure.

The second questionnaire was constructed based on the values identified in questionnaire one. It presents five fixed choice sets and each choice set includes the following attributes:

a) Housing Fee: Presented as bundled rate or a partitioned rate
b) Deposit: Presented as bundled or partitioned to the housing fee.
c) Amenities: Presented as all-inclusive, choice of two, or a la carte.

Each scenario asked the respondents to assign a rating (definitely not acceptable, somewhat acceptable, definitely acceptable) to each script. A “none” alternative was available in the event the respondent had no opinion on the scenario. The non-residents were given an average value of 370 Euros to consider when completing the survey. The value was established as a median value of the room rates LCC dormitories have. Scenario one presents an all-inclusive fee for the housing rate, no deposit required, and it includes the price values for the amenities identified in questionnaire one. The second scenario is similar to the first scenario, except it presents a bundled deposit fee rather than the bundled housing fee as presented in the first scenario. Scenario three is the least expensive choice because it is formulated on the a la carte pricing strategy. It subtracts the value of the previously included amenities and offers a charge based on usage. The fourth scenario is the scenario currently offered by LCC dormitories and it presents a limited choice fee. Lastly, scenario five is identical to scenario two and it was added as a manipulation check to validate that the respondents were answering the questions and not randomly selecting options. There was no significant difference in the mean scores between these two scenarios, suggesting participants were responding consistently when answering the survey questions.

**Empirical Findings**

Of those participating in the survey, 33.6% were male and 66.4% were female. The age of the participants fell in the 18-22 years old range with more than 80% of responses. The respondents represented a variety of education stages with 29.6% Prime students⁵ and freshmen, 14.4% sophomores, 16% juniors, and 40% seniors and graduates. Approximately 62% of the respondents were on-campus residents and the remaining 38% were off-campus residents. As a further reliability method Cronbach’s Alpha value is .676, which is an acceptable coefficient.

To address the first research question concerning what pricing strategy is preferred by most of the student dorm residents, respondents were asked to choose their preferred scenario. Table two summarizes the results collected by showing the number and the percentage of the respondents who choose the option “Definitely acceptable” for each of the five scenarios.

These findings are opposite to the results discovered in the hospitality industry. According to the study by Repetti, Roe and Gregory (2015), the customers in the hospitality industry preferred the bundled pricing strategy over the partitioned pricing strategy. Therefore, the results presented in table four reject the first hypothesis of this study, which stated that the residents will prefer the current limited choice pricing strategy.

<table>
<thead>
<tr>
<th>Pricing strategy (reliability test)</th>
<th>Scenario</th>
<th>N</th>
<th>% of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partitioned fee</td>
<td>Scenario 3</td>
<td>53</td>
<td>42.4</td>
</tr>
<tr>
<td>Limited choice</td>
<td>Scenario 4</td>
<td>35</td>
<td>28.0</td>
</tr>
<tr>
<td>Bundled fee</td>
<td>Scenario 5</td>
<td>26</td>
<td>20.8</td>
</tr>
<tr>
<td>Bundled fee</td>
<td>Scenario 2</td>
<td>23</td>
<td>18.4</td>
</tr>
<tr>
<td>Bundled fee</td>
<td>Scenario 1</td>
<td>16</td>
<td>12.8</td>
</tr>
</tbody>
</table>

Source: Authors

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⁴ The value of a washing token is currently sold at 1.15 EUR.
⁵ Students part of the intensive English program
To address research question two, concerning any correlation between the respondent’s age and their preferred pricing strategy, a Pearson correlation was used. The level of studies (Prime, freshmen, sophomore, junior, senior and Master) was used as a proxy for determining customers’ living experience in the dormitories. Table three presents the correlation between residents’ year of study and their preferred pricing strategy. The first observation is that the Pearson correlation values are close to zero. In table three, all of the identified correlation coefficients are small to insignificant. The reason for such values is that the study was conducted for a population where more than 80% of the respondents were in the 18-22 years old range. This represents a very narrow age category. Therefore, because of limited age demographics, the Pearson correlation is so weak.

Table 3: Correlation between studies and the strategy preferred

<table>
<thead>
<tr>
<th>Studies</th>
<th>Scenario 1 Bundled fee</th>
<th>Scenario 2 Bundled fee</th>
<th>Scenario 3 Partitioned fee</th>
<th>Scenario 4 Limited choice fee</th>
<th>Scenario 5 Bundled fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Correlation</td>
<td>-.073</td>
<td>-.073</td>
<td>.066</td>
<td>-.104</td>
<td>-.108</td>
</tr>
<tr>
<td>Sig (2-tailed)</td>
<td>.421</td>
<td>.420</td>
<td>.467</td>
<td>.247</td>
<td>.232</td>
</tr>
<tr>
<td>Nr. of observations</td>
<td>125</td>
<td>125</td>
<td>125</td>
<td>125</td>
<td>125</td>
</tr>
</tbody>
</table>

Source: Authors

The second observation is that scenario one and scenario two which represent bundled pricing strategies have negative coefficients. It shows that the more a student is advanced in his study and thus is older, the less likely he is to choose a bundled strategy. This finding is consistent with hypothesis two which states that the longer time a resident lives in the dorm, the more likely he is to switch from bundled fee to a partitioned pricing strategy.

Similarly, scenario three representing an a la carte pricing strategy has a positive coefficient meaning that the more advanced a student is in his studies the more likely he is to choose a partitioned pricing strategy. Therefore, hypothesis two is not rejected. The third observation is that scenario four that represents LCC’s current pricing strategy in the form of a limited choice pricing strategy, got one of the strongest correlation coefficients. The result proves that the more a student has advanced in his studies and thus his age, the more likely he is to dislike the LCC dormitories’ current pricing strategy. This finding is consistent with the “discovered preference hypothesis,” which states that over time customers make better choices, and in this case, with the less costly choice. Furthermore, this observation is consistent with the findings of the study by Naylor and Frank (2001), which states that price bundling loses its “inferred discounting” effect with repeat customers. Lastly, scenario five got a similar score to scenario two, proving that the respondents were not randomly choosing answers.

Further investigation was done for the pricing strategy preferred by the non-residents of LCC residency halls. The results are presented in Table 4.

Table 4: Non-residents preferred pricing strategies

<table>
<thead>
<tr>
<th>Residence</th>
<th>Scenario 1 Bundled fee</th>
<th>Scenario 2 Bundled fee</th>
<th>Scenario 3 Partitioned fee</th>
<th>Scenario 4 Limited choice fee</th>
<th>Scenario 5 Bundled fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Correlation</td>
<td>-.076</td>
<td>-.064</td>
<td>.163</td>
<td>-.114</td>
<td>-.138</td>
</tr>
<tr>
<td>Sig 2-tailed</td>
<td>.400</td>
<td>.476</td>
<td>.070</td>
<td>.207</td>
<td>.124</td>
</tr>
<tr>
<td>Nr. of observations</td>
<td>125</td>
<td>125</td>
<td>125</td>
<td>125</td>
<td>125</td>
</tr>
</tbody>
</table>

Source: Authors
The results presented in table four are similar to the results presented in table three. The non-residents, however, show stronger preference for the partitioned pricing strategy in scenario three. Moreover, the non-residents have a stronger aversion towards the current pricing strategy offered by LCC dormitories. Therefore, the non-residents are more price-sensitive than the current dorm residents. This finding can be explained that the non-residents have acquired enough knowledge over the years about their own needs and personal consumption and would therefore prefer to pay separately for their expenses than pay an average bundled fee. However, it is unclear if the non-residents do not live in the dormitories because of the limited choice pricing strategy applied, or because of other inconveniences.

Discussion

Rates and fees remain one of the most important trigger points of consumer behavior. This research suggests that the customers in the accommodation sector prefer a partitioned pricing strategy over a limited choice fee or a bundled price. Moreover, the results of this study suggest that the longer the stay of a resident in the dormitory, the higher the probability that he will prefer a partitioned fee. Correspondingly, the shorter the stay of a resident in the dormitory, the higher the probability that he will prefer a bundled fee.

Contrary to the findings in the hospitality industry of the study conducted by Repetti et al. (2015), the customers in the accommodation sector preferred a partitioned fee over a bundled fee or a limited choice fee. This preference is inconsistent with the pricing strategy employed by most dormitories across multiple countries. One reason why dormitories are charged a limited choice fee could be that the residence halls belonging to a university represent a captive market. Therefore, a dormitory may use a limited choice fee or a semi-bundled fee for increasing its profitability. As noted by Knutson (2011), bundling fees together can serve as an effective tool to increase sales or profit for companies, or in this case - dormitories. However, the practice of bundling services together can represent an advantage for the residents as well. Duke (1994) states that price bundling can serve as a method to attract price-sensitive consumers who “are attracted to purchase more goods and services by bundling independent products”. In the case of residency halls, paying for rent, utilities and Wi-Fi, seems like a good deal for potential residents, because the housing fee includes the independent product – Wi-Fi service. Therefore, both the dormitory managers and the residents have advantages from offering a limited choice fee or a bundled residency fee. The mutual gain of both parties can serve as an explanation for a limited choice fee in the accommodation sector.

The second research question found significant statistical evidence that the longer time a resident lives in the dormitories the more likely he is to prefer a partitioned pricing strategy. This finding is consistent with the proposed hypothesis and does not contradict the conventional literature about the subject. In terms of pricing strategies, this finding suggests that over time people are more likely to choose a partitioned pricing strategy over the limited choice package or the all-inclusive fee. However, this effect should be tested for different brand perceptions. As suggested by Love (2012) the practice of price bundling works well only for low tier brands. Interestingly, dormitory fees are different than the other surcharges evaluated in previous studies (i.e. shipping and handling charges). Dormitory fees include amenities that some consumers may not use or find value in, and yet still pay for them.

While this study provides interesting contributions, there are limitations to the work. The survey attempts to replicate actual consumer behavior purchasing decisions, but it is possible that participants can have different behaviors than those indicated in the responses. This study also exposes additional areas of research. Further, in-depth examination of pricing strategies in other dormitories in Lithuania, and other countries would be useful for modelling consumer behavior in the accommodation sector. Comparing various pricing strategies among privately owned dormitories and publicly owned dormitories is another suggestion for further research.

References


See pricing strategies across countries in Chapter two


CYCLIC DYNAMICS OF INFLATION: EMPIRICAL ANALYSIS
Alexander Protasov,¹ Tatyana Kotcofana,² Polina Stazhkova³

Abstract: The paper is dedicated to the study of nonlinear dynamics of inflation. We hypothesize that in the second half of the twentieth century, inflation cycles replaced the pre-existing inflation-deflation cycles. This hypothesis is based on the study of data about price levels in various countries of the world for the period of 1950 to 2016. The paper shows some results of a spectral analysis that was applied to the dynamic series of prices. The results of the spectral analysis confirmed the hypothesis about the existence of inflation cycles.

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Keywords: inflation, cycles, spectral analysis, spectral density function

Introduction
Two characteristics can be distinguished among the features of modern inflationary processes, both in developed countries and in countries with emerging markets. The first characteristic is the permanent nature of inflation, and the second one is the uneven nature of inflation’s development. The study of these characteristics has certain scientific and practical value. In particular, the study of the nonlinear dynamics of inflation makes it possible to predict the development of inflationary situations and apply adequate anti-inflationary measures. The observation of price dynamics in the world economy reveals that inflationary outbursts are periodic. An analysis of the rate of price levels in developed countries in the second half of the twentieth century shows that there is a clear periodicity in the acceleration and slowdown of inflationary processes. This means that inflation has acquired a permanent character, but it has also gained a new feature – cyclical dynamics. This fact raises questions about the existence of a specific “inflation cycle.”

Unfortunately, the cyclical dynamics of inflation is not yet widely covered in economic literature. Although there are works with inflation cycles as a direct subject of research (Banerji, 2005), but there are very few of them. Most often, nonlinear dynamics of inflation is considered by researchers in the context of studying other macroeconomic issues: monetary policy and business cycles (Gali, 2008; Niemira and Klein, 1994), history of changing the role of money in the economy (Skene, 1992) or the relationship between inflation and economic growth (Simran, 2015; Malkina, 2006; Zoidov, 2001).

Thus, the aim of this paper is to demonstrate the historical dynamics of inflation on the example of developed countries and to isolate a cyclical component in a dynamic series of prices with the use of non-standard methods of statistical data processing.

Cyclic dynamics of inflation: historical data
There is no clear definition of the inflation cycle in the studies on non-linear dynamics of inflation. Therefore, in this article the inflation cycle (IC) refers to a regular, relatively stable, rhythmic, regular and periodic reproduction of the alternating phases of acceleration and slowing of inflation. The acceleration phase is a consistent annual increase in the rate of price growth in relation to every preceding year, and the slowdown phase is a consistent annual reduction in the rate of price growth.

Four countries with developed market economies (USA, Great Britain, Germany, and France) were selected for the empirical analysis of the cyclical dynamics of inflation. The study of the dynamics of consumer price indices in these countries from 1950 to 2016 confirms the existence of cyclical fluctuations in inflation levels. First, in all the analyzed countries there was a stable presence of alternating phases of acceleration and slowing down of price growth rates. This can be seen in Figure 1. For example, in the USA during 1968-1969 there was an annual increase in the rate of growth in consumer prices: 1968 – 4.7%; 1969 – 6.2%. Then in 1970 trend has been replaced by an opposite one and during the next two years there has been an annual slowdown in the price growth rate: 1970 – 5.6%; 1971 – 3.3%. In the subsequent period (1972-1976) the picture of inflation dynamics was repeated.

¹ St. Petersburg State University, a.protasov@spbu.ru
² St. Petersburg State University, tankotsofan@mail.ru
³ St. Petersburg State University, p.stazhkova@spbu.ru
The annual rate of price growth accelerated from 3.4% in 1972 to 12.3% in 1974, and during the next two years there was a gradual slowdown from 6.9% in 1975 to 4.9% in 1976. Thus, each inflation cycle consists of a phase of acceleration and a phase of slowing inflation.

Figure 1: Dynamics of inflation in developed countries (1950 - 2016)

Secondly, the periodicity is traced in the dynamics of fluctuations in the rate of inflation. That is, fluctuations have a clear direction that changes after a certain period of time. Thirdly, there is a rhythm of fluctuations in the inflation rate. This means that the duration of the phases of acceleration and slowing of inflation in neighboring cycles (i.e., cycles that follow one another) often coincides. However, over time, as follows from the graphs presented in Figure 1, the inflation rhythms can vary. The change in the rhythms of inflation cycles, as our analysis has shown, is associated with the impact on the price dynamics of shocks of a different nature. For example, the sharp rise in world prices for hydrocarbons in 1973 - 1975, or the switching of state regulation from the Keynesian model to a monetarist model, as it had happened at the turn of the 1970s and 1980s.

Table 1 shows the grouping of consumer price growth indices and the inflation cycles in the respective countries. Analysis of Table 1 shows that during the period from 1950 to 2016, the UK, Germany and Canada experienced 16 complete ICs, 17 ICs were observed in the United States, and 15 in France. The average duration of IC for these countries was: 3.8 years in the US, 4 years in Germany, 4.1 years in France and Great Britain, 3.9 years in Canada.

Such differences in the dynamics of inflationary processes in the countries represented show that inflation in each country has specific features. This is due to the economic conditions of reproduction processes, pricing practices, monetary circulation and anti-inflationary policies, dominance of intangible assets and global competitiveness (Pashkus et al., 2016), as well as features of state regulation of the economy. (Kirillovskaya et al., 2016) However, it is clear that for all the countries studied, the uneven development of the inflationary situation is common. It manifests itself in a cyclical nature.

**Empirical analysis of inflation cycles**

The results of the spectral analysis of the dynamic series of prices confirm the existence of inflation cycles. This method of data processing was chosen due to two main reasons. First, it eliminates the need to apply the procedure for removing the trend from the original series. This is important because the long-term trend determines the long-wave dynamics of inflation, so removing it becomes impractical.
Secondly, this method allows identifying the most powerful harmonics in the frequency spectrum of price fluctuations and thereby determining the cyclical fluctuations that have a determining influence on the dynamics of inflationary processes. There is a brief description of the method of spectral analysis below, a more complete version of which can be found in (Granger and Hatanaka, 2015; Harvey, 1975; Sitnikova, 2009; Glazyev, 1991).

The long price series are oscillatory processes, similar in shape to the sinusoid. In mathematical form, the sinusoidal series can be represented as following:

\[ X(t) = A \cdot \cos(\omega t - \varphi), \]

Where \( A \) is an amplitude of the oscillations of the values of the series; \( \omega = \frac{2\pi}{T} \) – angular frequency; \( \varphi \) – phase shift; \( T \) – time; \( 1/T = f \) – frequency (the number of oscillations per unit of time).

The dynamical series \( X_n \), which describes the oscillatory changes in time of the values of any statistical indicator (for example, price indices or their increments), consists of the sum of harmonics that are periodic over a certain frequency interval with amplitudes and phases constant around average. These oscillatory changes in each given point in time are \( X(t_1); X(t_2); \ldots; X(t_n) \), with \( t_1, \ldots t_n \) as specific points in time in which the investigated indicator of the dynamic series takes specific values. These oscillatory changes are described by the probability density with the use of indicators of mathematical expectation (\( \mu \)), variance (\( \sigma^2 \)), autocovariance function (\( \gamma(\tau) \)) and spectral density function (\( S(f) \)):

\[
\mu = \int_{-\infty}^{+\infty} X f(X) dX \\
\sigma^2 = \int_{-\infty}^{+\infty} (X - \mu)^2 f(X) dX \\
\gamma(\tau) = \int_{-\infty}^{+\infty} \left[ (X(t_1) - \mu)(X(t_2) - \mu) \right] f(X) dX \\
\tilde{S}(f_i) = \frac{1}{2\pi} \left[ \gamma(f) + 2 \sum_{i=1}^{N-1} \gamma(2\pi f_i) \cos(2\pi f_i t) \right]
\]

Where \( \tilde{S}(f_i) \) is an estimate of the power of the spectral density function (SDF), which makes it possible to analyze the frequencies of the oscillatory processes in a given dynamical series and it is also related to the autocovariance function \( \gamma(\tau) \) by mutual Fourier transform. \( \gamma(\tau) \) is autocovariance with a lag \( \tau \); \( N \) is the length of given series; \( f_i \) is a frequency of oscillations of the index of the series.

In any given point of time, the value of the series can be represented as a Fourier series in the form of a sum of sin and cos:

\[ X(t) = A_0 + \sum_{i=1}^{n-1} A_i \cos(\omega_i t - \varphi_i) + A_n \cos(\omega_n t) \]

with \( \omega_n = 2\pi f_n \); \( f \) is main frequency, determined by the length of the series \( f = \frac{1}{N} \). The variance of the series is represented as the sum of the squares of the amplitudes of the oscillations (harmonics):

\[ 1/N \sum(Xt - A0)^2 = 12Nt = 1 \sum Ai 2n - 1i - 1 + An2 \]

Since the dynamic series, and especially the series of prices, are filled with a "mixture" of regular and irregular (random) oscillations, a procedure is performed to estimate the contribution of the variances that make up the totality of the oscillatory processes in the investigated series to the overall variance of the oscillatory process. In particular, the dynamic process can be represented by the sum of elementary oscillations with random amplitudes and phases (Glazyev, 1991). In this case, the variance of the random process is obtained in the form of a continuous sum of variances of all oscillations:

\[ \sigma^2 = \int_{-\infty}^{\infty} dF(\omega) \]
The contribution to the total dispersion of a dynamic process with frequencies from a certain interval \((\omega, \omega+d\omega)\) is equal to \(dF(\omega)\). The function \(F(\omega)\) is the spectral distribution function of the dispersion of the oscillatory process with respect to frequencies, \(S(\omega) = \frac{dF(\omega)}{d\omega}\) is a function of the spectral density of the distribution of the dispersion of the oscillatory process over a continuously varying frequency. The peak points on the SDF graphs determine the average amplitude of the oscillation amplitude in the defined frequency interval. Thus, the SDF makes it possible to estimate with mathematical rigor an individual harmonic (oscillations with a certain period) as part of the overall process from SDF values or from SDF graphs. In other words, the SDF shows the presence of periodic oscillations at the any given interval and their variance. This method was used to determine the presence of oscillations in the dynamics of inflation, its period (frequency) and amplitude.

Table 1 shows the periods of the observed cyclic components in the dynamics of the growth rates of consumer price indices in the studied countries with developed markets and the power value of the spectral density function for the corresponding frequency.

<table>
<thead>
<tr>
<th>Countries</th>
<th>Periods of cyclical components (in years)</th>
<th>Values of the SDF</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>8,3</td>
<td>11,4</td>
</tr>
<tr>
<td></td>
<td>6,2</td>
<td>10,2</td>
</tr>
<tr>
<td></td>
<td>5,0</td>
<td>19,8</td>
</tr>
<tr>
<td></td>
<td>4,2</td>
<td>7,6</td>
</tr>
<tr>
<td></td>
<td>3,1</td>
<td>3,3</td>
</tr>
<tr>
<td></td>
<td>2,6</td>
<td>3,8</td>
</tr>
<tr>
<td></td>
<td>2,3</td>
<td>2,7</td>
</tr>
<tr>
<td>Germany</td>
<td>12,5</td>
<td>9,6</td>
</tr>
<tr>
<td></td>
<td>8,3</td>
<td>13,6</td>
</tr>
<tr>
<td></td>
<td>4,2</td>
<td>5,7</td>
</tr>
<tr>
<td></td>
<td>3,1</td>
<td>4,9</td>
</tr>
<tr>
<td></td>
<td>2,6</td>
<td>6,0</td>
</tr>
<tr>
<td></td>
<td>2,3</td>
<td>4,8</td>
</tr>
<tr>
<td>France</td>
<td>8,3</td>
<td>35,7</td>
</tr>
<tr>
<td></td>
<td>5,6</td>
<td>45,9</td>
</tr>
<tr>
<td></td>
<td>5,0</td>
<td>45,6</td>
</tr>
<tr>
<td></td>
<td>3,6</td>
<td>34,3</td>
</tr>
<tr>
<td></td>
<td>2,5</td>
<td>8,6</td>
</tr>
<tr>
<td>Great Britain</td>
<td>10,0</td>
<td>38,4</td>
</tr>
<tr>
<td></td>
<td>4,6</td>
<td>37,4</td>
</tr>
<tr>
<td></td>
<td>2,3</td>
<td>5,03</td>
</tr>
</tbody>
</table>

Source: Author

**Conclusion**

The conducted research has shown that the development of inflationary processes has inherited the property of multicyclicity. The method of spectral analysis made it possible to reveal cycles of different duration in dynamic series of prices. In particular, over the past 65 years, the dynamics of inflation in developed countries have seen harmonics characteristic of the rhythms of Kondratiev waves, Kuznets swings, business cycles and shorter Kitchin cycles, all of which have wide coverage in economic literature. The same analysis revealed the presence of specific 2 to 4 yearlong fluctuations that do not fit into the well-known cycles. This confirms the hypothesis of inflation cycles existence.

The nonlinear dynamics of inflation is determined by the intensity of the distribution conflicts, the strengthening and weakening of which creates impulses for the cyclical development of inflationary processes. This statement follows the traditions of post-Keynesian theory (Palley, 1996), the theory of “conflict inflation” (Rosenberg and Weisskopf, 1981; Gordon, 1981), and our previous research. In (Protasov, 2013; Protasov, 2015; Kotcofana, 2007), it is shown that inflation is a monetary expression of the fundamental distributional conflict of the capitalist economy – the struggle of various social groups and classes for their shares in the national income.
References


THE ROLE OF ECONOMIC ACTIVITIES’ CLUSTERS IN GROSS VALUE ADDED GENERATION IN THE BALTIC STATES

Rima Rubčinskaitė, Gindrutė Kasnauskienė

Abstract: Economic globalization affects regional development through different economic value creation chains. The structure of regional economic activities’ groups and size of clusters could also influence the structure and size of gross value added in a particular region. This paper examines the impact of the main labor force indicators on the generated gross value added in diverse economic activities in the Baltic States and the neighboring regions of Finland and Poland in the period of 2000-2013 according to Eurostat data. The research has shown that the structure of economic activities clusters in the Baltic States (Estonia, Latvia, Lithuania) significantly differs from the neighboring regions of Poland and Finland. We also found that the labor force input has a significant impact on the following economic activities’ clusters in the Baltic States: “Industry (except construction)”, “Wholesale and retail trade, transport, accommodation and food service activities”, “Construction”, “Professional, scientific and technical activities; administrative and support service activities”, “Financial and insurance activities”, “Arts, entertainment and recreation; other service activities; activities of household and extra-territorial organisations and bodies”. The impact of the labor force on generated gross value added differs in diverse economic activities. The authors believe that the results of this study could be useful for policy makers in building more progressive national and regional economic development strategies.

JEL Classification Numbers: J21, P25, O14; DOI: http://dx.doi.org/10.12955/cbun.v5.957

Keywords: economic clusters, labor force, gross value added, regional development, Baltic States

Introduction

The empirical research results indicate that the composition of clusters as groups of specific economic activities has a significant impact on value creation in the studied regions. The structure of regional economic activity groups and the size of clusters could also influence the structure and the size of gross value added in a particular region. The questions we discuss in this paper are of considerable importance to the Baltic States: Does location (i.e. region) matters in the Baltic States? How much do the Baltic States vary or are similar in terms of the distribution of labor force across economic activities? How much do the Baltic States vary in the structure of gross value added of economic activities? How much does the input of the labor force matter to the generation of gross value added in a specific economic activity?

There are two main strands of research used to analyze clusters and the agglomeration impact on regional development that are briefly presented in the paper. The Porter’s cluster theory is widely accepted by policy makers at the regional, national and the European Union levels. The clusters and networks became part of the EU strategy “Europe 2020” and the industrial policy “An Integrated Industrial Policy for the Globalisation Era Putting Competitiveness and Sustainability at Centre Stage.”

This study aims to evaluate the role of economic activities’ clusters in gross value added generation in the Baltic States (Estonia, Latvia, Lithuania) and neighbor regions of Finland and Poland. The originality of the paper lies in the fact that it has been for the first time, to the authors knowledge, that a few small open economies of the same geographical location were analysed as one region and compared with the neighbour regions of other countries in terms of labour distribution across clusters of economic activities and its impact on gross value added.

The following part of the paper reviews the modern regional development theories. Further, the methods used to investigate the subject are described. Then follows the discussion on a geographical scale of the research. The next part highlights the analysis of labor and gross value added structure of the selected regions and the main results of a regression analysis on the impact of labour force on gross value added in selected clusters and regions. The last section discusses the main findings and conclusions.

Literature review: Cluster Theory and New Economic Geography

Two different research strands on regional economic development were developed in the end of the 20th century and the beginning of the 21st century: a cluster theory by Michael Porter and a new economic geography by Paul Krugman. Both of them highlight the location being quite little under

1 Faculty of Economics of Vilnius University, rima.putiene@gmail.com
2 Faculty of Economics of Vilnius University, gindra.kasnauskien@ef.vu.lt
consideration in economics earlier. M. Porter and his followers argue that the location defines the specific structure of interrelated economic activities and the patterns of such collocation can be called clusters (Porter, 2003; Brachert, Titze, Kubis, 2011; Delgado, Porter, Stern, 2012). The analysis of the USA County Business Patterns (CBP) data allowed M. Porter to classify clusters in the following categories: traded, local, and resource-dependent (Porter, 2003). According to Porter’s cluster theory, clusters have an impact on the economy and innovation of the region and use the concentration, correlation and regression analysis to prove this (Porter, 2003; Sölvell, Ketels, Lindqvist, 2008; Brachert, Titze, Kubis, 2011; Delgado, Porter, Stern, 2012; Pires et al., 2013; Ketels, Ch., Protsiv, S., 2013). The main variables used are employment, establishments, wage size, and patent indicators (Porter, M., 2003; Brachert, Titze, Kubis, 2011; Pires et al., 2013; Delgado, Porter, Stern, 2013).

Paul Krugman focuses attention on the relationship between the location and trade (Krugman, 2010). According to Martin and Sunley (1996, p. 6), Krugman’s theory “combines the models of imperfect competition and scale economies used in a new trade theory with the location theory’s. It highlights the emphasis on the significance of transport costs and “the interaction of external economies of scale with transport costs” to be the key to his explanation of regional industrial concentration and the formation of regional “centers” and “peripheries.” Others add that new economic geography explains “market expansion effect” (i.e. the increased local demand for upstream activities when a new company starts production in a certain location) and “market crowding effect” (i.e. a local supply for downstream activities) (Ottavianno, 2002).

While discussing regional economics, there are two main groups of theories: a location theory that analyses “economic mechanisms that distribute activities in space” and a regional growth (or development) theory where research objects are “spatial aspects of economic growth and the territorial distribution of income” (Capello, 2011). New Economic Geography (NEG) as a location theory analyses the diversity of locations, determinants of local growth using quantitative approach. The cumulative causation model (Myrdal, 1957; Kaldor, 1970) and the endogeneous growth model (Luca, 1988; Romer, 1987) belong to the same local growth theories where growth is treated as territorial competitiveness (Capello, 2011). It should be added that Porter’s cluster theory also deals with competitiveness as the main source of inspiration for a cluster concept in the region.

While both new theories deal with spatial distribution as such, they both received critique and were widely discussed and compared. While Porter’s cluster theory received much critique on the empirical basis (Woodward, 2012) and the geographical scale of cluster (Martin and Sunley, 2003; Brachert, Titze, Kubis, 2011), this means that the definition of a region matters. Krugman’s new economic geography was criticised because of focusing “on forces and processes that were important a century ago but much less relevant today” (Krugman, 2010, p.3). Both theories are still under the scholarly focus, and both are exploited in regional economics studies.

**Methodology and geographical scale of the research**

Most of the research carried out into clusters mainly measures cluster strength exploiting spatial agglomeration of labor force such as location quotient, Gini coefficient. Input-output methods, network analysis, discriminant analysis methods are used for defining clusters (Hill and Brennan, 2000; Porter, 2003; Delgado, Porter, Stern, 2013; Kies, 2008). The multidimensional approach developed by Titze et al. (2011) exploits the combination of spatial concentration and input-output methods (Brachert, Titze, Kubis, 2011). This combination allows to identify horizontal or vertical dimensions of clusters, where horizontal dimensions mean “clusters of firms producing similar output” and compete in the same market, and where the vertical dimension means that a cluster includes “firms linked through input-output relations” (Malmberg and Maskell, 2002; Brachert, Titze, Kubis, 2011).

It is argued that cluster measures should be compared with agglomeration measures as industry employment and firm’s concentration and should be analyzed together with regional policy’s key variables - productivity, employment growth and innovation (Woodward, 2013).

The school of NEG applies economic models with the focus on the economy of scale and agglomeration of firms and labor (Martin and Sunley, 1996; Cumbers and MacKinnon, 2004). Diverse approaches to analyze the spatial distribution of clusters of economic activities are exploited. Most research exploits administrative units of analysis, for example counties, districts, regions, etc... (Pablo-Marti and Arauzo-Carod, 2011).
This research exploits the percentage of individuals in employment and gross value added to avoid the problem of the regional size. For example, the population size of Lithuania was more than 3 million during the given period, while in Latvia – 2.5 million and 1.0-1.5 million in other selected regions. The population size impacts the size of the number of persons employed in the region. The distribution analysis was done by exploiting labor percentage share through clusters of economic activities in the selected regions. To understand which region is homogeneous and has the same economic function, i.e. the input of labor impacts the outcome of gross value added, a regression analysis of the selected regions and the selected clusters of economic activities was exploited.

To define geographical unit of analysis one should have in mind how much regions are similar in economy, social and political development, cultural values. This study focuses on the geographical scale of the Baltic States – Estonia, Latvia and Lithuania (NUTS 2 classification) – and their neighboring regions in the North (Finland regions - Länsi-Suomi, Helsinki-Uusimaa, Etelä-Suomi) and in the South (Poland regions - Warminsko-Mazurskie, Podlaskie). The Baltic States have similar history, similar political systems and comparable economic development as well as similar local resources. According to the report “The State of the Region. The Top of Europe - Striving for Direction in a Complex Environment” (Ketels and Pedersen, 2015), the Baltic States belong to Europe’s macro-region – the Baltic Sea Region which includes Denmark, Finland, Iceland, Norway, Sweden, North Germany regions (Hansestadt Hamburg, Mecklenburg-Vorpommern and Schleswig-Holstein), North Poland regions (Pomorskie, Warminsko-Mazurskie and Zachodnio-Pomorskie) and Russian regions (Archangelsk Komi Republic, Nenetski AO, Vologodsk district). Other researchers see the Baltic States as part of the region of Central and Eastern Europe which also includes Czech Republic, Poland, Romania, Slovenia, Hungary (Blajer-Golebiowska, 2014). To confirm that the Baltic States are similar in economic outcomes, their gross value added (GVA) structure was analyzed. The neighbor regions were added to examine whether there is some relationship between the neighbor regions and the Baltic States in labour and GVA structure.

The main aim of the research was to analyse the impact of labour input on gross value added in the main clusters of economic activities in the Baltic States and the neighbour regions (Estonia (EE), Latvia (LV), Lithuania (LT), Länsi-Suomi (FI19), Helsinki-Uusimaa (FI1B), Etelä-Suomi (FI1C), Podlaskie (PL34), Warminsko-Mazurskie (PL62)). The regions were classified according to the EU NUTS2 classification. The Eurostat data of economic activities’ clusters of 2000-2013 period was used. The cluster research exploits labour indicators as the main measure of agglomeration in the region and as the main indicator of the impact on regional economy. Thus, the employment indicator (i.e. the number persons employed) was exploited in this study which was assumed as the independent variable in further analysis. The dependent variable was assumed as the gross value added in clusters of economic activities. The following clusters of economic activities according to NACE Rev. 2 data were analysed (AFF) “Agriculture, forestry and fishing”, (IND) “Industry” (includes “Mining and quarrying”), (MNF) “Manufacturing” (includes “Manufacturing”, “Electricity, gas, steam and air conditioning supply”, “Water supply; sewerage, waste management and remediation activities”), (CONS) “Construction”, (WHRT) “Wholesale and retail trade; repair of motor vehicles and motorcycles, Transportation and storage, Accommodation and food service activities”, (ICT) “Information and communication”, (FINS) “Financial and insurance activities”, (RE) “Real estate activities”, (PRFSC) “Professional, scientific and technical activities, Administrative and support service activities”, (PAEDU) “Public administration and defence; compulsory social security; Education; Human health and social work activities”, (ARTS&) “Arts, entertainment and recreation; Other service activities; Activities of households as employers; undifferentiated goods-and services-producing activities of households for own use; Activities of extraterritorial organisations and bodies”.

Main results and discussion

Firstly, the structure of GVA and employment was analyzed. Then the regression analysis was done using panel data. The data of cluster of economic activities “Public administration and defense; compulsory social security; Education; Human health and social work activities” was used only for the calculations of the percentage share. One limitation of the research was that the EUROSTAT data did not have gross value added data of all the above listed clusters of economic activities of Poland’s regions. The main research question was what share of gross value added of a cluster could be explained by a share of the persons employed. The shares of indicators were calculated in percentages.
The economic activity clusters were grouped by the mean of the percentage share of GVA and the persons employed of a 5-year period (Table 1). This analysis aimed to have the first insight on how similar or diverse the locations were. The main aim was to decide if we could assume that the Baltic States are similar in GVA and labor structure.

Table 1: The mean of the percentage GVA share and the mean of percentage share of persons employed of economic activities clusters in the Baltic States and NUTS2 neighbor regions of 2009-2013 period

<table>
<thead>
<tr>
<th>Indicator / Region</th>
<th>FI19</th>
<th>FI1B</th>
<th>FI1C</th>
<th>EE</th>
<th>LV</th>
<th>LT</th>
<th>PL34</th>
<th>PL62</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;1 GVA, %</td>
<td>FINS</td>
<td>AFF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EMPL, %</td>
<td>RE</td>
<td>AFF</td>
<td>RE</td>
<td></td>
<td></td>
<td></td>
<td>ICT, RE</td>
<td>ICT, RE</td>
</tr>
<tr>
<td>≤1-5&lt; GVA, %</td>
<td>AFF, ICT, ARTS&amp;</td>
<td>FINS, ARTS&amp;</td>
<td>AFF, ICT, FINS, ARTS&amp;</td>
<td>AFF, ICT, FINS, ARTS&amp;</td>
<td>AFF, ICT, FINS, ARTS&amp;</td>
<td>AFF, ICT, FINS, PRFSC, ARTS&amp;</td>
<td>FINS, ARTS&amp;</td>
<td>FINS, ARTS&amp;</td>
</tr>
<tr>
<td>EMPL, %</td>
<td>ICT, FINS, ARTS&amp;</td>
<td>FINS, RE, PRFSC, ARTS&amp;</td>
<td>AFF, ICT, FINS, ARTS&amp;</td>
<td>ICT, FINS, RE, ARTS&amp;</td>
<td>ICT, FINS, RE, ARTS&amp;</td>
<td>ICT, FINS, PRFSC, ARTS&amp;</td>
<td>FINS, PRFSC, ARTS&amp;</td>
<td>FINS, PRFSC, ARTS&amp;</td>
</tr>
<tr>
<td>≤5-10&lt; GVA, %</td>
<td>CONS, RE, PRFSC</td>
<td>CONS, ICT, RE</td>
<td>CONS, RE, PRFSC</td>
<td>CONS, RE, PRFSC</td>
<td>CONS, RE, PRFSC</td>
<td>CONS, RE, PRFSC</td>
<td>AFF, CONS</td>
<td>AFF, CONS</td>
</tr>
<tr>
<td>EMPL, %</td>
<td>AFF, CONS, PRFSC</td>
<td>MNF, CONS, ICT</td>
<td>CONS, PRFSC</td>
<td>CONS, PRFSC</td>
<td>AFF, CONS, PRFSC</td>
<td>AFF, CONS, PRFSC</td>
<td>CONS</td>
<td>CONS</td>
</tr>
<tr>
<td>≤10-15&lt; GVA, %</td>
<td>WHRT</td>
<td>MNF</td>
<td>WHRT</td>
<td>MNF, PAEDU</td>
<td>MNF, PAEDU</td>
<td>PAEDU</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EMPL, %</td>
<td>IND, PRFSC</td>
<td>MNF</td>
<td>MNF</td>
<td>MNF</td>
<td>MNF</td>
<td>AFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤15-20&lt; GVA, %</td>
<td>MNF, PAEDU</td>
<td>IND, WHRT, PAEDU</td>
<td>MNF, PAEDU</td>
<td>IND, WHRT</td>
<td>IND</td>
<td>IND, MNF</td>
<td>IND, MNF, WHRT, PAEDU</td>
<td>IND, MNF, WHRT, PAEDU</td>
</tr>
<tr>
<td>EMPL, %</td>
<td>IND, MNN, WHRT</td>
<td>IND, WHRT</td>
<td>IND, MNN, PAEDU</td>
<td>IND, PAEDU</td>
<td>IND</td>
<td>IND, WHRT, PAEDU</td>
<td>IND, PAEDU</td>
<td>IND, PAEDU</td>
</tr>
<tr>
<td>≤20 GVA, %</td>
<td>IND</td>
<td>IND</td>
<td>WHRT</td>
<td>WHRT</td>
<td>IND, PAEDU</td>
<td>IND, PAEDU</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EMPL %</td>
<td>PAEDU</td>
<td>WHRT, PAEDU</td>
<td>PAEDU</td>
<td>WHRT</td>
<td>WHRT</td>
<td>WHRT, PAEDU</td>
<td>AFF</td>
<td></td>
</tr>
</tbody>
</table>

Source: Authors

As the main variable for the spatial distribution and the agglomeration analysis is labor, the indicator of share of employment was the main argument for further grouping of locations. Thus, for further research the following clusters and regions were selected:

- “Construction” – all regions (FI19, FI1C, EE, LV, LT, PL34, PL62);
- “Industry” – FI19, FI1C, EE, LV, LT, PL62;
- “Wholesale and retail trade; repair of motor vehicles and motorcycles, Transportation and storage, Accommodation and food service activities,” (ICT) “Information and communication” – EE, LV, LT;
- “Information and communication” - FI19, FI1C, EE, LV, LT;
- “Financial and insurance activities” - FI1C, EE, LV, LT;
“Professional, scientific and technical activities, Administrative and support service activities”
- FI19, FI1C, EE, LV, LT;
“Arts, entertainment and recreation; Other service activities; Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use; Activities of extraterritorial organizations and bodies” - FI19, FI1C, EE, LV, LT.

While grouping, the main focus was laid on the homogeneity criteria of the Baltic States, i.e. the percentage share of the cluster’s persons employed in the three Baltic States should fall into one group. Other regions were analyzed in the same group in case the share of employment of these regions belonged to the same percentage share group.

Further research was done by exploiting a classical linear regression model (CLRM). For this purpose, the data was analyzed using „MS Excel” and „Gretl” software. First, scatter diagrams were exploited where the independent variable was the percentage share of persons employed in a cluster and the dependent variable was the percentage share of GVA of a cluster. The assumptions of CLRM for normality, autocorrelation and homoscedasticity were tested using Jarque-Bera test, Durbin-Watson statistics and the White test.

The regression models of the selected clusters in the selected regions which vary in composition follow hereafter. There was no possibility to exploit the analysis with dummy variables for the regions because of the small number of observations. There was no possibility to use the multiple regression analysis because the variables were calculated as the percentage share inside the selected region. The applied level of significance was 0.05 ($\alpha=0.05$) in all the applied tests.

The “Construction” cluster was analyzed using two different region scales (Table 1 in Annex 1), one of which was the Baltic States and the other – the Baltic States and the Northern neighboring regions and the Southern neighboring regions. Both the regional models are statistically significant according to F statistics. The interesting findings are that the larger scale regional regression model meets all the CLRM model assumptions for normality, autocorrelation and homoscedasticity and could predict the average value of the “Construction” cluster percentage share of GVA by the percentage share of persons employed, i.e. if one increase percentage share of persons employed by 1%, the percentage share of GVA of this cluster will increase by 0.91%. To evaluate why the assumption for normality in the EE, LV, LT region was not fulfilled, we used a scaterdiagram (Figure 1, Annex 2). The normality assumption was employed because it is assumed that the number of independent variables in the model is optimal and there is no influence of omitted variables is small. Thus, in the case of the EE, LV, LT region, we could assume that there could be other independent variables that have the influence. The “Industry” cluster was analyzed using two different region scales (see Table 3 below), one of which was the Baltic States and the other – the Baltic States and the Northern neighbor regions FI19, FI1C and the Southern neighbor region PL62. Both the regional models are statistically significant according to F statistics. Both the models do not meet the normality assumption even though the adjusted determination coefficient is high in both cases.

The analysis of the scatter diagrams of the “Industry” cluster (Figures 2, 3, Annex 2) demonstrates that the linear model is not suitable for predicting a stochastic relationship. The analysis of the “Wholesale and retail trade; repair of motor vehicles and motorcycles, Transportation and storage, Accommodation and food service activities” cluster was done only for the Baltic States (EE, LV, LT). Even though the linear model is statistically significant and has high determination coefficient, it does not fulfill the normality criteria. Thus, it could not be used for prediction. The analysis of the “Professional, scientific and technical activities, Administrative and support service activities” cluster was done for two regions (Table 4 in Annex 1): one - FI19, FI1C, EE, LV, LT and the other was the Baltic States. We could note that these models also do not meet the normality criteria even though the determination coefficients are high and F statistics is significant. The cluster “Information and communication” was analyzed in two regions scales (see Table 5 in Annex 1): one of FI19, FI1C, EE, LV, LT and the other for the EE, LV, LT. The models are statistically significant. The determination coefficient is lower than in the previous models. Both the models do not meet the normality criteria. The second model (EE, LV, LT) also does not meet the homoscedasticity criteria. Both the models could not be used for prediction of a stochastic relationship. It could be noted that in earlier research, a negative correlation between the labor variable and the GVA was identified in the LT region (Rubčinskaitė and Kasnauskienė, 2016). The cluster
“Financial and insurance activities” was analysed in two different composition regions (see Table 6, Annex 1). The models could not be used for prediction because they do not meet the normality criteria. The “ARTS&” cluster was analysed in two different regional scales (see Table 7, Annex 1). Though both the models are statistically significant, they do not meet the normality criteria. Though, it could be noted that the determination coefficients and estimators are different in both models.

We could argue that the labour input impact on the generated GVA is similar in the following clusters “Construction,” “Industry,” “Wholesale and retail trade; repair of motor vehicles and motorcycles, Transportation and storage, Accommodation and food service activities.” It should be also noted that the concentration of labor force in these clusters is high and falls into the groups of $\leq 10-15<$ and $\leq 15-20<$. There are also different means of the determination coefficient in clusters. While the determination coefficient in clusters “Industry” and “Wholesale and retail trade; repair of motor vehicles and motorcycles, Transportation and storage, Accommodation and food service activities” is high and comparable, the determination coefficients of the regression models of clusters “Information and communication”, “Financial and insurance activities”, “Arts, entertainment and recreation; Other service activities; Activities of households as employers; undifferentiated goods-and services-producing activities of households for own use; Activities of extraterritorial organisations and bodies” are very different and lower.

The authors argue that all the models require improvements on including more variables and possible employment of non-linear regression models. The different scales of regions proved that the location scale matters. Even the structure of a cluster composition is similar, the relationship model is different on the regional scale and in a cluster.

A preliminary analysis of the economic activity composition in the selected regions confirms that “center-periphery” forces could matter. An example could be Finland Helsinki-Uusimaa (FI1B) which has very different cluster composition compared to other Finland’s regions under analysis. This could also be explained by a higher level of urbanization in the region. This fact confirms the assumption that regions matter. The specificity of the regions and agglomeration is important in both the theories presented earlier which confirms their relevance in our research. This is proved by a different composition of activities of the neighboring regions of the Baltic States. The neighboring regions under analysis, except for Helsinki-Uusimaa, are periphery regions of Poland and Finland and the identified differences in labor and the GVA structure could suggest that center-periphery forces work well on the national or state level.

**Conclusion**

According to the author’s knowledge, this is the first attempt to analyze the Baltic States as the whole region and compare it with the neighboring regions that belong to other nations and states. Also, this is an attempt to refuse the usual Cobb-Douglas production function while analyzing the labor input impact on GVA. This research was also an attempt to evaluate critically and assess the labor as the main indicator of agglomeration in cluster research by analyzing its possible impact on gross value added of the selected sector. The impact of labour force on generated gross value added is statistically significant in the selected clusters and regions. The impact is very different in the selected clusters and this implies that we should look for other than labor indicators when it comes to assessing the impact of clusters or industries agglomeration. Thus, we could accept Woodwards suggestion to explore more deeply the industries’ agglomeration variables to assess the impact of clusters and industries on the economic development of regions.

The research results could be useful for regional development policy makers. A more in-depth analysis of regions’ structure of economic activities’ clusters could be recommended and the regional development policy should take into account the center – periphery forces and to invest smartly in regions.

**References**


Table 1: Regression model of “Construction” cluster

<table>
<thead>
<tr>
<th>NACE Rev.2 / region</th>
<th>Regression function</th>
<th>R²</th>
<th>F, p</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Construction” – FF19, FI1C, EE, LV, LT, PL34, PL62</td>
<td>[ Y_{gva} = 2.84 + 0.91 X_{empl} + \varepsilon_i ]</td>
<td>R² = 0.8391</td>
<td>H₀: β₁=0; Hₐ: β₂≠0 ( F(1, 110) = 573.7053 ) p = 1.89e-45</td>
</tr>
<tr>
<td></td>
<td>u ~ N (0, ( \sigma^2 ))</td>
<td>( \chi^2_{\text{LM}} = 1.26759; \ p = 0.530575 )</td>
<td></td>
</tr>
</tbody>
</table>

Source: Authors

Table 2: Regression model of “Industry” cluster

<table>
<thead>
<tr>
<th>NACE Rev.2 / region</th>
<th>Regression function</th>
<th>R²</th>
<th>F, p</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Industry” – FF19, FI1C, EE, LV, LT, PL62</td>
<td>[ Y_{gva} = 1.15 + 0.930 X_{empl} + \varepsilon_i ]</td>
<td>R² = 0.9567</td>
<td>H₀: β₁=0; Hₐ: β₂≠0 ( F(1, 82) = 1863.95 ) p = 1.07e-57</td>
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<td>u ~ N (0, ( \sigma^2 ))</td>
<td>( \chi^2_{\text{LM}} = 1.256759; \ p = 0.750575 )</td>
<td></td>
</tr>
</tbody>
</table>

Source: Authors

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**Annex 1**

**Table 2: Regression model of “Construction” cluster**

<table>
<thead>
<tr>
<th>NACE Rev.2 / region</th>
<th>Regression function</th>
<th>R²</th>
<th>F, p</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Construction” – FF19, FI1C, EE, LV, LT, PL34, PL62</td>
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<td>R² = 0.8391</td>
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<td>( \chi^2_{\text{LM}} = 1.26759; \ p = 0.530575 )</td>
<td></td>
</tr>
</tbody>
</table>

Source: Authors
Table 3: Regression model of “Wholesale and retail trade; repair of motor vehicles and motorcycles, Transportation and storage, Accommodation and food service activities” cluster

<table>
<thead>
<tr>
<th>NACE Rev.2 / region</th>
<th>Regression function</th>
<th>$R^2$</th>
<th>$F$, p</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Wholesale and retail trade; repair of motor vehicles and motorcycles, Transportation and storage, Accommodation and food service activities” – EE, LV, LT</td>
<td>$Y_{gva} = 0.0198 + 1.01 \times \text{empl} + \epsilon_i$</td>
<td>$R^2 = 0.991$</td>
<td>$F(1, 40) = 4459.363$; $p = 1.20e-42$</td>
</tr>
<tr>
<td></td>
<td>$R^2_{Adj} = 0.990$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$u_i \sim N (0, \sigma^2)$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$H_0$: errors are normally distributed; $H_A$: errors are not normally distributed.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jarque-Bera test = 1.08515; p = 0.00136877; $H_0$ rejected.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Errors do not correlate: cov ($X_i$, $u_i$) = 0.</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>$H_0$: no first order autocorrelation; $H_1$: first order correlation exists.</td>
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<tr>
<td>Durbin-Watson statistic = 1.88; p = 0.413435; $H_0$ not rejected.</td>
<td></td>
<td></td>
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<tr>
<td>Homoscedasticity</td>
<td></td>
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<tr>
<td>$H_0$: Heteroscedasticity does not exist; $H_1$: Heteroscedasticity exists.</td>
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</tbody>
</table>

Source: Authors

Table 4: Regression model of “Professional, scientific and technical activities, Administrative and support service activities” cluster

<table>
<thead>
<tr>
<th>NACE Rev.2 / region</th>
<th>Regression function</th>
<th>$R^2$</th>
<th>$F$, p</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Professional, scientific and technical activities, Administrative and support service activities” – FI19, FI1C, EE, LV, LT</td>
<td>$Y_{gva} = 2.41 + 0.881 \times \text{empl} + \epsilon_i$</td>
<td>$R^2 = 0.8395$</td>
<td>$F(1, 68) = 355,9227$; $p = 9.96e-29$</td>
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<td>$R^2_{Adj} = 0.8372$</td>
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<td>$u_i \sim N (0, \sigma^2)$</td>
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<td>Durbin-Watson statistic = 1.88; p = 0.413435; $H_0$ not rejected.</td>
<td></td>
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<tr>
<td>Homoscedasticity</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>$H_0$: Heteroscedasticity does not exist; $H_1$: Heteroscedasticity exists.</td>
<td></td>
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</tr>
</tbody>
</table>

Source: Authors
Table 5: Regression model of “Information and communication” cluster

<table>
<thead>
<tr>
<th>NACE Rev.2 / region</th>
<th>Regression function</th>
<th>R²</th>
<th>F, p</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Information and communication” - FI19, FI1C, EE, LV, LT</td>
<td>Y_{gva} = 7.98 + 0.969 X_{empl} + \varepsilon_i</td>
<td>R² = 0.5562</td>
<td>F(1, 68) = 85.21121, p = 1.29e-13</td>
</tr>
<tr>
<td></td>
<td></td>
<td>R²_adj = 0.5496</td>
<td></td>
</tr>
<tr>
<td>u_i \sim N (0, \sigma²)</td>
<td>H₀: errors are normally distributed; Hₐ: errors are not normally distributed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Jarque-Bera test = 96.5006; p = 1.1096e-021; H₀ rejected.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Errors do not correlate: cov (X_i, u_i) = 0.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>H₀: no first order autocorrelation; Hₐ: first order correlation exists.</td>
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<td></td>
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<tr>
<td></td>
<td>Durbin-Watson statistic = 1.62273; p = 0.117841; H₀ not rejected.</td>
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<tr>
<td></td>
<td>Homoscedasticity</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>H₀: Heteroscedasticity does not exist; Hₐ: Heteroscedasticity exists.</td>
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</tr>
<tr>
<td></td>
<td>White test: LM = 4.078571; p (\chi² &gt; 4.078571) = 0.130122; H₀ not rejected.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 6: Regression model of “Financial and insurance activities” cluster

<table>
<thead>
<tr>
<th>NACE Rev.2 / region</th>
<th>Regression function</th>
<th>R²</th>
<th>F, p</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Financial and insurance activities” - FI1C, EE, LV, LT</td>
<td>Y_{gva} = 7.47 + 0.999 X_{empl} + \varepsilon_i</td>
<td>R² = 0.6202</td>
<td>F(1, 54) = 88.18038, p = 6.04e-13</td>
</tr>
<tr>
<td></td>
<td></td>
<td>R²_adj = 0.6131</td>
<td></td>
</tr>
<tr>
<td>u_i \sim N (0, \sigma²)</td>
<td>H₀: errors are normally distributed; Hₐ: errors are not normally distributed.</td>
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<tr>
<td></td>
<td>Jarque-Bera test = 70.0082; p = 6.27933e-016; H₀ rejected.</td>
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<tr>
<td></td>
<td>Errors do not correlate: cov (X_i, u_i) = 0.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>H₀: no first order autocorrelation; Hₐ: first order correlation exists.</td>
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</tr>
<tr>
<td></td>
<td>Durbin-Watson statistic = 1.78327; p = 0.30921; H₀ not rejected.</td>
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<tr>
<td></td>
<td>Homoscedasticity</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>H₀: Heteroscedasticity does not exist; Hₐ: Heteroscedasticity exists.</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>White test: LM = 0.863751; p (\chi² &gt; 0.863751) = 0.64929; H₀ not rejected.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Authors
Table 7: Regression model of “Arts, entertainment and recreation; Other service activities; Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use; Activities of extraterritorial organisations and bodies” cluster

<table>
<thead>
<tr>
<th>NACE Rev.2 / region</th>
<th>Regression function</th>
<th>$R^2$</th>
<th>F, p</th>
</tr>
</thead>
<tbody>
<tr>
<td>“ARTS&amp;” - FI19, FI1C, EE, LV, LT</td>
<td>$Y_{gva} = 6.03 + 0.65 X_{empl} + \epsilon_i$</td>
<td>$R^2 = 0.5252$</td>
<td>$R^2_{Adj} = 0.5182$</td>
</tr>
<tr>
<td></td>
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</tr>
<tr>
<td></td>
<td>H0: $\beta_1 = 0$; HA: $\beta_1 \neq 0$</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>F(1, 68) = 75.2325</td>
<td>p = 1.31e-12</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$u_i \sim N (0, \sigma^2)$</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>H0: errors are normally distributed; HA: errors are not normally distributed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Jarque-Bera test = 18.813; p = 8.219e-005; <strong>H0 rejected</strong>.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Errors do not correlate: cov $(X_i, u_i) = 0$.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>H0: no first order autocorrelation; H1: first order correlation exists.</td>
<td></td>
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<tr>
<td></td>
<td>Durbin-Watson statistic = 1.64205; p = 0.131577; <strong>H0 rejected</strong>.</td>
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<tr>
<td></td>
<td>Homoscedasticity</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>H0: Heteroscedasticity does not exist; H1: Heteroscedasticity exists.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Jarque-Bera test = 39.4895; p = 2.66048e-009; <strong>H0 rejected</strong>.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Errors do not correlate: cov $(X_i, u_i) = 0$.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>H0: no first order autocorrelation; H1: first order correlation exists.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Durbin-Watson statistic = 0.990543; p = 0.00045779; <strong>H0 rejected</strong>.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Homoscedasticity</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>H0: Heteroscedasticity does not exist; H1: Heteroscedasticity exists.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>White test: LM = 0.711541; p (\chi^2 &gt; 0.711541) = 0.700633; <strong>H0 not rejected</strong>.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>“ARTS&amp;” - EE, LV, LT</td>
<td>$Y_{gva} = 7.37 + 0.732X_{empl} + \epsilon_i$</td>
<td>$R^2 = 0.4699$</td>
<td>$R^2_{Adj} = 0.4566$</td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
<td>H0: $\beta_1 = 0$; HA: $\beta_1 \neq 0$</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>F(1, 40) = 35.46396</td>
<td>p = 5.46e-07</td>
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<tr>
<td></td>
<td>$u_i \sim N (0, \sigma^2)$</td>
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</tr>
<tr>
<td></td>
<td>H0: errors are normally distributed; HA: errors are not normally distributed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Jarque-Bera test = 39.4895; p = 2.66048e-009; <strong>H0 rejected</strong>.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Errors do not correlate: cov $(X_i, u_i) = 0$.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>H0: no first order autocorrelation; H1: first order correlation exists.</td>
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<tr>
<td></td>
<td>Durbin-Watson statistic = 0.990543; p = 0.00045779; <strong>H0 rejected</strong>.</td>
<td></td>
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<tr>
<td></td>
<td>Homoscedasticity</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>H0: Heteroscedasticity does not exist; H1: Heteroscedasticity exists.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>White test: LM = 6.30044; p (\chi^2 &gt; 10.0584) = 0.0428427; <strong>H0 rejected</strong>.</td>
<td></td>
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</tr>
</tbody>
</table>

Source: Authors
Annex 2

Figure 1: “Construction” cluster scatter diagram for EE, LV, LT region

Source: Authors

Figure 2: “Industry” cluster scatter diagram for FI19, FI1C, EE, LV, LT, PL62 region

Source: Authors

Figure 3: “Industry” cluster scatter diagram for EE, LV, LT region

Source: Authors
THE EVALUATION OF IMPACT OF MUNICIPALITIES’ FISCAL COMPETITIVENESS ON ECONOMIC GROWTH

Dovilė Rupliene, 1 Lina Garšvienė, 2 Dalia Rudytė, 3 Solveiga Skunčikienė, 4 Roberta Bajorūnienė 5

Abstract: The competition between municipalities is problematic due to a common misconception that rivalry is impossible because documents regulating finances are the same across all local self-governments. In contrast, scientific research shows that the livability of one municipality can differ to another because of differences in their social-economic benefits. This distinction is not conditioned by geographic location or other special features of the municipality but rather by the amount of funds assigned and allocated to social and public welfare. This article aims to reveal the factors pertaining to the municipalities’ fiscal competitiveness that affect economic growth within the state. This has relevance as a reallocation of a municipality’s expenditure could provide new possibilities towards increasing future revenue of the municipality. For reaching the aim is examined by evaluating the effect of municipalities’ fiscal competitiveness on Lithuania’s economic growth using the volume and structure of expenditure in its municipalities. Results show that the major channels determining the fiscal competitiveness of a region are human resources, the business sector, and the institutional environment, and that these differ among municipalities.

JEL Classification Numbers: H75, H76, R50; DOI: http://dx.doi.org/10.12955/chup.v5.958

Keywords: municipality, fiscal competitiveness, budget revenue, budget expenditure.

Introduction
The competition between municipalities is problematic due to a common attitude that such competition does not exist because municipalities have the same regulatory documents to manage finances at the local self-government level. Currently, scientists are interested in the issues of financial management of the local self-government, while the amount of research into evaluating the municipality’s competitiveness is rather modest. The problem, which has initiated this research, is the need to ascertain the factors that affect the economic growth of Lithuania through fiscal municipalities’ competitiveness. In this article, fiscal competitiveness of a region is defined as the ability of the region to allocate budget expenditure in such a way that develops the potential to collect more taxes for the municipality budget. The article aims to reveal the opportunities for a municipality to increase its budget revenue through greater focus on expenditure disbursement in local self-government. The objective of this research is to examine the effect of budget expenditure of the region (municipality) as elements of fiscal competitiveness on economic growth.

Literature Review
Fiscal Competitiveness and its Relation with Regional Competitiveness
The scientific literature contains extensive discussion about the definition of ‘competitiveness’ with this concept interpreted and analyzed at employee, company, city, region, state, and sector levels. In addition, the notion of competitiveness in scientific literature has often been associated with international trade, high exchange rate, and labor productivity (Gardiner et al., 2004; Kitson, et al., 2004; Meiliene & Snieška, 2010).

Competitiveness of regions is discussed in the scientific literature. However, there is no uniform opinion about the concept of ‘regional competitiveness’. To date, the works evaluating regional competitiveness have overlooked fiscal competitiveness apart from including it in calculations of competitiveness indices. Indicators of tax collection and expenditure of the public sector have been included as the constituent parts (Avila, 2014). This means that in scientific research the analysis of revenue and expenditure of the public sector contribute to evaluations of regional competitiveness. In scientific literature (Matuzevičiūtė et al., 2015; Rudytė & Skunčikienė, 2015), the factors that

1 Department of Economics, Šiauliai University, Lithuania, drupliene@yahoo.com
2 Department of Economics, Šiauliai University, Lithuania, lina.garsviene@gmail.com
3 Department of Economics, Šiauliai University, Lithuania, daliarudyte@gmail.com
4 Department of Economics, Šiauliai University, Lithuania, skusolveiga@gmail.com
5 Šiauliai University, Lithuania, bajoruniene.roberta@gmail.com
predetermine competitiveness are given as follows: institutional environment, macroeconomic situation, labor market, infrastructure, financial market, education, commodity (services) market, business, social environment, scientific infrastructure, and technology advances. Hence, numerous factors predetermine competitiveness, and moreover, they are closely related.

Despite no direct analysis of fiscal competitiveness and its impact on economic growth, several studies evaluate such when assessing the economic effects of fiscal decentralization (Kim, 2013; Baskaran & Feld, 2013; Amagoh & Amin, 2012). In addition, the scientific works examining the economic effects of fiscal policy measures evaluate fiscal competitiveness indirectly (Cottarelli & Jaramillo, 2012; Boskin, 2012). When taking into account the collection of the municipality’s budget revenue, fiscal competitiveness of a municipality becomes its exceptional appeal and ability to compete with other municipalities and ensure favorable conditions for business, create workplaces, and, at the same time, successfully collect budget revenue. According to the authors of this article, such a definition of fiscal competitiveness raises debate with budget expenditure depending on budget revenue.

The Channels of Impact of Regional Fiscal Competitiveness on Economic Growth

The scientific research that has evaluated factors determining the economic growth of regions has concentrated predominantly on the following aspects: the effect of human resources, the business sector, and institutional environment.

Fiscal competitiveness of a region depends on the amount of freedom the region has in determining their tax rate, applying for tax relief, or establishing procedures for allocating social benefits. There are many articles reporting the effect of fiscal decentralization on economic growth (Baskaran & Feld, 2013; Kim, 2013; Boskin, 2012; Amagoh & Amin, 2012; Thornton, 2007), although the research results have been disputed on occasions (Hammond & Tosun, 2009).

Human resources are connected with the fiscal competitiveness of the region regarding both budget revenue and expenditure aspects. The greater the amount of human resources in the region, the greater the number of products produced by business and, therefore the higher amount of revenue for the budget. In scientific research, the effect of human resources on regional competitiveness and economic growth has been assessed using various indicators for human resources. Some research (Faggian et al., 2016; Gennaioi et al., 2011; Unger et al., 2011) is of a general nature where the factor of human resources has been assessed together with others determining competitiveness and economic growth. Several other studies have assessed the impact of human resources and institutional environment regarding the possibilities of state institutions having an effect on economic growth (Acemoglu, Gallego & Robinson, 2014; Dias & Tebaldi, 2012).

Education and the quality of the education system often serve as indicators in evaluating the impact of human resources on regional competitiveness and economic growth (Hanushek, 2013; Castello-Climent & Hidalgo-Cabrillana, 2012). Others researchers assessing the impact of human resources on economic growth (e.g., O'Connor 2013; Audretsch & Pena-Legazkue 2012) evaluate human resources by considering entrepreneurship under the assumption that initiative market participants are creative and contribute to the establishment of new companies.

The effect of the business sector on regional competitiveness is extensive and includes various factors: the structure of economics, foreign and local investments, entrepreneurship, and the number and size of companies, etc. These factors also affect the fiscal competitiveness of the region because they predetermine budget revenue and expenditure. In scientific literature, most attention is paid to evaluating the effect of foreign direct investments (FDI) on regional competitiveness and economic growth.

Methodology

The scientific methods employed in this research included analysis of scientific literature and legislation and a multiple regression analysis.

Considering fiscal competitiveness lacked a clear definition, for the purposes of this study in assessing regional competitiveness, fiscal competitiveness of the region was defined as the ability of that region to allocate budget expenditure in such a way that the people, economic entities, and all spheres of activity contribute more taxes to the budget of the municipality.
An assumption of the study was that the ability of the municipality to collect additional revenue for the budget was directly connected with its economic growth. The study period was 2005 to 2014. This timeframe was chosen to provide enough observations for a statistically sound conclusion. Also, it partly eliminated the influence of cyclic economic recurrence that included periods of Lithuania entering the European Union resulting in rapid economic growth, the economic recession since 2008, and the current economic growth phase. In addition, this duration matched that typically used in research evaluating municipalities (regions), i.e., 10–20 years (Gennaioli, et al., 2011; Gardiner et al., 2004). The data from 60 municipalities of Lithuania were used.

The municipalities of one country are often chosen in similar types of research as in choosing several countries, or their groups, introduces the possibility of confounding differences relating to the regulation of municipalities (Jenčova et al., 2013). A limitation of the study was that the territory of Lithuania is small with municipalities close enough that business conditions of one municipality could affect the business sector of another. An overall assumption of the study was that the municipalities were comparable for purposes of the study. All municipalities were evaluated using the same methods. Data from 60 municipalities provided several variables for comparison and enabled a complex evaluation of the impact of factors determining economic growth.

This study used a two-stage model to achieve the research aim and determine how expenditure of municipalities influenced their economic growth. The variables in the model were calculated using the data of the Lithuanian Department of Statistics and Ministry of the Economy of the Republic of Lithuania (Lithuanian statistical system, 2017).

A primary econometric model was used to determine the general control factors, specific factors of budget expenditure influencing economic growth, and trends associated with the economic growth. Other factors expressed by the control variables in the model were also assessed. Three main factors were distinguished from the model: human resources, the business sector, and the institutional environment were each assigned two indicators.

The two indicators for ‘human resources’ were ‘labor force content’ (i.e., labor force per 1000 people) and ‘cost’ (i.e., average municipality wage) in the municipality. The study used the metric of labor force per 1000 in contrast to the level of labor force because the former reflected the number of people in general, rather than the working-age population. It was deemed more appropriate for revealing the municipality’s potential productivity given the situation where a municipality’s economic activity is high, but there may be many economically inactive groups (children and retired people). Children may be considered as the future labor force, but in the meantime, require municipality expenditure in maintenance of educational institutions. Retired citizens are not participants of the paid workforce and thus, do not contribute to such productivity. Therefore, it was assumed that the labor force content per 1000 people best reflected the municipality’s productivity.

The two indicators for ‘the business sector’ were the ‘number of companies’ and the ‘annual FDI per 1000 people’. The FDI indicator was used because it related to raising capital from external sources and providing greater opportunities for productivity and economic growth. In separate specifications of the model, the total number of companies, the number of small- and medium-sized enterprises, and the number of medium- and large-sized companies were evaluated. These latter additions were chosen because small- and medium-sized businesses are often perceived as the main business entities that promote economic activities and growth (Opafunso & Adepoju, 2014; Smeaton et al., 2011; Grigienaitė & Ivanovié, 2010; Nwoye, 2010).

The two indicators for ‘the institutional environment’ in the model were ‘state subsidies per 1000 people’ and a ‘dummy variable’ denoting the existence or not of special status zones in the municipality, i.e., Industry Parks (IP) or Free Economic Zones (FEZ).

Each statistical indicator in the econometric model was treated as a separate variable, and the conclusions were drawn taking into account the statistical significance of the variables and the value of their coefficients (positive and negative).

Panel data was used in the research to deal with the different periods of time and different entities. In this way, it was possible to evaluate the impact of analyzed factors on municipalities’ economic growth for the full period under analysis and in all municipalities of Lithuania. Therefore, the results
of the regression analysis showed the overall results of all Lithuanian municipalities. A regression analysis was carried out using the method of least squares, and coefficients were calculated using robust heteroscedasticity-consistent standard errors. In the model, the differentiation of data was used to evaluate annual change in all variables, and logarithms were used to transform all analyzed dependencies into linear models.

The data analysis was done using GRETL econometric package. Multiple regression models were formed with gross domestic product (GDP) growth rate as a dependent variable. The expenditure indicator, calculated per 1000 people, removed the confounding effect of municipality size. The econometric model involved the following equation:

\[
\Delta \ln(gdp_{it}) = \alpha + t_d \cdot 2007 + \ldots + t_d \cdot 2014 + \beta_1 \Delta \ln(exp_{it}) + \beta_2 \Delta \ln(\text{exp}_{it}) \cdot \text{dens} + \beta_3 \Delta \ln(\text{lab force}_{it}) + \\
+ \beta_4 \Delta \ln(\text{wage}_{it}) + \beta_5 \Delta \ln(\text{ent}_{it}) + \beta_6 \Delta \ln(fdi_{it}) + \beta_7 \Delta \ln(\text{sub}_{it}) + \beta_8 (\text{ip feas}) + \beta_9 (\text{gdp}_{it-1}) + \epsilon_{it}
\]  

(1)

Where:

- \(gdp_{it}\) = GDP per 1000 people in a municipality \(i\) in period \(t\);
- \(\alpha\) = a constant;
- \(t_d\) = time dummies;
- \(\beta\) = coefficients that reveal the impact of an independent factor on a dependent variable;
- \(\text{exp}_{it}\) = a municipality’s expenditure per 1000 people in a municipality \(i\) in period \(t\);
- \(\text{lab force}_{it}\) = labour force content per 1000 people in a municipality \(i\) in period \(t\);
- \(\text{wage}_{it}\) = average monthly wage per 1000 people in a municipality \(i\) in period \(t\);
- \(\text{ent}_{it}\) = the number of companies per 1000 people in a municipality \(i\) in period \(t\);
- \(\text{fdi}_{it}\) = annual FDI flow per 1000 people in a municipality \(i\) in period \(t\);
- \(\text{sub}_{it}\) = state subsidies per 1000 people in a municipality \(i\) in period \(t\);
- \(\text{ip feas}_{it}\) = the existence or not of an industry park or special economic zone in a municipality \(i\) in period \(t\);
- \(\text{gdp}_{it-1}\) = gross domestic product per 1000 people in a municipality \(i\) in period \(t-1\); and
- \(\epsilon_{it}\) = error of the model.

In different modifications of the model (Modification 1, Modification 2, Modification 3), \(\text{ent}_{it}\) revealed the total number of companies (ent_total) or the number of small- and medium-sized companies (ent_sm), or the number of medium- and large-sized companies (ent_mb).

Municipalities were distinguished by clusters according to population density (dens), and the interrelation between municipalities’ expenditure and population density was included in the model (exp*dens). Municipalities whose population density exceeded 77.3 persons per km² were ascribed to Cluster I, whereas municipalities with a lower population density were ascribed to Cluster II.

**Results and Discussion**

The results of the regression analyses evaluating the effect of the total expenditure of municipalities on economic growth are shown in Table 1. The main variable of the model for assessing the impact on municipalities’ economic growth was municipalities’ expenditure. This factor had a statistically significant effect on municipalities’ economic growth (99% of probability), as well as on municipalities’ expenditure per 1000 people. When increased by 1%, the gross product of municipalities increased to about 0.80% on average. The interrelation between municipalities’ expenditure and the population density influenced economic growth was statistically relevant. The inclusion of this interrelation variable into the model aimed to prove whether the impact of municipalities’ expenditure per 1000 people would be greater in municipalities with higher population density. The research findings failed to substantiate the assumption of a higher population density higher and higher expenditure per 1000 people corresponding to a higher level of absolute expenditure, and, thus, a larger concentration of expenditure for the territory experiencing such.
The model included two indicators for each of these three factors: human resources, the business sector, and institutional environment. Four of these indicators displayed a statistically meaningful result (Table 1). The human resources indicator of ‘average monthly wage per 1000 people’, the business sector indicators of ‘number of companies’ and ‘annual FDI per 1000 people’, and the institutional environment factor of ‘state subsidies per 1000 people’ showed a significant relationship with the municipalities’ economic growth. All were positively related to economic growth, except budget subsidies, which had a negative result (Table 1). In respect to the condition of the business sector, the added variable of the number of small- and medium-sized companies also showed a significant and positive relationship with the municipality’s economic growth.

The impact of the average monthly wage indicator for human resources can be explained by the growing wage increases that not only reflect the cost of labor (which is often thought to slow economic growth) but also the surge in purchasing power that occurs with increase in wages. The services sector is highly receptive to the increased earnings of the community. In addition, this factor is critical in presenting the municipality as an economically successful territory. In this respect, the territory can attract FDI, decrease emigration, and promote the establishment of small- and medium-sized companies within its territory.

Table 1: Results of multiple regressions on data of 60 Lithuanian municipalities and factors of human resources, the business sector, and the institutional environment

<table>
<thead>
<tr>
<th>Model Variables</th>
<th>Coefficients calculated using robust heteroscedasticity-consistent errors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Modification 1</td>
</tr>
<tr>
<td>Const</td>
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<td>ld_exp</td>
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</tr>
<tr>
<td>ld_exp*dens</td>
<td>0.0256</td>
</tr>
<tr>
<td>ld_lab_force</td>
<td>0.4860</td>
</tr>
<tr>
<td>ld_wage</td>
<td>0.6746***</td>
</tr>
<tr>
<td>ld_ent_total</td>
<td>0.2949*</td>
</tr>
<tr>
<td>ld_ent_sm</td>
<td></td>
</tr>
<tr>
<td>ld_ent_mb</td>
<td></td>
</tr>
<tr>
<td>ld_fdi</td>
<td>0.0598***</td>
</tr>
<tr>
<td>ld_sub</td>
<td>-0.5473***</td>
</tr>
<tr>
<td>IP_FEZ</td>
<td>0.0433</td>
</tr>
<tr>
<td>ld_GDP_1</td>
<td>-0.4106***</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.2639</td>
</tr>
</tbody>
</table>

*** 99.0 %; ** 95.0 %; * 90.0 % significance levels (n = 466)

dexp = a municipality’s expenditure per 1000 people in a municipality
d_exp*dens = interrelation between municipalities’ expenditure and population density included in the model
d_lab_force = labour force content per 1000 people in a municipality (indicator of human resources)
d_wage = average monthly wage per 1000 people in a municipality (indicator of human resources)
d_ent = the number of companies per 1000 people in a municipality (indicator of business sector)
d_ent_sm = the number of small- and medium-sized companies (added variable of business sector)
d_ent_mb = the number of medium- and large-large companies (added variable of business sector)
d_fdi = annual foreign direct investments per 1000 people in a municipality (indicator of business sector)
d_sub = state subsidies per 1000 people in a municipality (indicator of institutional environment)
ip_FEZ = existence or not of an industry park or special economic zone in a municipality (indicator of institutional environment)
d_GDP_1 = Gross domestic product per 1000 people in a municipality in period t-1

Source: Authors

Despite there being much variation considered about the effect of small- and medium-sized companies on economic growth, the results of this research show that such enterprises had a significant effect on the economic growth in Lithuania’s municipalities during the period under analysis. Meanwhile, the evaluation of the effect of the number of medium- and large-sized companies on economic growth was based on the assumption these businesses operate more efficiently, achieve economies of scale, and be
more competitive in local and international markets than the smaller ones. However, their impact on economic growth of Lithuania’s municipalities was not evident.

While analyzing the influence of the FDI in this study, it was noticed that, on the one hand, FDI had a direct impact, whereas, on the other hand, it has a contrary relation with economic growth of the state. Kuliaviienė & Solnyškinienė (2014), Moraru (2013), Sandalciar & Altiner (2012), Rupliene & Garšvienė (2008) observed that the impact of FDI on advances in technology in the state depended greatly on the state’s economic regulation (particularly concerning the regulation of labor and financial markets). A divergent relationship between FDI and economic growth was analyzed by Antwi, Atta Mills, Atta Mills & Zhao (2013). The authors highlighted that a negative impact of FDI surfaces in cases where local producers lose their position in the market, where companies in a particular sector increase, and where the capital earned from investments outflows from the state in which the investments have been made. As well, the impact of FDI on economic growth depends on the state’s institutions.

Study results for the business sector indicator of ‘annual FDI flow per 1000 people’ were encouraging, although the actual impact would be rather small. When FDIs increase by 1%, the municipality’s productivity grows by an average 0.06%. On the one hand, the impact of FDI may be less apparent. However, on the other hand, there has been no research to support such notion.

The factor of the institutional environment was described by two indicators in the model: ‘state subsidies per 1000 people’ and a ‘dummy variable’ denoting the existence or not of special status territories (IP and FEZ). This study found the state subsidies flowing into the municipalities’ budget as supplementary revenues inversely related to the economic growth of a municipality. When a municipality receives relatively large sums in the form of subsidies, it possibly fails to seek other ways of creating productivity to collect tax revenue since the subsidies fill the shortage of funds. A statistically meaningful effect on the municipality’s economic growth regarding whether IP or FEZ exist was not evident in this study.

Overall, the results of the model examining the effects of municipalities’ total expenditure and control on economic growth, show that the municipalities’ expenditure, the amount of an average wage, and the number of companies are indicators relating to economic growth, whereas the state subsidies, in contrast, appear to limit such growth.

**Conclusion**

Findings in scientific literature concur that the factors determining competitiveness are interrelated. Thus, an effect on one factor signals potential change in others. Fiscal competitiveness of a region may be defined as the ability of that region to allocate budget expenditure in such a way that people, economic entities, and all spheres of activity contribute more taxes to the budget of the municipality. The major channels determining the effect of regional fiscal competitiveness on economic growth in allocating expenditure for municipality programs are human resources, the business sector, and the institutional environment. In conducting this study and taking into account the amount and structure of expenditure in Lithuania’s municipalities, summations were made with reference to the statistical significance of variables and the value of coefficients. The impact of the municipality’s expenditure had no connection with the population density. The average wage in a municipality, the number of companies (size of no consequence), and the annual FDI were found to be indicators positively relating to economic growth. In contrast, an indicator negatively relating to economic growth was state subsidies to the municipality budgets. Thus, the research results show that the institutional environment can affect economic growth, though negatively in this case. As well, based on results with the average wage indicator, the greater the amount of human resources in the municipality the greater the productivity of business, and thus, more revenue for the budget. The amount and structure of human resources, when considering its value in education, entrepreneurship, and creativity of the community, provides for economic growth and collection of revenue for the municipality’s budget over a longer period. The business sector affects the fiscal competitiveness of a municipality quite broadly as it includes a great number of imperative channels, such as the structure of economics, foreign and local investments, entrepreneurship, and the number and size of companies. All affect the fiscal competitiveness of a municipality because they affect budget revenue and expenditure.
Acknowledgement
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References


TO THE QUESTION OF THE CLUSTER APPROACH IN TOURISM OF KAZAKHSTAN

Rysty Karuevna Sadykova,1 Assem Madysheva2

Abstract: In recent years, the cluster approach has become the main instrument of an effective state strategy for the development and management of tourism in countries with a high level of competitiveness. It is based on the interaction and cooperation of organizations operating in the tourism industry and government structures, without which innovation activity cannot be managed, new approaches emerge that involve an indirect impact on the development of the region within the national innovation system by creating conditions for increasing innovation activity and susceptibility of economic entities. The development of many regions is constrained by the lack of necessary conditions: inadequate material and financial resources, underdeveloped research base, inconsistent regional policies.

JEL Classification Number: Z32; DOI: http://dx.doi.org/10.12955/cbup.v5.959

Keywords: Competitiveness, tourism, tourist product, clustering of tourist activity, infrastructure.

Introduction

Tourism in modern society is one of the most important aggregated branches of the state economy, involving in its orbit a whole set of directions - both at the level of direct contact with the traveller (transport, tourist firms, accommodation and food systems, cultural and entertainment, sports and health, sanatorium- Resort complexes, etc.), and indirectly involved in the formation of a comprehensive tourist service (agriculture, processing industry, fuel and energy complexes, the automotive industry and the production of other means of transportation, communications, the construction complex, souvenir industry, and others).

In the tourist industry, there are various tourist organizations. Balabanov et al. (2001) stated that some of them provide clients with exclusively tourist services, while for others, tourism is one of several areas of their commercial activities. Organizations that exist only at the expense of tourism are called tourist organizations of primary services, and organizations that receive incomes not only from tourism activities are tourism organizations in the sphere of secondary services.

In this paper, the following methods were used:
- monographic (when collecting data from primary documents available in the presence of tourist infrastructure);
- grouping method (when grouping enterprises by homogeneous characteristics);
- settlement-constructive (when calculating indicators for medium- and long-term prospects);
- economic and mathematical methods (in the formation of models and variants of tourist clusters).

Role of tourism in the socio-economic system of the region

As Bogolyubov et al. (2005) stated, traditionally, the development and sale of tourism products are engaged in two types of tourist organizations that are part of the tourist industry: tour operators and travel agents.

Tour operator (in the international practice, sometimes the term "tour operator" is used) is an organization engaged in bundling of tours under contracts with service providers and in accordance with the needs of tourists. The tour operator develops tourist routes, provides them with services, organizes advertising, calculates and sets prices for tours on these routes, sells tours to a travel agent for the issue and sale of vouchers. The tour operator is responsible for providing the services included in the tour package. Sometimes he provides these services himself, receiving them from a counterparty or being the owner of hotels, restaurants, etc.

Most often, tours are compiled by a tour operator for a wholesale agency that offers these packages under its own name through its retail agents or through airlines.

According to Azrilian (1997) a travel agent is an organization that purchases tours developed by a tour operator, issuing permits for these tours and selling them to the consumer.

1 Kazakh National University of Economics, Finance and International Trade, Astana, Kazakhstan, rystysadykova@mail.ru
2 Kazakh National University of Economics, Finance and International Trade, Astana, Kazakhstan, asem_madysheva@mail.ru
According to Gulyaev (1996) travel agents perform two main functions:

1. provision of information services (report on tourist areas, accommodation options, help to make an estimate of the cost of travel);
2. marketing of tourist services.

In this regard, we can conclude that the organization of the tourism industry is divided into three groups:

- tourist organizations in the sphere of primary services;
- tourist organizations in the sphere of secondary services;
- tourist organizations (travel companies, travel agents, travel agencies), which act as a link between the tourist-consumers of services and the tourism industry itself, which offers services. This group includes organizations of transport and communications that carry tourists to a place where they will be given hospitality, moreover, transportation costs and services of tour operators are included in the cost of the voucher.

In the statistics of the country there is no criterion for identifying the sphere of activity occupied by the hospitality industry. It is very difficult to single out the tourism industry as a separate industry and to consider it outside of the connection with other objects of the tourism industry. Certainly, sanatoriums and boarding houses belong to the sanatorium and resort sector, restaurants and cafes to public catering, but if they are concentrated within one tourist-recreational, sports-recreational or cultural-entertainment complex, this is the tourism industry.

The services of the tourism industry are of a complex nature and thus, cause demand for a number of other goods and services. Therefore, for a more correct understanding of the structure of the hospitality industry, taking into account the existing motivations for consumers of tourism services, as well as analysis of current trends in world and Kazakhstan tourist flows, the services of the hospitality industry should be classified as shown in Figure 1.

**Figure 1: Classification of tourist services in the tourism industry**

<table>
<thead>
<tr>
<th>Classification of tourism industry services</th>
</tr>
</thead>
<tbody>
<tr>
<td>On the basis of services:</td>
</tr>
<tr>
<td>- common;</td>
</tr>
<tr>
<td>- specific;</td>
</tr>
<tr>
<td>By consumers:</td>
</tr>
<tr>
<td>- depending on age,</td>
</tr>
<tr>
<td>- type of family,</td>
</tr>
<tr>
<td>- sources of financing, etc.</td>
</tr>
<tr>
<td>On the objects:</td>
</tr>
<tr>
<td>- accommodation facilities;</td>
</tr>
<tr>
<td>- power objects;</td>
</tr>
<tr>
<td>- entertainment facilities;</td>
</tr>
<tr>
<td>- organization of sales of turmoil and souvenirs</td>
</tr>
<tr>
<td>By degree of loading:</td>
</tr>
<tr>
<td>- seasonal services;</td>
</tr>
<tr>
<td>- not a season;</td>
</tr>
<tr>
<td>- the period of exhibitions, festivals, forums.</td>
</tr>
<tr>
<td>By the qualification of personnel:</td>
</tr>
<tr>
<td>- highly qualified,</td>
</tr>
<tr>
<td>- Low-skilled</td>
</tr>
<tr>
<td>On the price segment:</td>
</tr>
<tr>
<td>- High-yielding;</td>
</tr>
<tr>
<td>- middle income;</td>
</tr>
<tr>
<td>- low-yielding.</td>
</tr>
</tbody>
</table>

Source: Authors
At present, it is difficult to single out the tourism industry as a separate industry. If about twenty years ago there were clear spheres: hotel industry, sanatorium and health resort, catering, leisure, now there is a mass of tourist-recreational, sports and recreational, cultural and entertainment complexes that unite these spheres into a single whole. Particularly there are difficulties with the placement sector. Institutionally, tourism is a branch of the national economy (Figure 2).

**Figure 2: Structure of tourism as a national economy**

<table>
<thead>
<tr>
<th>Tourism as a branch of the national economy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tourism industry</td>
</tr>
<tr>
<td>Tour operators and travel agents</td>
</tr>
<tr>
<td>Infrastructure</td>
</tr>
<tr>
<td>State tourist structures</td>
</tr>
<tr>
<td>Scientific services and personnel</td>
</tr>
</tbody>
</table>

Source: Authors

**Scientific approaches to the definition of cluster and cluster development of tourism**

According to Pyatinkin et al. (2014) clusters are a community of organizations from closely related industries, mutually contributing to the growth of each other's competitiveness, playing the role of "locomotives" for the development of industries.

Raisberg et al (2005) found that beginning from the 1990s, clusters around the world began to play a major role in the formation of innovative development strategies related to the orientation to local competitive advantages of socio-economic, scientific and production systems, which led to a revision of the foundations of economic and technological policies, and dominated earlier models of centralized development.

As Medynskiy (2007) stated for the first time the concept of "cluster" was introduced into scientific circulation by the American economist M. Porter, who defined the cluster as a group of geographically neighboring interconnected companies and related organizations operating in a certain sphere, characterized by common activities and mutually complementary.

Soziева (2009) found that the experience of many countries shows that clusters really contribute to the high efficiency of the economy and, thus, improve the welfare of the nation. In the world practice, a great deal of experience has been accumulated in the development of clusters, studies are conducted on a whole range of directions (Table 1). A special role for foreign scientists is given to the development and stimulation of cluster initiatives, as well as the formation of a policy to support clusters.

By definition of Ivanenko (2008) a cluster is a group of geographically integrated interconnected enterprises, equipment suppliers and their components, specialized services, infrastructure, research institutes and universities and related organizations operating in a particular industry, combined and complementary to each other Friend, enhancing the competitive advantages of individual companies and the cluster as a whole.

The cluster approach used in the studies of competitiveness, over time, has been used to solve an increasingly wide range of problems: in analysing the competitiveness of the state, region, and industry; as the basis of a nation-wide industrial policy; when developing regional development programs; as a basis for interaction between big and small businesses.

Kazakhstan's economic science in this area is based on the borrowing of foreign experience. Thus, the domestic economists Baymuratov (2005) stated, on the basis of studying the European experience, that

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3Locomotive – driving force
the cluster is defined as a network of suppliers, producers, consumers, elements of industrial infrastructure, research institutes interconnected in the process of creating added value.

Table 1: Directions and results of foreign studies of cluster development

<table>
<thead>
<tr>
<th>Directions</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The role of entrepreneurship in the formation and increase of activity of clusters</td>
<td>Expansion of entrepreneurial activity contributes to the accelerated formation of clusters, which, in turn, ensure the effectiveness of the entrepreneurial subsystem</td>
</tr>
<tr>
<td>2. Influence of clusters and tourist configurations on the growth of entrepreneurship at the regional level</td>
<td>In the regional aspect, tourist configurations form a certain type of clusters, contributing to the growth of entrepreneurial activity</td>
</tr>
<tr>
<td>3. Local dynamics and global links - the role of inter-organizational ties within the cluster and global value chains in stimulating innovation and entrepreneurship</td>
<td>The study of local dynamics and global economic ties proves the effectiveness of clustering IDs in improving the innovativeness of regions</td>
</tr>
<tr>
<td>4. Importance of territorial proximity between business activities and sources of knowledge</td>
<td>Territorial proximity continues to remain a priority in the formation of clusters</td>
</tr>
<tr>
<td>5. Relations between knowledge bases at the level of organizations, cluster capabilities and the potential for economic growth of clusters</td>
<td>Clustering provides a level-by-level link between subjects of microeconomics (firm), macroeconomics (state), mega-economics (international institutions)</td>
</tr>
<tr>
<td>6. The influence of the place of entrepreneurial activity in providing regions with qualified personnel due to the development of educational infrastructure in the regions</td>
<td>The positive role of entrepreneurship as a source of financing of the educational sphere is conditioned</td>
</tr>
<tr>
<td>7. Alternative models for the formation and development of cluster organization of entrepreneurship in different regions</td>
<td>Accounting for regional natural, climatic, technological and production specifics determine the differentiation in the typology of clusters</td>
</tr>
<tr>
<td>8. Development of competitiveness of cross-border clusters</td>
<td>The most promising form of the cluster organization is the transboundary cluster, which extends the production, educational, scientific, innovative potential of the territories</td>
</tr>
</tbody>
</table>

Source: Authors

Another group of domestic economists Suraganova (2006), Ketels (2005), Nazarov (2005) cites the following definitions of the concept of cluster:

1. Regionally limited forms of economic activity within related sectors (technological affinity, for example, a biotechnological cluster), usually tied to one or another institution in the knowledge industry (research institutes, universities, etc.).

2. Vertical production chains: rather narrowly defined sectors, in which adjacent stages of the production process form the core of the cluster (for example, the chain "supplier - collector - marketer - client").

Namazbekoy (2005) defines a cluster as high-tech industries defined at a high level of aggregation (for example, a "chemical cluster") or a set of sectors at an even higher level of aggregation (for example, an "agro-industrial cluster").

Within the framework of this research, the theoretical aspects of the cluster approach in the tourism industry were summarized, systematized and refined, namely: the definition of the concept of a "tourist cluster" was defined, the object, subjects, the purpose of the functioning of tourist clusters were determined, and the subjects of interaction of the target groups of tourist clusters were identified.

The results of an empirical assessment of the relevance of the cluster approach to tourism regulation

The purpose of this research is to study the prospects of creating a tourism cluster and the necessary forms of state support in the North-Kazakhstan region. The subjects of the analysis are:

- trends in the development of small businesses in the tourism (in terms of the main segments: health, cognitive, congress (business), sports, entertainment, religious tourism, etc.);
the needs of small business entities that carry out activities in the field of tourism, in state support (in accordance with the main forms of state support);

- problems that hamper the formation of the cluster and the development of small business in the tourism industry and recommendations on the mechanisms for their solution;

- prospects for the development of small business in the sphere of tourism;

- factors contributing to the formation of a cluster in the region.

Within the framework of the research of development trends, the following issues were studied: the financial situation of small business entities working in the sphere of tourism, the main segments of entry and domestic tourism in which they operate, the most attractive regions for tourism development and the places of the region, the development of certain types of tourism, and others.

When conducting an analysis of the needs of entrepreneurs in government support, measures of support for small business entities were considered. Currently, the state program "Road map of business 2020" is operating in the region.

The entrepreneur has the opportunity to receive on a free basis:

1. Support for start-ups (start-up projects), which includes:
   a. short-term training of entrepreneurs and the public on the basics of entrepreneurial activity (the "Business Advisor" project);
   b. provision of a standard package of documents necessary for the entrepreneur;
   c. information and analytical support and organization of free access of entrepreneurs to a single enterprise base;
   d. providing marketing research results in priority sectors of the economy.

2. Service support for running an existing business. This is aimed at improving the enterprise management system in order to improve its efficiency and includes the provision of the following specialized services to support business processes:
   a. maintenance of accounting and tax accounting and reporting;
   b. compilation of statistical reports;
   c. customs procedures;
   d. advising on the implementation of quality management systems;
   e. lawyer consulting;
   f. consulting on marketing issues;
   g. service in the field of information technology.

In addition, the attitude of entrepreneurs to measures for the development of tourism in the area, which does not directly relate to supporting small business, was explored.

On the basis of the study, recommendations were made for creating a favorable climate for the formation and development of a cluster in the tourism sector in the North Kazakhstan region. In accordance with the Law of the Republic of Kazakhstan No. 211-II from June 13, 2001 "On Tourist Activities in the Republic of Kazakhstan", "inbound tourism" means travel within the Republic of Kazakhstan to persons who do not reside permanently in its territory and, "domestic tourism - travel within Of the Republic of Kazakhstan of citizens of the Republic of Kazakhstan and persons permanently residing in its territory. Within the framework of this study, segments of inbound and domestic tourism were studied, which for the purposes of the study were understood as travel of tourists to the North Kazakhstan region.

Empirical research base

The empirical basis for the study was an oral survey and a survey conducted in July-October 2015 and January 2016. Both studies were conducted in a comparable manner.

General population

The total population of the study is the participants in the tourism cluster. The participants of the tourism cluster are considered by us as a homogeneous aggregate, represented by a single sign "factors affecting the development of the tourism cluster in the North Kazakhstan region."

Selective aggregate

The study used a systematic probabilistic sample. Out of 80 enterprises, a route (a uniformly stretched chain of interviewers) selected 37 enterprises for interviewing. With a homogeneous population, a
probabilistic systematic sample gave an equal opportunity for each participant in the cluster to become a respondent. The sampling error was 1.1 points with a probability of 95%.

Method of collecting information

The following methods of information collection were used:

1. Formalized interview on the questionnaire (see below) 37 enterprises of participants in the tourism cluster of the North-Kazakhstan region.
2. Included monitoring of the group of experts in the process of seminars, conferences. Information was collected on the factors that affect the development of the tourism cluster, the assessment of the business environment of the tourist cluster by the criteria of M. Porter's model

Research toolkit

A questionnaire containing closed questions was used. In the sample, during the survey of small enterprises operating in the sphere of tourism, 37 enterprises from all regions of the North-Kazakhstan oblast were involved. Practically all respondents of the survey are organized in the form of limited partnerships (33 enterprises), two respondents are individual entrepreneurs.

The youngest enterprise among those who were in the sample was registered in 2015, the oldest in 1996. At the same time, the average age was 5 years.

The maximum number of employees of enterprises from the number of respondents in 2015 was 12 people, the minimum - 3. The average number of employees in 2015 was 6 people. Over the past 4 years, the number of employees of the small business subjects surveyed has changed insignificantly, in rare cases, in the direction of its increase.

Tourist activities are carried out by the overwhelming majority of their surveyed entrepreneurs - 25 respondents, tour operators - 5 enterprises and 5 enterprises combine these two activities.

In this subsection, an analysis is made of the development trends of small business entities that carry out their activities in the field of tourism, including their financial and economic situation, specialization in certain types of tourism, the most attractive regions and places in the tourist area.

The financial and economic situation of the enterprises surveyed is currently at a stable level. Thus, 47% of respondents rated it as good, 50% as satisfactory and 2% as very good. At the same time, it is possible to talk about the insignificant annual turnover of enterprises: the turnover of 6 enterprises surveyed in 2015 fell into the group to 500 thousand tenges, 11 - to the group from 500 thousand to 1 million tenges, and 5 - to the group from 1 million tenges Up to 2.5 million tenge. At the same time over the past 2 years only one of the small business subjects interviewed has made quite large investments.

As targets for the near future, more than half (51% of respondents) plan to "slowly but develop," 30% set the task to develop at a fast pace, 5% - to keep the volumes. One respondent proposes to close the business.

Within the framework of a survey of small business entities operating in the tourism sector, problems characteristic of all small businesses were investigated, and factors that hampered the formation of the cluster and the development of domestic and incoming tourism in the region were identified.

Based on the results of the survey, it can be stated that respondents estimate the impact of problems typical for all small businesses on their activities as small.

Among the factors hampering the formation of the cluster and the development of domestic and inbound tourism (it was suggested to choose 3 options for the answer), the surveyed enterprises noted:

- Lack of sufficient tourist resources (16 respondents);
- insufficient level of development of the tourist and recreational infrastructure of the region (13 respondents);
- lack of well-developed tourist products (11 respondents);
- insufficient level of development of the service sector (6 respondents).

An important area of research is the assessment of the prospects for the development of a tourism cluster in the North Kazakhstan region by small business entities that carry out their activities in the tourism sector. Figure 3 shows the regions of the North-Kazakhstan region with the largest tourist potential.
Main findings:

First, the reduction in the impact of factors that impede the formation and development of a cluster of tourism in the region should be conducted out by carrying out complex measures by the regional authorities. It should be noted that to level out such a factor as the lack of a sufficient number of tourist resources, it seems almost impossible, since it is conditioned by the inherent features of the territory (natural, historical, sociocultural and others).

Second, the analysis of the dynamics and trends in tourism development carried out in the work showed that, given the significant tourist and recreational resources in the North Kazakhstan region, there are all prerequisites for the competitive development of tourism and recreation and the consistent formation of a tourist and recreational cluster in the region.

Third, in order to attract foreign tourists to Kazakhstan, it is necessary that tourist products of Kazakhstan be included in the catalog of foreign tour operators and these tour packages should be installed at a low price to attract the largest number of tourists.

Fourth, the cluster functions only in a certain environment, namely under favorable conditions (political, socio-cultural, economic, natural), which are a combination of external factors that ensure the competitiveness of tourist services.

Fifth, to ensure the formation of favorable conditions for the development of clusters, it is necessary:

1. Enhancing the system of professional and continuing education.
2. Creation of industrial parks and industrial parks as an infrastructure for the development of clusters.
3. Implementation of targeted investments in the development of engineering and transport infrastructure, housing construction, which is implemented in view of the tasks of cluster development.
4. Implementation of tax regulation measures for cluster members.
5. Reducing administrative barriers.

Conclusion

Today, Kazakhstan can be viewed as a new emerging market for the development of cluster tourism with its biological and geological diversity, minimal population density, rich historical and cultural
heritage. The state program will create a modern highly efficient and competitive tourism industry in the republic and ensure the development of related sectors of the economy.

The development of the economy made it possible to identify the specific features of the cluster approach, which consist in the formation of innovative clusters in three directions: developing policies to support the formation of clusters and creating an environment conducive to their effective functioning; determination of the main ways of development on the basis of an analysis of their potential, market needs and the overall external environment; development of its strategy, identifying and justifying the need and profitability for themselves in the creation and development of the cluster.

At the same time, the competitiveness of each organization is linked to the performance of others involved in the value chain with supplier-buyer relations, local and regional institutions, resulting in a general increase in the competitiveness of the interconnected organizations (cluster) and, consequently, the region as a whole.

References


CONTRIBUTION FROM THE FIELD OF FAMILY BUSINESS TO BUSINESS INCUBATORS, MICRO AND SMALL ENTERPRISES

Yolanda Saldaña,1 Fernando Miguel Ruiz,2 Laura Leticia Gaona,3 Juan Jesús Nahuat,4 Kelly Alejandra Muñoz2

Abstract: Most micro and small businesses start as family businesses, as they start from family savings as their main source of financing. However, the methodology used to incubate businesses in Mexico does not include tools to effectively manage family influence. This paper outlines the reasons why government agencies that allocate federal resources for business incubation should incorporate such tools into their methodologies. A documentary and a field investigation were carried out. The results show the tendency to start a business with family savings and therefore, with family interference. Likewise, it was found that newly created businesses show a high failure rate. It concludes the need to include in the methodologies used by business incubators in Mexico tools and knowledge in the field of family business. This, with the purpose of contributing towards the increase in the length of time that new companies last and the consolidation of existing micro and small enterprises in Mexico.

JEL Classification Numbers: M10, M20, M50; DOI: http://dx.doi.org/10.12955/cbup.v5.960

Keywords: Family business, business incubators, micro and small enterprises.

Introduction

At global level, companies are classified as micro, small and medium-sized enterprises (Valdez & Sánchez, 2012). The National Institute of Statistics Geography and Informatics (INEGI) in its press bulletin 285/16 reported that the business sector in Mexico is constituted as follows: microenterprise - 97.6%, small business - 2.0%, and medium-sized enterprise - 0.4% (INEGI, 2016). This classification is also used by government programs that allocate federal economic resources to boost them. However, classifying firms in micro, small or medium enterprises is the easiest, but not the most useful method, because the type of ownership conditions affects more the continuity of firms than the size of these firms (Tàpies, 2014).

Cabello et al. (2004), Mendoza et al. (2010), Simón (2013), La Salle (2013), Tàpies (2014) and Arthursen (2016) agree that most micro and small enterprises are family owned, since they start with their own from family savings. As a result, they are affected by the conflicts inherent in any non-professionalized family enterprise (Tàpies, 2014). Therefore, the objective of this work is to support the proposal that Mexican government agencies that allocate federal economic resources to promote the creation of new businesses, incorporate in their methodologies knowledge and tools in the field of family business. This in order to assist in reducing the failure rate of micro and small enterprises in our country.

Literature review

The National Institute of Entrepreneurs (INADEM), Mexico’s main government agency for business incubation, does not include in its methodology, knowledge and tools in the field of family business. INADEM implements and coordinates the national policy to support micro, small and medium-sized enterprises (Romo, 2013). As a public body, it fosters and promotes entrepreneurial culture; supports the creation and consolidation of businesses, and promotes access to financing and capital for micro, small and medium enterprises (INADEM, 2016). To participate in the calls for funding, the entrepreneur must take the Online Incubation Program (PIL). This course gives entrepreneurs who have a business idea the basic knowledge to “create and operate their company with greater opportunities to keep growing and to be competitive.” Currently, the course consists of four modules: Create your Company; How to make a business plan; Resources to operate your Business and finally, Evaluation and Development of the Business Idea (INADEM, 2016).

In addition, INADEM uses the Canvas Model designed by Osterwalder & Pigneur (2014). This model describes through nine blocks the logic of how a company seeks to make money and covers the four

1 Faculty of Accounting and Management, Universidad Autónoma de Coahuila, ysalco@yahoo.com.mx
2 Faculty of Accounting and Management, Universidad Autónoma de Coahuila, fernandor075@gmail.com
3 Faculty of Accounting and Management, Universidad Autónoma de Coahuila, lauragaonatamez@hotmail.com
4 Faculty of Accounting and Management, Universidad Autónoma de Coahuila, jjna.2009@gmail.com
5 Universidad Autónoma de Coahuila, k_2308@hotmail.com
main areas of a business: customers, supply, infrastructure and financial viability (Osterwalder & Pigneur, 2014). These nine blocks allow us to determine ways to make the company profitable; Distribution channels; Benefits and income; Essential resources and activities; The most important costs and alliances necessary to operate (Andrade, 2012). Table 1 summarizes the nine blocks of the Canvas Business Generation Model.

<table>
<thead>
<tr>
<th>Table 1: Blocks that make up the Canvas Model</th>
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<tbody>
<tr>
<td>Market segment</td>
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<tr>
<td>Value proposal</td>
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<tr>
<td>Channels</td>
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<tr>
<td>Relationship with customers.</td>
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<tr>
<td>Source of income.</td>
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<tr>
<td>Key Resources</td>
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<td>Key activities</td>
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<td>Network of alliances.</td>
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<tr>
<td>Cost structure</td>
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Similarly, methodologies for business incubation of other organizations such as New Ventures (2007); CORPODET (2016); CETYS, (2016) and others that operate in Mexico do not include tools and knowledge on how to run a family business. Despite the fact that most businesses tend to start with family interference (Tàpies, 2014).

Reasons for including in the methodology for incubating companies, topics on family business:

1. Most of micro and small businesses start as family businesses.

Micro and small businesses are not synonymous with family businesses. However, most of these businesses in the initial phase are family businesses, as they find it difficult to access external sources of financing and depend on their own and family savings to start their business (Tàpies, 2014).

In order to verify what was expressed by Tàpies (2014), in October 2016 a census was carried out in the Faculty of Accounting and Administration of the Autonomous University of Coahuila. The objective was to identify how many of the 1st students who currently own a business had recourse to family savings; And how many of those who have the plan to create a business within no more than 12 months, will have funding from the family. 99 students said they have a business. But of these, only 57 agreed to respond to the administered census. This corroborates the tendency of the Mexican population to prevail in the informal economy (Vidales, 2013).

The results showed that 80.7% of the 57 who currently have a business resorted to financing from family savings. While of the 71 students who plan to open a business, 80.3% said that the financing will come from their own and family savings. These data corroborate the findings of Cabello et al. (2004), Mendoza et al. (2010), Simón (2013), La Salle (2013), Tàpies (2014) and Arthursen (2016).

2. The interference of the family in the new business puts the survival of the business at risk.

A business with a family influence is a complex issue, since the family, its internal dynamics and the management of the company are involved, which must be adequately addressed with rational policies and decisions. Since within the family business two very different systems interact: family and company, each with its very particular characteristics and attributes. It is therefore not uncommon for conflicts to arise in the business and in the family arising from the coexistence of these two systems; And conflicts in the family affect the company and vice versa (Saldaña et al., 2012).

Family businesses suffer from problems that are different from unfamiliar ones. For example, in a family-run business, there is no clear distinction between the company’s economic flows and those of the family; A confusion prevails between the bonds of affection of the family and the contractual relations in the company; The assignment of posts is based on family relationships and interests, and there is an inadequate organizational structure that responds more to the needs of the family than to the needs of the company (Vásquez, 2010). In addition, there is evidence to affirm that family and organizational norms conflict in a family business (Rodríguez-Fornos 2008; Belaustegui-gotita, 2010; Grabinsky, 2010; Álvarez-Martínez, 2011). This conflict is reflected in the processes of staff recruitment, compensation and staff assessment. For the impartiality has a different connotation if it is the family or the company. In the company, impartiality is based on the concept of merit, while in the
family it is based on equity and necessity (Lansberg, 1983). If the new business owner does not know how to strike a balance between the demands of the family and the profitability of the business, it jeopardizes the survival and consolidation of the business. This is one of the reasons why family firms show a high failure rate (Gallo, 1998).

3. Newly created businesses in Mexico have a high failure rate.

According to INEGI figures for every 100 businesses created in Mexico, 70% close during the first five years and only 11% survive at 20 years (INEGI, 2015). On the other hand, the National Commission for the Protection and Defense of Financial Services Users (CONDUSEF, 2014) indicated that only half of the small companies in Mexico survive to 18 months and state as one of the causes: Family. López (2016) notes that while in Colombia 59% of new companies subsist for more than two years, 75% of newly created businesses in Mexico close operations before two years of existence and only 25% are kept in operation. Among the causes, they point out are weak finances, lack of goals and poor planning. These figures are perplexing since incubator methodologies include and emphasize precisely these issues.

Conclusion

Most businesses in México begin with family interference. However, these businesses do not have the tools to manage the influence of the family effectively. This contributes negatively, among other causes, to the high failure rate among micro and small enterprises in Mexico.

Therefore, it is proposed to include in the methodology used by the various business incubators in Mexico and especially in the one employed by INADEM, tools such as: family protocol, code of ethics, guidelines for hiring and firing relatives, etc. As well as knowledge about the differences between the family and the business system; The concept of family in the Mexican culture and its impact on the family business; The human resources within this type of company; The conflict of rules between the family and the organization: The professionalization of this, and how to move from family business to families of entrepreneurs, among others. This will allow the new entrepreneur to have the knowledge and tools necessary to effectively manage the influence of the family and establish a balance between the demands of the family and the profitability of the company. The implementation of this proposal can contribute to increasing the survival of new companies and the consolidation of existing micro and small enterprises in México.

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Abstract: Due to the interaction of two incompatible systems: family and business, family business managers may have cognitive biases that result in ineffective management. Therefore, the objective of this research study was to identify and determine the most common biases in the management of a family structure business. A documentary investigation was carried out with the purpose of compiling in a single document such biases. The analysis made it possible to conclude that the identified biases arise precisely from the interaction and incompatibility of these two systems; and that the absence of knowledge on the part of the business family and of directors of familiar companies of the presence of these biases impacts the permanence and consolidation of the familiar company.

JEL Classification Numbers: M10, M20, M50; DOI: http://dx.doi.org/10.12955/cbup.v5.961

Keywords: Cognitive bias, effective management, family business.

Introduction

The domestic family prepares their offspring to develop their life independently (Gordon & Nicholson, 2010). The business family moves in the opposite direction to the domestic one, because it continues economically united beyond its original generation (Nogales, 2007). When a domestic family becomes an entrepreneur, its dynamics become different and complex since in the family business two divergent systems interact: family and business (Belusteguigoitia, 2010).

Often family business managers tend to lack the technical and formal skills to manage the family business effectively. They are guided primarily by intuition and family interests and do not clearly define the roles and responsibilities of family employees (Antognilli, 2009); They lack an organizational structure that is congruent with business needs and resources (Rodriguez, 2008) and give little importance to human resource practices as a means of control (Sánchez, 2012). In part, the origin of this problem is related to the distortions, perceptual flaws and defects that operate silently, which are called "cognitive biases" and that influence our actions and decisions (Libertad & Álvarez, 2000).

Therefore, this research aims to identify and determine the most common biases in the management of a family structure business. By effective management of a family business we understand the set of operations that are carried out to direct and properly and rationally manage a family structure business with the purpose of ensuring the profitability of the company and the corporate patrimony.

Literature review

The management of a family business where the members of the different branches are the owners and, in turn, work in this one, becomes a difficult matter since the management of the company must be with rational policies and decisions (Navarro, 2008). However, there are repeated biases in the management of the same. Some of the most frequent are: Irrational management of family influence in business.

In the case of Mexico, the existence of the extended family and its growth through the inclusion of political relatives and influence peddling, exerts an increasing and considerable pressure on the family business for the following reasons: First, a profitable business is attractive to family members who even try to incorporate their political relatives, friends, and people they think they should support. Second, when we have reached the second or third generation there will be many more family members - husbands, grandchildren, grandchildren, in-laws, in-laws, etc. - who will feel entitled to be hired. Finally, there are those relatives who, because they are not well qualified, do not manage to be placed in other companies and therefore expect to be supported by a job through being part of the

1 Faculty of Accounting and Management, Universidad Autónoma de Coahuila, ysalco@yahoo.com.mx
2 Faculty of Accounting and Management, Universidad Autónoma de Coahuila, fernandor075@gmail.com
3 Faculty of Accounting and Management, Universidad Autónoma de Coahuila, lauragaonatamez@hotmail.com
4 Faculty of Accounting and Management, Universidad Autónoma de Coahuila, jjna.2009@gmail.com
5 Student, Faculty of Accounting and Management, Universidad Autónoma de Coahuila, k_2308@hotmail.com
family. This becomes a dilemma for the director, because if he accepts them he jeopardizes the profitability of the business, if he rejects them, he will be violating the rules of support that govern the family (Belausteguigoitia, 1996).

Putting the interests of the family to the interests of the company

Of the 5 '144,056 companies that exist in Mexico, 3'724,019 are family businesses (Alcaraz, 2012). This means that more than 70% of companies in Mexico are family run and source of employment of more than 54 million Mexicans (Grant-Thornton, 2011). However, family businesses show a high failure rate. One of the causes of this problem is related to the tendency to satisfy the demands of the family without considering the needs of the organization. This is corroborated by a study by Banamex (2008) who found that for 67% of family businesses in Mexico, the family goes first. Only 33% of these businesses put the interests of the company before the family. 72% of family businesses lack policies for hiring and firing relatives; And 58% do not have a family council or hold formal meetings to address family matters related to the company.

Bias in the decision-making process

People have distortions and flaws in perception that influence silently during the decision-making process. These failures are called "biases" (Libertad & Álvarez, 2000). One of the cognitive biases that exert the greatest influence in family business corresponds to that of emotions, which constitute a potential obstacle to logical, rational and objective decision making. "All people subjected to intense emotion can think and act wrongly, distorting reality. The impulses that originate, to a greater or lesser extent (greed, ambition, unbridled power) also influence the thinking, reflection and deliberation necessary to carry out the decision-making process "(Bonatti, 2014). In a family business, emotions permeate throughout the organization affecting not only how the business is managed but also, in the process of strategic decision making Kellermanns et al. (2014). For the decision-making is made by the family and therefore the emotional component, the emotional conflicts and the norms that govern the family influence in that process Braidot (2012).

Confusion between the norms that govern the family and those that guide the company

A rule is a line of conduct and indicates what a person should do or not, given a particular situation and what is expected. The norms that guide the behavior of the individual in the family environment are different from those that are managed in the organizational. This implies that what is expected of an individual according to family norms is opposed to what is expected of the same individual according to the principles of the organization (Gross, 2009).

In the family, two rules operate to guarantee impartiality: in vertical family relationships (parent-child relationship) the dominant norm of fairness is the concept of necessity. Parents have the moral obligation to distribute the necessary resources to meet the needs of their children. In horizontal family relationships, as it is between siblings, each individual has the right to receive equally the same resources and opportunities (Belausteguigoitia, 2010).

Transferring the roles of the family environment to the company

The set of behaviors that the person must play are called roles. Status and role are closely related. A status entails a set of roles and, for its part, the role originates from the status. The coherence between status and the roles played makes it possible for social relations to happen smoothly (García, 2011). Roles also allow you to predict the actions of others. When we interact with others, we make use of the role that is appropriate to the environment. However, experience shows us that this is not always the case. For in life it may happen that a person plays a social role in a context that does not belong to him. This is called asymmetry between the role played and the social situation that corresponds to it (O’Neil, 2006).

According to Belausteguigoitia (2007), members of an entrepreneurial family tend to interact following the same patterns that occur in the family, regardless of the context in which they find themselves. Since they transfer the patterns of behavior that are given in the family, to the company. Especially if the interaction occurs among the same members of the family. The conflict arises when we confuse the role that we must play in the house with the role that society has established to play in the company (Trevinyo-Rodriguez, 2010). The roles become blurred and conflicts arise marked by confusion. The slide of family roles to the labor scenario is reflected when:
A) The director of a family business continues to play the role of father when the children or relatives are employed: he scolds and uses a tone of voice and words that usually correspond to a more intimate environment as it is in the family context.

B) The director does not comply with the prescribed behaviors for the role of boss, as he does not dismiss a relative for breach, the salary is not assigned according to performance, nor apply the same penalties that would apply to a non-family worker.

C) Family business directors often do not take into account their vocation and pressure them to take over the business. This behavior is more congruent with the role of the father than with the director of a company (Pelliza, 2011).

Avoiding the professionalization of the family business

There is a difference between the dynamics that are generated within a family business and a business family. The unprocessed family business is that "... in which the interactions between the family members and the company of which they are owners have not been identified, analyzed and formalized, it is usual for there to be 'traps' Or ‘confusions’ that are subtracting competitiveness ..." (Scerpella, 2006). In this type of family business there is no clear distinction between the economic flows of the company and those of the family; the owner believes that by the fact that they are the proprietor, they automatically acquire the capacity to direct. A confusion prevails between the bonds of affection of the family and the contractual relations in the company. The assignment of posts is based on family relationships and interests, and there is an inadequate organizational structure that responds more to the needs of the family than to the needs of the company (Vásquez, 2010).

On the other hand, the business family has achieved the professionalization of the same: the allocation of posts is based on individual competencies and not on the basis of family relationships and interests; The organizational structure is congruent with the needs of the company and not with those of the family. Succession is achieved through merit and not by kinship. Direction is objective and rational. The business has a developed management system and promotions are achieved on the basis of good performance. There is strategic planning with a clearly defined vision (Vásquez, 2010). "It is a team of people, with family ties between them, that promote the implementation of 'good practices' and the development of competitive advantages in the businesses of which they are owners, understanding that these companies are and / or will be a source of generation of value to them "(Scerpella, 2006).

Conclusions

In this paper, the most common cognitive biases that can contribute to an ineffective management of a family business were collected and described. Such biases usually operate in a hidden way and are not easy to detect, as we tend to reject any data that contradicts our opinion or belief and select only that information that ratifies what we consider correct; to overestimate our abilities, knowledge and experience; to choose to take as a reference previous experiences or information of the past and to give in to emotions, which impede the logical and rational scrutiny of the options that are best suited.

To ensure effective management of the family business the first step is to become aware of the existence of these cognitive biases and how they operate. Yet, if the present owners of family business cultivate the conviction that the business is not only of their property; but belongs to later generations and if they have the will to guarantee the livelihood and business heritage for them, it will be more feasible to the owners to make greater use of a logical reasoning in order to reduce the impact of such bias on the management of the family business.

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MARKET ORIENTATION OF COMPANIES WITH THE BRAND “ZNAČKA KVALITY SK”

Simona Šályová,1 Janka Táborecká-Petrovičová,2 Alena Kaščáková3

Abstract: Market orientation represents an established concept whose implementation leads to the achievement of superior performance. Specific features of market-oriented companies are the subject of many studies for years. The purpose of this article is to examine the market orientation of two types of companies from foodstuff industry in Slovakia. In this article we compare the market orientation of food producers who are holders of certificate of quality “Značka kvality SK” and those who are not. “Značka kvality SK” is a certificate awarded by Ministry of Agriculture and Rural Development of the Slovak Republic. In our research, we would like to find out if the companies which are awarded as leaders in food quality have a predisposition for market-oriented behavior. In our research we used statistical parametric t-test and the non-parametric Mann-Whitney test. The results indicate that there is no significant difference between market orientation of producers who hold the certificate of quality “Značka kvality SK” and those who do not. These findings support the assumption that concept of market orientation is applicable for all kinds of companies. This article presents partly the results of complex research focused on investigating the relationship between market orientation and business performance.

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Introduction

Businesses operate in increasingly intensive competitive environment and therefore become necessary for them to generate, distribute and use market information efficiently. This market-oriented behaviour could be the competitive advantage for all kinds of businesses. The purpose of this article is to examine the market orientation of two types of companies from foodstuff industry in Slovakia. In this article, we compare the market orientation of food producers who are holders of certificate of quality “Značka kvality SK” and those who are not. In our research, we would like to find out if the companies which are awarded as leaders in food quality have a predisposition for market-oriented behaviour. We used the MARKOR scale developed by Kohli and Jaworski (1993) for data gathering, and statistical tests for data processing. The results of our research could be useful for companies in the foodstuff industry during the process of developing their market orientation.

Theoretical background

Business and market environment are changing in different countries what influence consumer perception, needs, and behavior in various ways. Dynamic changes, such as the consumers’ increasing access to information allow them to make smarter decisions about their consumption, or intensifying of the buyer’s market made it critical for businesses to monitor situations in the market and satisfy the evolving needs and wants of customers. Regarding the current situation in the market, businesses need to be more market-oriented than ever before in order to succeed in the global economy (Chakravorti, 2013). Since the 1990s, market orientation one of the key concepts in marketing literature, which was the subject of numerous empirical studies (Bodlaj and Rojšek, 2010). Market orientation has been developed from two perspectives, which are market orientation as behavior and market orientation as philosophy (Cadogan and Diamantopoulos, 1995).

Market orientation

Market orientation from the behavioral perspective was defined by Kohli and Jaworski (1990, p. 6) as an “organization-wide generation of market intelligence, pertaining to current and future customer needs, dissemination of the intelligence across departments, and organization-wide responsiveness to it.” Kohli et al. (1993) characterize market intelligence generation, the first element of behavioral perspective, as the collection and assessment of customer needs and also the forces that affect the development and refinement of these needs (Dong et al., 2013). Market intelligence dissemination refers to the quick distribution of information and involvement of all members of a business unit into the generalized discussion about customers and competition. This is the way how to maximize the

1 Ing. Simona Šályová, Faculty of Economics, Matej Bel University, simona.salyova@umb.sk
2 doc. Ing. Janka Táborecká-Petrovičová, PhD., Faculty of Economics, Matej Bel University, janka.taborecka@umb.sk
3 Ing. Alena Kaščáková, PhD., Faculty of Economics, Matej Bel University, alena.kascakova@umb.sk
value of generated information. Lastly, the responsiveness to market intelligence is characterized as implementation of activities consistent with the accumulated market intelligence, and planning the supply in line with the customer needs and wants (Varela and Rio, 2003). Piercy (1992) developed the behavioral-strategic approach to market orientation which according to him is comprised of three elements: strategies, plans, and information. Strategies are related to the critical decisions about the market definition, market segmentation and the differentiation of products in comparison with competitors. Plans concern the marketing mix policies, development, and information as referred to the whole market and used for strategy design, planning, and control (In: Avlonitis, Gounaris, 1997). In the original study of Narver and Slater (1990, p. 21), they defined market orientation from cultural perspective as an “organizational culture that most effectively and efficiently creates the necessary behaviors for the creation of superior value for buyers and thus, continuous superior performance for the business.” The cultural perspective of market orientation consists of three components, which are customer orientation, competitor orientation and inter functional coordination (Ngai and Ellis, 1998). Gadimi et al. (2013, p. 3495) summarized approaches to customer orientation and concluded that “it definitely involves a focus on customers by identifying, analyzing, understanding, and answering their needs, demands, and expectations, and generating, creating and increasing their satisfaction, acceptance and reliability.” Competitor orientation can be understood as knowledge of competitors’ short-term strengths, weaknesses and also long-term strategies and capabilities (Narver and Slater, 1990). Woodside (2005) explain that inter functional coordination consists in the willingness of different functional departments’ members to cooperate in order to achieve their objectives, competitive advantages, effectiveness and better performance (Gadimi et al., 2013). Abiodun and Mahmood (2015) concluded that behavioral and cultural perspectives are both based on efforts to understand market needs and wants, and to react to market opportunities and overall cross functional integration. Grbac and First (2011) add that many researchers have examined the impact of market orientation on business performance irrespective of whether market orientation is viewed as the culture or as the behavior of a business.

Market orientation and the quality in the context of foodstuff industry

Gellynck et al. (2012) summarize two consequent phenomena of the European agro-food market over the past ten years. On the one hand, globalization caused an increase in competition from large enterprises while trade liberalization led to the decrease in market protection. On the other hand, there is an increase of interest of consumers in food quality not only in the range of health and safety, but also from the country of origin point of view. Origin and methods of production became the important criterion for consumers while choosing the product. Musová (2013) states that in the context of Slovak consumers there is an increase of interest in the origin of food products while the majority of consumers would like to be better informed about the origin of food products from Slovakia. The brand “Značka kvality SK” is connected to the origin of food products and it is used as a marketing tool which has the impact on ethnocentric behavior of consumers while it emphasizes the country of origin and also quality of the product. This claim is also supported by Tábořecká-Petrovičová, Šedo, Zajková (2014) who state that ethnocentric behaviour is closely linked to the country of origin. Product orientation is considered an opposite to the market orientation in marketing literature Kotler (1988). Poliáčiková (2007) states that the product concept is guided by the view that consumers look for those products that offer superior quality, operational reliability, performance and modern design. Product improvement and innovations are crucial in businesses applying this concept. The problem with this concept is the fact that the enhancement of the product may not meet the needs and demands of consumers. Lewis et al. (2001) cite Harmsen et al. (2000) who consider product orientation as a supplement to market orientation in the meaning that objective quality of product can definitely enhance performance and satisfies the customers’ needs and wants, especially those segments which seek product quality.

Data and methodology

The main aim of this article is to examine the market orientation of food producers in Slovakia who are holders of certificate of quality “Značka kvality SK.” “Značka kvality SK” is a property of the Ministry of Agriculture and Rural Development of the Slovak Republic and is used as certificate of quality for Slovak producers of food products. It was put into practice in 2004 when the program of a national quality mark for Slovak agricultural products and foodstuffs was established. The main
priority of the program was to promote domestic quality products and thus strengthen their competitiveness in the domestic market. The next priority was to differentiate domestic products from foreign products and provide customers a better orientation in food products. This mark of quality on a product is a guarantee for the consumer that this product was produced in compliance with the requirements of national legislation and the legislation of the EU, while the determined technological process was followed during the production. “Značka kvality SK” can be awarded to a Slovak manufacturer whose products are produced from domestic raw material. The next condition is to maintain the declared technological process parameters of quality and food safety, while at the same time required the declaration of raw materials, i.e. from the total raw material consumption by at least 75% must be consumption of domestic raw materials and all stages of the production process must take place in the Slovak Republic. The quality mark is awarded by an expert commission to registered products. The commission is appointed by the Minister of Agriculture and Rural Development, who based on the recommendations of this commission and the principles for assessing and qualifying the quality mark, awards “Značka kvality SK” to manufacturers (Ministry of Agriculture and Rural Development of the Slovak Republic, 2017).

Our research was conducted on the sample of Slovak manufacturers of food products. The research sample consists of 33 manufacturers, while 45.45 % of them (i.e. 15) hold the certificate of quality “Značka kvality SK” and 54.55 % of manufacturers (i.e. 18) do not hold this certificate of quality. We addressed companies of all sizes from the number of employees’ point of view. Questioning was realized through the online questionnaire sent via email. For measuring market orientation, we used the MARKOR scale (Kohli and Jaworski, 1993). We reduced the original 32-item MARKOR scale to a 20-item scale as a resulted from pilot questioning and feedback from manufacturers. We applied a 7-degree Likert scale like other authors (Pitt et al., 1996; Puledran et al., 2003, Hooley et al., 2003). In our article, we wanted to find out if there is a difference in the market orientation level between holders of quality certificate “Značka kvality SK” and non-holders of quality certificate “Značka kvality SK.” We were interested in the assumption that the product’s quality might be a predictor of market orientation. We have formulated following the research question (RQ):

RQ: Are food producers with the certificate of quality “Značka kvality SK” more market-oriented than the other food producers?

In order to answer this research question, we conducted a statistical verification. We used the Kolmogorov-Smirnov test of normality and a t-test for equality of means.

**Results and Discussion**

We examined if there is difference of the market orientation level between holders of the quality certificate “Značka kvality SK” and non-holders of the quality certificate “Značka kvality SK.” In Table 1 are presented the means of the market orientation components and overall market orientation of respondents. Respondents could reach from 1 to 7 points for each component. The first component of market orientation is intelligence generation. Surprisingly, non-holders of “Značka kvality SK” achieved higher means (5.269) of intelligence generation than holders of “Značka kvality SK” (5.189). The second component of market orientation, intelligence dissemination, achieved higher means (5.390) by holders of “Značka kvality SK” in comparison to non-holders of “Značka kvality SK” (5.005). The biggest difference of means between these two groups of respondents was in responsiveness to market intelligence. Non-holders of “Značka kvality SK” achieved mean 5.201 and
holders of “Značka kvality SK” achieved mean 5.938. We were also interested in the means of the overall market orientation. Non-holders of “Značka kvality SK” achieved 5.172 points and holders of “Značka kvality SK” achieved 5.577 points.

Table 1: Means of market orientation of food producers

<table>
<thead>
<tr>
<th>Market orientation components</th>
<th>Non-holder of “Značka kvality SK”</th>
<th>Holders of “Značka kvality SK”</th>
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<tbody>
<tr>
<td>Intelligence generation</td>
<td>5.269</td>
<td>5.189</td>
</tr>
<tr>
<td>Intelligence dissemination</td>
<td>5.005</td>
<td>5.390</td>
</tr>
<tr>
<td>Responsiveness</td>
<td>5.201</td>
<td>5.938</td>
</tr>
<tr>
<td>Overall market orientation</td>
<td>5.172</td>
<td>5.577</td>
</tr>
</tbody>
</table>

Source: Authors

For statistical verification, we used IBM SPSS 19.0 and we set the significance level α=0.05. We used statistical tests for the examination of significant differences between market orientation of holders and non-holders of the quality mark “Značka kvality SK.” Firstly, we tested the normality of the data. The results of the non-parametric Kolmogorov-Smirnov test of normality are shown in Table 2. Data are normally distributed (Sig. = 0.074, resp. 0.200).

Table 2: Test of normality

<table>
<thead>
<tr>
<th>ZK</th>
<th>Kolmogorov-Smirnov*</th>
<th>Shapiro-Wilk</th>
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<td>MO</td>
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<td>1</td>
<td>.153</td>
</tr>
</tbody>
</table>

a. Lilliefors Significance Correction
* This is a lower bound of the true significance.

Source: SPSS output.

If the data could not be normally distributed we would use a non-parametric Mann-Whitney test. However, the data were normally distributed. Thus, we could use the t-test for verification of difference between the variables. According to the result of this t-test there is no significant difference between market orientation of holders and non-holders of “Značka kvality SK” (Sig. = 0.235).

Table 3: Independent Samples Test

<table>
<thead>
<tr>
<th>Independent Samples Test</th>
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<tbody>
<tr>
<td>Levene’s Test or Equality of Variances</td>
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<td>F</td>
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Source: SPSS output.
On the basis of our results we can state that our assumption that food producers which hold the certificate of quality “Značka kvality SK” are more market-oriented than food producers which do not hold the certificate of quality “Značka kvality SK” was not confirmed. This kind of study is very specific and it is difficult to find similar studies. In scientific literature, there are several studies which partly deal with the issue of market orientation and quality. Through this research we can understand the studied issue from a little bit different point of view. Raju and Lonial (2001) examined the relationships of market orientation and quality context with organizational performance within the hospital industry. The results show that both constructs have significant effect on performance. However, the direct effect was proved only within the market orientation and organizational performance relationship. Quality context is only indirectly linked to organizational performance through its effect on market orientation. Ramayah et al. (2011) investigated the mediating role of service quality in the relationship between market orientation and organizational performance. According to this study, service quality partly mediates the market orientation – organizational performance relationship. Both studies indicate only partial links between quality and market orientation. There are several studies which deal with the market orientation of foodstuff businesses (Lewis et al., 2001; Gellynck et al., 2012; Nwokah, 2008). However, these studies are focused mainly on the investigation of the level of market orientation and its relationship to business performance.

Conclusion
The main aim of this article was to examine the market orientation of food producers in Slovakia who are holders of the certificate of quality “Značka kvality SK.” From this research results it can be stated that certificate of quality “Značka kvality SK” does not influence the level of market orientation, because there was no significant difference between two groups of businesses (non-holders and holders of “Značka kvality SK”). We consider this result partly positive, because it indicates that all businesses could be market-oriented and the certificate of quality is not a warrant of a higher level of market orientation. This research has several limitations. The research sample of 33 businesses is relatively small and we would expect different results if we would use larger sample. For measuring market orientation, we used the MARKOR scale according to the (Kohli and Jaworski, 1993) which covers the behavioural approach to market orientation. However, there is also the possibility to use another scale which refers to the cultural approach.

Acknowledgement
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THE ECONOMIC CONSEQUENCES OF CRIME AND OTHER ANTISOCIAL ACTIVITIES

Viktor Šoltés,1 Katarína Repková Štofková2

Abstract: Crime and other antisocial activities are the social phenomena that adversely affect the lives of people. Besides the negative impact on the quality of human life, the crime has a negative impact also on the economy. Damage caused by criminal acts can also be quantified in economic terms. This damage consists principally of the assets stolen from victims of crime, e.g. material damage. A substantial part of the damage also represents the financial losses that were caused by the economic crime. Another part of the damage is financial compensation provided by the state to the violent crime victims or their family members.

The paper deals with the analysis of the economically quantified damage caused by different types of crime in the Slovak Republic. The aim of this paper is to identify and analyze types of crimes that cause the largest economic losses and subsequently propose measures for elimination of critical types of crime to prevent greater economic losses.

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Keywords: Economic damage, crime, victim, financial losses, antisocial activities

Introduction

Several factors influence the quality of life. The most important are the socio-economic and security situation. Deterioration of the quality of life occurs when the state for its inhabitants cannot guarantee the required level of security. In this case, occurs searching for better living conditions and is increasing the risk of migration (Štofková, 2016). The consequence of leaving inhabitants abroad is the economic loss from them.

An indicator of the poor security situation is primarily crime and other antisocial activities. However, crime statistics cannot objectively evaluate the current criminal situation. Considering the latent (hidden) crime is necessary. Even though crime statistics are not an objective indicator of the current crime situation, it is a representative indicator useful for assessing the security situation.

Consequences of crime and other antisocial activities arise in the society a sense of fear, insecurity or worry for lives, health, and property of citizens. In addition to the psychological impact of crime, it has an adverse effect on the physical integrity of people. However, the society must realize that crime has a negative impact also on the economy.

For the state and society, it is necessary to recognize the economic impacts of crime. Monitoring the development of damage caused by each type of crime, it is possible to set priorities in the fight against crime. For the state, it is necessary to arrange that the damage caused by the crime will be the lowest which leads to better tax collection and acquisition of funds to the state budget. Then it will be possible to invest these funds in the development of society and thus improving the quality of life of the population.

Crime

As Gašpierik (2010) writes, crime and other antisocial activities is a negative social phenomenon that has various aspects. Their common feature is

- disruption of the harmonious development of society,
- disruption of existing law,
- disruption moral and moral values,
- disruption the desired development of personality (and thus the whole society),
- inciting an atmosphere of fear, anxiety, panic, mistrust, and insecurity.

The consequence of crime and other antisocial activities is damaged. According to Štôfko & Štofková (2011), victims suffer mainly physical and mental damage. Regarding society, it comes to the spiritual and material damage. In addition, in most cases, there is also the economic damage (caused to the victim or to the whole society).

1 Faculty of Security Engineering, University of Žilina, Slovakia, Viktor.Soltés@fbi.uniza.sk
2 Faculty of Operation and Economy of Transport and Communication, University of Žilina, Slovakia, Katarina.Repkova@fpedas.uniza.sk
Act no. 583/2008 Coll. on the Prevention of Crime and Other Anti-Social Activities says that crime is conduct that is a criminal offense. The criminal offense is an illegal act whose characteristics are given by the Criminal Code (Act no. 300/2005 Coll.). Act no. 583/2008 Coll. on the Prevention of Crime and Other Anti-Social Activities also defines other antisocial activities. It is conduct that is an offense or other administrative offense. For other antisocial activity, it is also possible to regard conduct that is not an offense or other administrative offense but hurts society.

Crime can be precisely expressed by specific quantitative and qualitative parameters. Phenomenology of the offense deals with examining these variables (Kubás, 2017). As Svetlík & Veľas (2016) say, among these variables, it is possible to include the structure of crime, which determines the proportion of each type of crime in the total number of the offenses committed at a certain time in a certain place. The structure of crime in the Slovak Republic consists of:

- violent crime,
- moral crime,
- property crime,
- other crime,
- residual crime,
- economical crime.

Figure 1 shows the evolution of the total number of each type of crime in Slovakia.

<table>
<thead>
<tr>
<th>Figure 1: Development of different types of criminality in Slovakia</th>
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<tr>
<td><img src="image" alt="Graph showing development of different types of criminality in Slovakia" /></td>
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<td>Source: Authors</td>
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</table>

The economic damage of selected types of crime

Every kind of crime is specific by type of damage that is perpetrated. The economic damage is typical mainly for economic and property crime. However, the economic damage is also in the remaining types of crime (Šoltés, 2016). Its incidence is minimal (virtually zero) in the moral crime since it is a specific kind of crime, the consequences of which are mainly psychological but also physical and health.

Figure 2 shows the evolution of the economic damage to different types of crime in thousands € in 20 years.

To the total economic damage caused by the crime have a dominant share economic crimes. Property crimes also cause greater economic damage. The largest economic damage was caused in 2003 when the amount of damage exceeded € 2 billion. At present, the amount of damage has a downward trend and is about 400 million €.
Figure 2: Development of the economic damage caused by criminality in Slovakia [thousands €]

<table>
<thead>
<tr>
<th>Year</th>
<th>Violent</th>
<th>Moral</th>
<th>Property</th>
<th>Other</th>
<th>Residual</th>
<th>Economical</th>
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Source: Authors

As Fomich (2016) writes, the offender of economic crime cannot be anyone, but only a person with particular social or economic status. The offender must have a high degree of intelligence and knowledge than needing the offender of another type of crime. A typical feature of economic crime is higher latency and rigorous investigation.

Committing economic crimes are committed far greater economic damages than committing another type of crime. Among typical economic criminal offenses belong Criminal Offence Endangering Market Economy, Criminal Offences against Economic Discipline, Currency and Tax Related Criminal Offences and Criminal Offences against Industrial Property Rights and Copyright.

Figure 3 shows the evolution of the economic damage of economic crimes in thousands € in 20 years.

Figure 3: Development of the economic damage caused by economic criminality [thousands €]

Source: Authors

Development of the economic damage caused by economic crimes follows the development of the overall economic damage caused by the crime. Extremes were reached in 2002-2005. In the last ten
years, the situation has stabilized, and economic damage does not exceed € 600 million (in the last three years did not exceed € 400 million).

Property crime has a major part of total crimes. Regarding the caused damage, it is the second most serious form of the offense. Figure 4 shows the evolution of the economic damage of property crime in thousands € in 20 years.

![Figure 4: Development of the economic damage caused by property criminality [thousands €]](source: Authors)

Evolution of economic damage caused by property crime is declining in the long term (except in 2014). The highest damage caused by property crimes (as with the economic crime) was achieved in 2004 and 2005 (nearly € 150 million). In 2016, damage slightly exceeded € 50 million. Regarding dynamics, it is necessary to point out that every year damage decreases by almost 20 million €.

**Conclusion**

Crime and other antisocial activity is a socio-pathological phenomenon that undermines the individual's life and development of the society. Crime can be objectively quantified by the number of registered crimes. Their number in recent years is steadily declining. Regarding the total number of crimes, it has dominant position property crimes.

Crime is a negative phenomenon as it causes various forms of damage, e.g. psychological damages, and damages to the physical integrity of the victim, but also economic damage. Evolution in recent years shows that the economic damage caused by crime has decreasing character. The peak was reached in 2003. Overall, the economic damage caused by crimes is in the hundreds of millions of €. This amount of funds cannot be considered as a negligible. Therefore, the state should do everything possible to avoid such high losses. The aim of the state should be to take preventive measures related to reducing the severity of the crimes (mainly economic, but also property). Among other things, the state should increase its activity in the field of detection and investigation of economic crime. However, it is necessary to take sufficiently effective measures in the field of generally binding legal regulations. In recent years, state policy focuses on improved tax collection and reducing tax evasion. The struggle with these negatives over the past few years is partly reflecting the reduction of the economic damage caused by the (economic) crime.

**Acknowledgment**

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Act of the National Council of the Slovak Republic no. 300/2005 Coll. Criminal Code

Act of the National Council of the Slovak Republic no. 583/2008 Coll. on the Prevention of Crime and Other Anti-social Activities


EMPLOYEE BENEFITS AS ONE OF FACTORS OF WORK MOTIVATION

Nátalia Stalmašeková1, Tatiana Genzorová2, Tatiana Čorejová3

Abstract: Behind a successful company there are several factors which affect its activities and performance. These are various economic issues, production processes, capital and people – employees. The human resources of a company largely depend on how the company is able to respond to challenges of the market. Employers are recently trying to take care of their employees much more than just rewarding them with a salary. They provide them a variety of employee benefits with which they try to motivate them to better perform. The aim of the paper is to describe the system of benefits provided by companies in general. The first part of the paper contains a general framework of the issue and the second part describes the current situation of providing benefits in Slovakia and abroad, specifically in the United States. The paper highlights the differences in understanding of importance of benefits in each country. The final part of the paper contains research about opinions of students of the University of Žilina about providing benefits at the workplace.

JEL Classification Numbers: J33; DOI: http://dx.doi.org/10.12955/cbup.v5.964

UDC Classification: 331, 2

Keywords: work motivation, employee benefits, research, survey

Introduction
Štofková et al (2011) says that employees – human resources – are an indispensable source for success of any company. It follows that we should treat them at least with the care we treat material, finance and information resources. Therefore, the key task of human resources management is to motivate its employees to give their best performance. One part of this motivation is through rewards. Beside typical money rewards, non-monetary rewards, also known as employee benefits, gained importance in last few decades. For companies, they represent opportunity to differentiate themselves from other companies, lure new employees and retain current employees. Nowadays many companies are building their corporate identity on interesting and unique employee benefits. A typical example is the company Google.

Employee Rewards
Employee rewards are one of the main parts of a motivation program in the company. Generally, we can incorporate rewarding into three categories (Kachaňáková, 2003):
- direct money rewarding – it includes salary, bonuses, fees and commissions,
- indirect money rewarding – it includes stocks, insurance, loans, extra fee for food, clothing and more,
- non-monetary rewarding – material values – company car, phone, a variety of social benefits and services, for example. use of recreational facilities, counseling services, child care and various other.

Rewarding of employees
Employee benefits are rewards that the company provides to employees only for the fact that they are its employees. Usually, they are not tied to employee performance. Sometimes however, they depend on status of employee in the company, his merits and the time he has worked in the company.

Employee benefits can be segmented into three basic groups (Strenitzerová, 2015.):
- benefits of a social nature (corporate pensions, life insurance, business loans and guarantees for loans, child care workers (nurseries and kindergartens), etc.),
- benefits of work nature (food, discount for company products to employees, language tutor, etc.).

1 Ing. Natália Stalmašeková, University of Žilina, Faculty of Operation and Economics of Transport and Communications, Univerzitná 8215/1, 010 26 Žilina, natalia.stalmasekova@fpedas.uniza.sk
2 Ing. Tatiana Genzorová, University of Žilina, Faculty of Operation and Economics of Transport and Communications, Univerzitná 8215/1, 010 26 Žilina, tatiana.genzorova@fpedas.uniza.sk
3 Dr. h. c. prof. Ing. Tatiana Čorejová, University of Žilina, Faculty of Operation and Economics of Transport and Communications, Univerzitná 8215/1, 010 26 Žilina, tatiana.corejova@fpedas.uniza.sk
benefits associated with the position in the company (prestigious company cars for managers, pay phone in the apartment, allowances for clothing and other expenses representation of companies, corporate apartment, etc.).

Trade unions when collective bargaining generally create pressure on providing employee benefits. If the company wants employee benefits to have a positive impact on employee motivation, their satisfaction and stability as well as good relations with trade unions, it should be interested which employee benefits employees prefer. Due to differences in the preferences of employees, companies have begun offering an optional benefit system (i.e. Cafeteria system). Employee can choose such benefits that are currently most interesting for him. In the case that his preferences will change in time, he has a possibility of choosing different benefits. (Striček and Štofková, 2013)

The optional benefit system is convenient for the company and employee for several reasons: (Strenitzerová, 2015):

- The optional system is economical and provides the ability to better control costs and becomes more diverse and attractive;
- It leads to an increased awareness of employee benefits;
- Employee benefits are useful in the acquisition and stabilization of employees. If the company offers tailored benefits, it becomes more attractive to potential and current employees;
- The system may have a positive impact on the attitudes and behavior of employees, employees feel they are more equal partners;
- Optional systems provide companies and employees (i.e. Trade unions) the possibility of better control over the distribution of benefits, because the choice of each employee is registered and recorded.

Koubeck (2007) says that the disadvantage of optional benefits system is its administrative complexity. Employees also may not always recognize their current needs, which can result in inappropriate selection of employee benefits, which can then manifest into their dissatisfaction.

Current situation of issue in Slovakia

Employee benefits were brought to Slovakia by foreign companies which employee a significant number of people in our part of the market. For many companies, these benefits are part of their corporate culture. Slovak companies are not lagging behind and also under pressure by unions to provide employee benefits. In 2016, Slovak web journal platy.sk published on its site surveys for employee benefits where they concentrated on the most used benefits in Slovak companies during 2015. Corporate teambuilding was identified as the most common benefits provided by the employer at top of the range (26%). Second place at 20% were both free drinks at the workplace and employee education. Education of employees includes training in their profession (meetings, workshops...), but especially the teaching of foreign languages, which is especially preferred by foreign companies. They try to educate their staff in case they need travel to other branches where they are forced to communicate with English or German-speaking colleagues. Another very common benefit is the possibility to use flexible working hours (18). Employers try to provide to employee some freedom to decide about arrival to work. Employees reported at considerable level that they can use both the company mobile phone and the PC, which is provided at work, for private purposes. Furthermore, frequent benefits are holidays, reimbursement of transport, a housing allowance or reimbursement of sporting activities. In the survey for web journal platy.sk, 32% of respondents from a sample of 65000 people admitted that their work still has no employee benefits.

Many international companies in Slovakia offer the same benefits as in abroad branches. For example, one of the most famous employer in Žilina provides its employees financial bonuses in the form of variable pay, Christmas bonuses, and extra for overtime or additional retirement savings. Many foreign companies have acceded to promote marriages and families by giving bonuses to families with new born baby. Many companies take care of the culture of the company and its corporate social responsibility and they want to learn from their employees by using benefits, for example car factory Kia rewards blood donors. These benefits include ‘eco-friendly’ shopping, when on purchases friendly home appliances or use a bicycle as a means of transport provided by certain funds bearing the costs of employees. Slovak company Topvar concerned with the production of beer is giving their female employees contribution for babysitting, so they can come to work earlier. (Berecz, 2016)
Current situation in USA
Abroad, the employers understand benefits quite differently. They realized that generous benefits are needed to attract talented employees. Based on the survey of employee satisfaction conducted by the company Glassdoor (2016) it is shown that for 60% of respondents, benefits are the main reason according to which people decide whether to take a job or not. To attract prospective talented employees, large American companies offer their employees massage chairs, private chef, and yoga classes. Large companies seek to reflect the benefits of their employees in the work carried out. For example, Airbnb, which in 2016 was declared as the best place to work, provides its employees an annual salary of $2,000 just to travel.

<table>
<thead>
<tr>
<th>Benefits in Slovakia</th>
<th>Benefits in USA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corporate teambuilding</td>
<td>Better health, dental and vision insurance</td>
</tr>
<tr>
<td>Free beverages</td>
<td>More flexible hours</td>
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<tr>
<td>Education</td>
<td>More vacation time</td>
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<tr>
<td>Flexible working hours</td>
<td>Work from home options</td>
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<tr>
<td>Cell phones for private purpose</td>
<td>Unlimited vacation</td>
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<tr>
<td>Employee discounts</td>
<td>Student loan assistance</td>
</tr>
<tr>
<td>Retirements savings</td>
<td>Tuition assistance</td>
</tr>
<tr>
<td>PC for private purpose</td>
<td>Paid maternity/paternity leave</td>
</tr>
<tr>
<td>Work from home options</td>
<td>Free gym membership</td>
</tr>
<tr>
<td>More vacation time</td>
<td>Free day care services</td>
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</tbody>
</table>

Table 1: Ten most desirable benefits

Data and methodology
The aim of this research is to find out which employee benefits do students of University of Žilina prefer. The results show the most attractive employee benefits of students-future labor. This research can point to benefits which employers can use in the future to attract good skilled graduates.

The task of the questionnaire was to find out:
• which of the following employee benefits would be most attractive for students of the University of Žilina.
• have the students ever been employed?

The research sample contains 100 students of University of Žilina. The research was performed in February 2017. For research, we had to suspect that more than half of respondents had had working experience.

We presume that young people are influenced by international companies which are doing business in Slovakia and they expect different types of benefits. Further, we expect that women desire different types of benefits than men.

Results and Discussion
The research sample consists of 100 respondents, 43% male and 57% female. Figure 1 shows that most desired employee benefits are flexible working hours, a company car for private purpose and extra paid vacation. The use of a company car is a benefit often offered in Slovakia and employees appreciate it. Flexible working hours is a new type of employee benefit for Slovak employees which is more and more required. In the past regime, this benefit was not offered. There is only 20 paid vacation days for absolvents in Slovakia, therefore extra paid vacation is also desired.
If we look at answers only from female respondents, the most desired benefits are flexible working hours, extra paid vacation and of course home office. This shows that women are concerned about time, because they have to split time between work and family more than men. On the contrary, the most desired benefits by men are a car and a phone/notebook for private purpose.

**Conclusion**

Employee benefits are powerful tool in the hands of companies. Benefits are a great opportunity to lure, raise and keep employees. Already Tomáš Baťa emphasized the importance of keeping employees satisfied. (Štofková et al, 2015). Only satisfied employee can identify with the company and do their best work. Based on the results of the research, we recommend incorporating the Cafeteria system into the motivation program of companies if it is possible. It is convenient not only for employees but also for companies. The company could have a better control of costs as well as appearing more attractive and diverse.
Acknowledgements
VEGA 1/0515/15 Endogenous factors of the IPR intensive industries in the regional enterprise environment in Slovak Republic
VEGA 1/0693/16 Research of innovative solutions in the context of quality management
VEGA 1/0733/15 Research of the quality management to support business competitiveness.

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CONVENTIONAL AND SHADOW BANKING SECTOR – COMPARATIVE ASPECTS OF THE POST-CRISIS PERIOD IN TAIM OF THE CURRENCY BOARD - BULGARIA’ CASE

Elena Velkova Stavrova

Abstract: The shadow banking or financial institutions specializing in lending take an increasingly larger share of today's markets and channels for the movement of financial resources in the markets of resources between economic agents or households.

The main scientific question of this paper is to analyze the reasons of dynamic trends of development of the shadow financial system, and how that contrasts with the conventional model of financial intermediation of commercial banking: “The chains for value creation through credit intermediation that move free financial resources in economic systems for realizing more efficient operations with fewer risks; In non-banking credit intermediation chain trades that take place on weighted average price - and exchange rates in the markets for short-term securities; yield creation in the shadow banking industry are intensively secured strongly which personally are guaranteed both, from individuals and the firms; value chains in the alternative banking system have carried out extensive conventional financial transformation outside the banking system. This means that this type of intermediation converts illiquid, risky fixed assets in "safe" and liquid short-term liabilities.”

The used methods are: content analysis, and econometrics analysis of empirical databases of the years 2012 – 2016 by two financial sectors from BNB.

The finding based on the econometrics analyses supports the scientific hypothesis about relations between the process of the increasing role of the informal banking sector, which pushes conventional bank financing due to high credit standards of banking institutions and limited access to finance for individuals who receive their income in the area of the gray economy.

JEL Classification: G21, G23, G28; DOI: http://dx.doi.org/10.12955/cbup.v5.965

Keywords: shadow banking, value chain, financial innovation, financial intermediation

Introduction

„The rapid development in financial innovations have changed the landscape, for moving free financial resources into the economic system - from savers to individual and corporate investors. Enhanced interference by national and international regulators has restricted innovative creativity and competitive competition between conventional banks by taking additional types of risks. This purposeful intervention has provided additional incentive for these banks to look for an opportunity to secure efficient operations through the development of alternative credit forms whose assets are guaranteed through diversified portfolios. Regulatory arbitrage, limited capital requirements, and post-crisis recovery processes gave further impetus to companies and non-bank credit institutions to provide access for borrowers who would hardly respond to conventional banks' access to credit forms to meet their needs.

Although the shadow banking business is a broad term we use to name nonbank institutions that conduct bank operations, shadow banking is an alternative to the conventional because of the significantly more liberal financial safety net, which otherwise engage conventional banking with the formation of reserves, and the performance of a complex system of regulatory and supervisory rules specified as with national and international banking law.

On the other hand, significant is its role and contribution to improving the competitive environment for increasing the efficiency of the banking business, a process that is stimulated further by the significant losses that the real economy banking industry bore during the global financial and economic crisis (Patonov, 2013; Tanchev, 2015; Tsenkov, 2016 and Tsenkov, 2016).

Body text

The banking system is critical for the economy as a whole and fluctuations in it are a function of money supply. In this context Minsky's theory about the importance of endogenous money (Ganchev, 2015) in the economic system are critical to the relationship between conventional and alternative shadow banking systems.

1 SWU “Neofit Rilski”-Blagoevgrad, Faculty of Economics, stavrova@swu.bg
Table 1: Comparison between conventional and shadow Banking

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Conventional banking system</th>
<th>Shadow banking system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capitalization</td>
<td>10 000 000 BGLN</td>
<td>1 000 000 BGLN</td>
</tr>
<tr>
<td>Leverage</td>
<td>State of Maintenance leverage ratio</td>
<td>State of Maintenance leverage ratio not less than the statutory capital</td>
</tr>
<tr>
<td>Financing</td>
<td>Stocks, deposits</td>
<td>Stocks, shares</td>
</tr>
<tr>
<td>Liquidity</td>
<td>State of Maintenance liquidity ratio</td>
<td>State of Maintenance liquidity ratio not less than the statutory capital</td>
</tr>
<tr>
<td>Manager’s skill</td>
<td>Skills for managing financial institution</td>
<td>Skills for managing financial institution</td>
</tr>
<tr>
<td>Type of operations</td>
<td>Full range of banking services</td>
<td>Financial leasing, warranty deal, factoring, forfaiting. Acquisition of holdings in a credit institution or other financial institution; lending with funds not raised through public attraction of deposits or other repayable funds.</td>
</tr>
<tr>
<td>Monitoring</td>
<td>Every 3 month reporting, annually reporting</td>
<td>Every month reporting, annually reporting</td>
</tr>
<tr>
<td>Numbers</td>
<td>27</td>
<td>179</td>
</tr>
<tr>
<td>Monitoring</td>
<td>Chartered by Central bank</td>
<td>Register in Central bank</td>
</tr>
</tbody>
</table>

Source: www.bnb.bg

The structure characteristics of the Bulgarian non-banking sector of credit institutions is the representation of both national and mixed - national and international capital, of which - 179 credit intermediaries with national capital, Improving the business environment and profit growth in the financial sector is likely to reduce the projected demand for debt to finance investments and simultaneously stimulate further investment attitudes of the business. This resource is not included in economic turnover and expects profitable future investment projects. Given that endogenous money is closest to the activities of banks that create demand, they limit short-term loans to individuals and businesses. This economic recovery in investment banking, where it is investing internal resources of retained earnings, but in conventional commercial banking or the process this happens slowly, because the return on investment through cost of labor or wages and household consumption take place with lags in time. So, to finance investments empirical reality shows that firms take on new debt to finance assets.

Figure 2: Main credit aggregates by conventional banking sector

Source: Author
Banks’ behavior to introduce financial innovation, especially when in financial markets’ interest rates are negative or close to 0, follows a conscious violation by moving deposits to shadow financial sector’s credit institutions even in most cases violate the liquidity management regulations.

Working under the Currency board, the Bulgarian banking system is highly regulated and the central bank is limited to using a single tool - the mandatory minimum reserves. The change in the system of taxation of income and profits in proportion to the progressive tax rate of 10% trigger implementation of the "paradox of Keynes' for saving, which loaded the system with excess liquidity. An elevated criterion for access to credit in a crisis restricts the activities of banks to banking services and loans primarily to borrowers in the gray zone of the economy and directs them to the area of shadow banking.

The requirement for registered capital and funding sources in both types of banking is clearly defined - with transparent sources and restrictions on crossing the minimum limit. The difference between the two sectors lies in the ability to attract deposits on open financial markets, which is why financial Institution of the informal banking sector attract resources through equity shares and contributions, but not as deposits of individuals and companies.

As a consequence of the above, and the analysis (Stavrova, 2012, Stavrova 2013, Stavrova & Zlateva, 2016) and comparison of major credit performance of the two types of banking systems, respectively, Figure 1 and Figure 2 give way to formulate some basic differences and similarities:

The processes of global financial and economic development have reached a varying degree, the direction of development and the residual effects both on the synchronous functioning of the banking and non-banking sectors as inseparable parts of the financial system. While significant deviations from the mean represented as fluctuations and the peak in the variable "rate of increase in problem loans" in the third quarter of 2015, which noted the conventional banking sector, the same time interval banking sector shows a systematic, offensive upward development. The explanation of this trend is the specific feature of the currency board system, which allows bankruptcies of banks and prohibits the central bank to be a lender of last resort. This is the reason for the significant amount 5,592 690 000 BGN, which is referred to as an increase in non-performing bank loans in the aforementioned period. During the same period, the conventional banking system has a symbolic rate of increase or decrease in the provision for new loans. This process may in each case be assessed as risk-sharing and transferring a system of shadow banking which creates a dangerous precedent for a new credit bubble.

Undoubtedly and significantly, the advantage that ensures the functioning of the shadow banking sector is the possibility of regulatory arbitrage - a considerably simplified licensing procedure, limited requirements for professional expertise of management. Undoubtedly and significantly, the advantage that ensures the functioning of the shadow banking sector is the possibility of regulatory arbitrage - a considerably simplified licensing procedure, limited requirements for professional expertise of management, the independence of decision-making without coordination with the regulatory authority.
The reporting activity is also simplified - instead of the monthly statements provided by traditional banks, credit institutions submit quarterly data, the independence of decision-making without coordination with the regulatory authority. The reporting activity is also simplified – instead of the monthly statements provided by traditional banks, the credit institutions submit quarterly data. This simplified procedure spur market participation of the non-banking sector and this makes it significantly more effective compared to the conventional banking sector.

Another important difference between conventional and shadow banking is that it provides an opportunity for gains from specialization in the financial intermediate and receiving the benefits of products’ specialization in one segment of the financial market. From this, the realization of economies of scale is made possible by learning, and improving offering specialized credit in specific forms of credit intermediation functions. Alternative forms of credit intermediation are widely represented in the form of leasing in co-operation with car and industrial equipment manufacturers and dealers, purchase of debt commitments such as factoring and franchising, etc.

The customers of non-banking credit institutions are looking to borrow a much smaller amount than the banks would have made. The average value of the loans granted by its company is about BGN 700 and the maximum amount that can be borrowed - BGN 2,500. Thus as a result, they fill the consumer micro-credit niche, which is not as attractive and profitable for the banks and until recently this kind of lending was offered by illegal lenders.

A key advantage of shadow banking companies is that their operations are really negotiated short-term - usually the time between bidding and receiving is at most a few days and usually up to several hours. Unlike banks, bureaucratic procedures are limited to a minimum, loans are available at home, on the phone, and recently online. Thus, their services can benefit households and firms in remote areas where branches of conventional banks do not operate. An important advantage is that non-bank institutions are more flexible in terms of proof of income and past credit history, which is key to the majority of the population which works in the gray and no-tax pay economy in Bulgaria.

Finally, it should be underlined the special social role of the informal banking sector, namely providing accelerated access to loans to individuals and companies that cannot meet the high requirements for obtaining loans put up by their conventional banks. These small-volume loans, albeit expensive enough, as the new credit agreements are used to solve the urgent needs of households. A steady growth trend shows that this sector is represented by a relatively stable volume of loans and a continuously increasing importance in the credit market segment as a whole.

Conclusion

As, seen above, and in the resulting analytical comparison between two sectors – the conventional banking and the shadow banking sector, both are in a sharp competitive game for the same group of users, these sectors carry differently the ways to structure the fluctuations experienced by the non-financial sector during the global financial and economic crisis. Although the efforts of financial and political authorities were directed exclusively to the stability of the conventional banking sector, this same sector, although in arrears, suffered considerable losses that caused the banks to fail and hence shake the banking system as a whole.

At the same time the shadow banking sector going through all these events prepared and generated high levels of risk in the price of credit resources, and therefore not suffered any significant losses.

During the same period the conventional banking system has a symbolic rate of increase or decrease in the provision of new loans. This process may in each case be assessed as risk-sharing and transferring a system of shadow banking, which creates a dangerous precedent for a new credit bubble. These trends of development, except that those that register, need to be monitored, controlled and guided to limit the possibilities of occurrence of new crisis fluctuations. Development of an international framework for the operation and oversight of shadow banking will limit the realization of regulatory arbitrage and hence - the possibility of concentrating significant risks in some regions.

References


CONCENTRATION INDICES IN ANALYSIS OF COMPETITIVE ENVIRONMENT: CASE OF RUSSIAN BANKING SECTOR

Polina Stazhkova,¹ Tatyana Kotcofana,² Alexander Protasov³

Abstract: This article is devoted to the analysis and evaluation of competitive environments by using some indicators of market concentration. An analysis was made of the key (main) concentration indices most often used in countries with developed market economies. The state of the competitive environment in the banking sector of the Russian Federation is estimated with the use of indices. The consistency of these indicators to the basic antitrust regulations was investigated. The authors show that in order to obtain reliable results each of the available methods of monopoly power detection requires a detailed market analysis.

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Keywords: concentration ratio, Linda Index, Herfindahl-Hirschman Index, market share, kernel

Introduction

The presence of monopolistic structures is one of the main problems while forming a competitive environment in a market economy. The challenge for antitrust authorities is to identify the monopoly and monitor its operations. This applies to firms that occupy a dominant position and abuse it. Traditionally, the most favorable condition for the emergence of a monopoly is a highly concentrated market.

The concentration of sellers reflects the relative sizes and number of firms operating in the industry. The concentration level will be the highest with the minimum number of firms on the market. It is also affected by the size of firms. The more firms differ in size, the higher the concentration level.

In turn, the level of concentration can determine the behavior of firms in the market. As a rule, the higher it is, the more firms will depend on each other or on the dominant firm. The monopolistic structure of the market is an exception. It is characterized by the maximum degree of concentration, but the only firm, the monopolist, does not depend on its actions from the behavior of competitors because of their absence. The market will have a lower degree of competition with a higher concentration level.

However, firms that occupy a dominant position, as a rule, do not recognize their position as monopolistic and they are trying to prove the absence of monopoly power. Thereby, there are clear criteria for determining the level of concentration. This makes it possible to assess the market structure, to establish the existence of a monopoly and to determine it quantitatively.

Economists have developed quite a lot of indices to measure concentration. Research by Khan et al. (2016) shows that the final assessment of the degree of competition and its impact on the effectiveness of economic policy depends on the choice of the concentration indices. In practice however, only the two most popular indicators are usually used. The Federal Antimonopoly Service of the Russian Federation in its analytical reviews and reports uses the concentration index – CR-3 and the Herfindahl-Hirschman index – HHI. In our view, it is necessary to expand the set of concentration indicators used to assess the competitive situation of the market more realistically.

Data and methodology

One of the first coefficients used by economists to analyze market structures was the market concentration index (CR). It shows the percentage of one or more large firms in the total volume of the analyzed market in terms of key economic parameters (sales volume, value added, money turnover, asset size, own and attracted capital, number of employees, etc.). Competition authorities are primarily interested in the firm’s share in sales, so most often the concentration indicators, including CR, are calculated based on this parameter. Later, when analyzing concentration indices, we will speak specifically about market share as a proportion of income from sales of the company (or group of companies) in the total income from the sales of industry or market, implying that other parameters can be used.

¹ leading specialist, Department of educational programs, St. Petersburg State University. p.stazhkova@spbu.ru
² Ph.D., assistant professor, St. Petersburg State University, t.kotsofana@spbu.ru
³ Ph.D., assistant professor, St. Petersburg State University, a.protasov@spbu.ru
US antitrust authorities have been actively using the concentration index to investigate market structures since 1968 (Gosudarstvo i rychnoyye struktury, 1993). This indicator is simple to calculate, that undoubtedly is its advantage. Usually this ratio is calculated for the largest companies in the market of a certain product. It gives an estimate the ratio of market shares of enterprises with the largest shares to the total market volume. The number of such large companies can vary. In the US (U.S. Department of Commerce, 2006) and France, the index is calculated for 4, 8, 20, 50 or 100 of the largest companies. In Germany, England, Canada, data on 3, 6, 10, etc. companies are considered. In Russia, this indicator has been calculated and published in official statistics since 1992 for three (CR-3), four (CR-4), six (CR-6) and eight (CR-8) of the largest sellers (Knyazeva, 2007). The formula for concentration index can be represented as follows:

\[ CR_n = \frac{\sum_{k=1}^{n} V_k}{\sum_{k=1}^{n} V_k + \sum_{j=n+1}^{N} V_j} \]

where \( CR_n \) is the concentration index of the given market, \( V_k \) is the volume of sales for \( k \)-th large seller, \( V_j \) is the volume of sales for \( j \)-th smaller seller, \( n \) is the number of largest sellers in the market, \( N \) is the total number of companies in the market.

The concentration index presents relative shares or percentage. The higher the values of this indicator are, the stronger the market power of the largest firms is, and the stronger the degree of concentration in the market is, the weaker the competition. Thus, for the same number of largest firms, the higher the degree of concentration, the less competitive is the industry.

As it was already mentioned above, this index can be calculated for a different number of major companies in the market of certain products. However, it is more appropriate to examine the values of this index for three or four large firms.

In Knyazeva (2007) the following criteria for comparing market structures are distinguished:

1. For three firms, the market is considered to be un-concentrated with an index below 45%; \( CR-3 < 45\% \);
2. The market is considered to moderately concentrated at the values of the index \( CR-3 \) between 45% and 70%;
3. The market is highly concentrated when the index values are bigger than 70%; \( CR-3 > 70\% \).

Despite the fact that the concentration index is fairly simple to use and interpret, it has a number of drawbacks. Firstly, it does not take into account the size of the firms, which were not included in the sample \( k \). Secondly, it does not reflect the distribution of shares both within the group of the largest firms and between outsider firms. To solve this problem, the Lind index is actively used in the countries of the European Union. It allows identifying the largest firms on the market (Waterson, 1984), the so-called “oligopolistic core.” Its calculation will be shown below. Thirdly, \( CR \) characterizes only the sum of shares of firms, but the gap between these firms can vary. There is a possible inaccuracy in its implementation due to this fact. It has some limitations in the application, since it does not allow differentiating the role of different producers in the market. This index can show the same numerical value for fundamentally different markets, distorting the true state of affairs.

Consider two markets with a set of share distributions where one firm controls 80%, the second - 5%, the third - 3%, the fourth - 2% and a set where the first firm occupies 24%, the second - 23%, the third - 22%, the fourth - 21%. Concentration will be measured as 0.9 for both markets, although it is obvious that in the first case the dominant position is occupied by one company and in the second case the distribution of the shares of the first four companies is more or less even (Pakhomova & Richter, 2009). The use of the Herfindahl-Hirschman index makes it possible to overcome this drawback.

The concentration index is the simplest indicator of the presence or absence of a monopoly, but it is not precise enough, and moreover, has low information content. To address the above shortcomings, other indicators of market power can be used. We will look into those that are currently actively used in economically developed countries, and are the most successful in the facilitating antitrust policy.
The Linda index was proposed by Remo Linda and is widely used in the European Union. Like the concentration index (CR), the Linda index is calculated only for a few of the largest firms, so it also does not take into account the situation on the periphery of the market. But unlike the concentration index, it is focused on accounting for the differences in the core of the market. The Linda index can show how many and what firms occupy dominant positions in the market. For this purpose, the index is calculated step by step. First for the two largest firms, then for three and so on, until the continuity of the function is violated (here, the tendency of the index decrease will be replaced by its increase). This violation of continuity shows that the latter company added to the calculation has a significantly smaller market share than any of the previous.

For the two largest firms the Linda index will be equal to the percentage of their market shares. According to Gosudarstvo i rynochnyye struktury (1993) we number the market shares of individual firms in a decreasing order, and then the Linda index for these firms will look as follows:

\[
IL = \frac{k_1}{k_2} \times 100\%,
\]

Where \(IL\) is Linda Index, \(k_1\) and \(k_2\) are market shares.

Based on Gosudarstvo i rynochnyye struktury (1993) the Linda index for the three firms \(k_1, k_2, k_3\) will be the arithmetic mean of the two ratios: the ratio of the share of the largest firm to the arithmetic average of the second and third largest firms; the ratio of the arithmetic average of the two largest firms to the share of the third largest firm.

\[
IL = \frac{1}{2} \left( \frac{k_1}{(k_2 + k_3)/2} + \frac{(k_1 + k_2)/2}{k_3} \right) \times 100\%.
\]

The Linda index for the four firms \(k_1, k_2, k_3, k_4\) will be the arithmetic mean of the three ratios: the ratio of the share of the largest firm to the arithmetic average of the other three largest firms; the ratio of the arithmetic average of the first two largest firms to the share of the other two largest firm; the ratio of the arithmetic average of the three largest firms to the share of the fourth largest firm.

\[
IL = \frac{1}{3} \left[ \frac{k_1}{(k_2 + k_3 + k_4)/3} + \frac{(k_1 + k_2)/2}{(k_3 + k_4)/2} + \frac{(k_1 + k_3 + k_4)/3}{k_4} \right] \times 100\%.
\]

In the same manner the Linda index for five, six and more firms can be calculated. If for two firms the index is 200, for three is 170, and for four is 230, the continuity of the function is violated after adding the fourth firm. This means that the first three firms are the core of the market. Their market shares are significantly larger than the proportion of the fourth largest company and all the rest. If one or two firms occupy a clearly dominant position, the index will rise from the very beginning. In this case adding a third firm to the calculation increases the inequality of forces of the firms considered in the index.

The Linda index overcomes the above mentioned drawback of the concentration index. It is reflecting the distribution of market shares among the largest firms, and not just the ratio of the shares of the largest firms to all other sellers.

Another disadvantage of the market concentration index (CR) is the concealment of the true position in the market and the determination of the same numerical value for fundamentally different markets. To a certain extent it can be avoided while using the Herfindahl-Hirschman concentration index (HHI). The US Department officially refused CR, and adopted the HHI as the main characteristic of the market structure. Since June 1982, the HHI serves as the main reference point for the US antitrust policy in assessment of all kinds of mergers (Avdasheva & Rosanova, 1998). This index can be used as a measure of concentration however, its main task is not to determine the market share controlled by several of the largest companies, but the characteristic of the distribution of “market power” among all the subjects of this market. Exactly this is the advantage of HHI over CR.

The firm’s specific weight in the industry is used to calculate HHI. Just as for other concentration indicators, different parameters can serve as the basis for determining the specific weight, but the most important of them is the market share. It is assumed that the greater the share, the greater the potential for the emergence of a monopoly. In the calculation of this index all firms are ranked by weight from
the largest to the smallest. Market shares of all producers of a certain product are needed to accurately calculate. It is not possible for a large number of firms.

The Herfindahl-Hirschman index is calculated as the sum of the squares of the shares of all firms operating in the market. It is the percentage of each firm present in the market in the total sales volume squared and sum while arranged in decreasing order:

\[ \text{HHI} = Y_1^2 + Y_2^2 + Y_3^2 + \ldots + Y_n^2 \]

or

\[ \text{HHI} = \sum_{i=1}^{n} Y_i^2, \quad i = 1, 2, 3, \ldots, n, \]

Here \( Y_1, Y_2, \ldots, Y_n \) are shares in decreasing order. Market shares can be expressed in fractions or as a percentage. In the first case, HHI will take values from 0 to 1, in the second – from 0 to 10000.

According to international practice, the HHI value, close to zero, corresponds to the minimum concentration, \( \text{HHI} < 0.10 \) (or \( \text{HHI} < 1000 \)) – low level of concentration. In accordance with US law, the index value \( 0.10 \leq \text{HHI} \leq 0.18 \) (or \( 1000 \leq \text{HHI} \leq 1800 \)) corresponds to the average concentration level, and \( \text{HHI} > 0.18 \) (or \( \text{HHI} > 1800 \)) indicates a high level of market concentration (Knyazeva 2007).

European legislation sets this limit at 0.2 (or 2000) (Guidelines, 2004).

It should be noted that this index reacts to a big number of firms as well as to the individual market share of each firm. It provides an opportunity to obtain information on the comparative capabilities of firms to influence the market situation in conditions of varying degrees of concentration. Petria et al. (2015) consider HHI to be the most correct of the concentration indices, since it takes into account the market shares of all firms and gives greater weight to firms with large market shares. However, the main advantage of the index is its ability to react quite sensitively to the redistribution of shares between firms operating in the market. Due to this sensitivity, it can indirectly indicate the magnitude of the economic profit obtained as a result of the exercise of monopoly power.

Table 1 compares the values of the concentration index (CR-3) with the indices of Linda (IL) and Herfindahl-Hirschman (HHI)

<table>
<thead>
<tr>
<th>Index</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Concentration Index for three firms (CR-3)</strong></td>
<td>low &lt;45%</td>
</tr>
<tr>
<td></td>
<td>medium 45% - 70%</td>
</tr>
<tr>
<td></td>
<td>high 70% - 100%</td>
</tr>
<tr>
<td>Herfindahl-Hirschman Index (HHI)</td>
<td>&lt;1000</td>
</tr>
<tr>
<td></td>
<td>1000 – 1800 (2000)</td>
</tr>
<tr>
<td></td>
<td>1800 (2000) – 10000</td>
</tr>
<tr>
<td>Linda Index (IL)</td>
<td>The higher the market concentration, the earlier the continuity of the function is violated (the decrease will be replaced by an increase). In case of domination of one firm, the index will increase from the very beginning.</td>
</tr>
</tbody>
</table>

Source: Authors

As we could see, each of the concentration indicators examined has its advantages and disadvantages. The most adequate for reflection of the real market situation, in our opinion, is the Herfindahl-Hirschman index. However, with a large number of firms operating on the market, its calculation presents a certain complexity. The Linda index is also complex in calculation; it estimates the concentration only among the largest companies. Nevertheless, the use of IL helps to clarify the distribution of market power in the oligopolistic core.

The following criteria can be proposed to assess the merits of different concentration indices.

1. The concentration indices should give qualitatively consistent results both for the analysis of the market in general and for the analysis of the core of the market. For a less concentrated market this indicator should be less than for a more concentrated one, even if we do not calculate it for all sellers, but only for the largest ones.
2. The concentration index should increase with the increase in the share of a large firm by reducing the share of a smaller firm.
3. The concentration index should decrease when a new firm enters the market, if its size is not larger than the size of the largest of the already existing firms.

4. The concentration index should increase when firms conduct M & A transactions.

From the indices considered, only the Herfindahl-Hirschman index meets all four criteria listed above. The Linda index and the CR only partially meet these conditions.

**Results and Discussion**

The concentration indices were calculated for analyzing the competitiveness of the Russian banking sector and six largest banks: Sberbank, VTB Bank Moskvy (together with VTB 24), Gazprombank, FK Otkrytiye, Rossel'khozbank and Al’fa-Bank. The key areas of banking activities are attracting deposits and lending to individuals and legal entities. The indices were calculated for each of these two areas, dividing each of them into two segments: services for individuals and for legal entities.

The market shares of these banks are shown in Table 2, the concentration indices (CR-3 and CR-6) and Herfindahl-Hirschman are presented in Table 3, and the dynamics of the Linda index is in Table 4.

### Table 2: Market share of the six largest banks in January 2017

<table>
<thead>
<tr>
<th>Banks</th>
<th>Loans, %</th>
<th>Deposits, %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>individuals</td>
<td>legal entities</td>
</tr>
<tr>
<td>Sberbank</td>
<td>40.29</td>
<td>32.06</td>
</tr>
<tr>
<td>VTB Bank Moskvy</td>
<td>16.86</td>
<td>15.21</td>
</tr>
<tr>
<td>Gazprombank</td>
<td>2.86</td>
<td>9.95</td>
</tr>
<tr>
<td>FK Otkrytiye</td>
<td>1.68</td>
<td>5.19</td>
</tr>
<tr>
<td>Rossel'khozbank</td>
<td>3.02</td>
<td>4.32</td>
</tr>
<tr>
<td>Al’fa-Bank</td>
<td>2.14</td>
<td>3.74</td>
</tr>
</tbody>
</table>

Source: Authors

### Table 3: Concentration indices (CR-3 and CR-6) and Herfindahl-Hirschman Index for the six largest banks in January 2017

<table>
<thead>
<tr>
<th>Indices</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Loans</td>
</tr>
<tr>
<td></td>
<td>individuals</td>
</tr>
<tr>
<td>Concentration index (CR-3)</td>
<td>60.17</td>
</tr>
<tr>
<td>Concentration index (CR-6)</td>
<td>66.85</td>
</tr>
<tr>
<td>Herfindahl-Hirschman Index (HHI)</td>
<td>1940.23</td>
</tr>
</tbody>
</table>

Source: Authors

### Table 4: Linda Index for the six largest banks in January 2017

<table>
<thead>
<tr>
<th>Linda Index</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Loans</td>
</tr>
<tr>
<td></td>
<td>individuals</td>
</tr>
<tr>
<td>Two largest banks</td>
<td>238.99</td>
</tr>
<tr>
<td>Three largest banks</td>
<td>675.59</td>
</tr>
<tr>
<td>Four largest banks</td>
<td>734.64</td>
</tr>
</tbody>
</table>

Source: Authors

4 The sixth biggest bank on the individuals’ loans market is Raiffeisenbank

5 The sixth biggest bank on the market of individuals’ deposits is Binbank
CR-3 and CR-6 show that there is a medium level of concentration on all markets, while in services for individuals it is slightly higher. In loans for legal entities CR-3 is quite low but CR-6 is the highest. This can be explained by more equal distribution of shares among the three largest banks.

The Linda index is rising right from the start. Table 2 shows that Sberbank is the only dominating bank, for deposits for legal entities there are two dominant banks – Sberbank and VTB group. Not for all the markets IL will be the same. According to other indices the least concentrated is the segment of deposits for legal entities, it is also the lowest in IL.

HHI shows high concentration in deposits for individuals, moderately high (high by American standards) in loans for individuals and moderate in services for legal entities. The most competitive according to HHI is the segment of deposits for legal entities.

For the Russian bank system as a whole (600 banks) HHI in January 2017 was 1220. It indicates a moderate concentration. As Parsons & Nguyen (2016) noted, in G7 countries the HHI for banks in the 2000-s was not lower than 5000, and after 2010 it is over 6000.

The level of concentration in Russian banks is moderate according to other criteria. CR-5 in January 2017 was 59.04%, but in 2008 it was 42%, in 2010 – 48% (Khandruyev & Chumachenko, 2010). The HHI based on 957 banks in 2010 was 907 (Raksha, 2010). The growth rate is moderate. As a result, the concentration of the first five banks in Russia is comparable to European levels. As Leigh & Triggs (2016) showed the market share of the four largest Australian banks is 94%.

The Linda Index shows higher levels of concentration compared to the HHI, CR-3, CR-6. It is due to the fact that IL shows the concentration of the core, not the whole market. Due to the fact that in Russia most of the 600 banks have really small market shares, concentration levels look moderate. The six largest banks occupy less than 70%. But there is clear dominant in the core of the market. The market share of Sberbank according to different estimates can be from 23% to 47%. This can be seen only with the Linda index.

On the one hand, IL points out the leader and probable monopolist. On the other hand, it is unable to detect competitive forces presented by a number of smaller firms on the periphery.

**Conclusion**

These indices of concentration show the market structure with different levels of accuracy, they describe different aspects of the situation. In different circumstances, depending on the specific objectives of the antimonopoly policy, different concentration indicators may be most appropriate. However, in any case, detailed and multilateral analysis of the market is needed while using each of the considered indices, and possibly, their combination for a more realistic assessment. It is important not only to adequately assess the results obtained with the help of quantitative methods, but also to understand the reasons why the market has a high or low concentration. Without a meaningful analysis of the data used for calculating the concentration indices and their results, the approach to the implementation of the antimonopoly policy will be formal, one-sided, and, therefore, most likely, will not give the desired results.

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CONTINUOUS IMPROVEMENT AND APPLICATION OF QUALITY MANAGEMENT METHODS IN RAILWAY TRANSPORT PROCESSES

Vladimíra Štefancová,1 Anna Šatanová,2 Danka Harmanová3

Abstract: The basic principle of continuous improvement of each enterprise is to comprehend its particular transport processes. For better understanding and detailed analysis there are available lots of quality improvement toolkit. The relationship between consequence and potential causes can be monitored through various fundamental and specific tools. This article is oriented on train delay which belongs among the typical problems in the railway sector and is considered significant from the customer's perspective. The aim of this paper is to highlight the possible applications of quality management methods in the framework of the train delay issue. These delays influence a train's punctuality and therefore it is important to identify most prevalent causing these problems reasons as well as to analyze them and propose solutions.

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Keywords: Flowchart, Ishikawa diagram, Pareto, delay causes, quality management, process

Introduction

With growing competition, a company is forced to increase the efficiency and productivity of its work and thus improve its final product or service. The implementation of new procedures and pioneering technique can positively change unresolved issues of any enterprise. The Six Sigma is considered an integral part of quality management with the aim of continual improvement. The principles of the Six Sigma methodology were applied in the past particularly in manufacturing, but nowadays there is a tendency also to use these methods in the services sector.

The goal output of rail transport is supplying the services in the required time frame as well as at the desired quality. This all depends on the quality of the resources, with regard to the utilized vehicles, properly scheduled timetable, individual operating processes as well as the staff willingness. This article emphasizes that the Six Sigma is an essential tool to increase customer satisfaction and simultaneously improve the quality of processes in railway transport. In order to achieve the desired results, it is necessary to focus on customer requirements and to become a customer-centered organization gradually. The aim of this article is to highlight the possible application of quality management methods with the goal of averting extraordinary circumstances such as train delay.

The importance of acquisition and evaluation uniform data about train delays

An important determinant for the customer when deciding about the use or non-use of services of the transport company becomes the quality of the provided services. Therefore, if we want to assess the quality of services effectively, it is necessary to take into account the factor of time, which is possible through dynamic models that take into account the procedural character of provided services (Nedeliaková & Panák, 2015).

One of the goals of a railway company that operates in the area of services in railway transport is to obtain a lasting market share with a view of increasing it (Majerčák & Nedeliak, 2010). This goal can be achieved through continuous monitoring and evaluation of the quality of the services provided, and taking into account the specific characteristics of all the parts of the transportation process (Nedeliaková & Panák, 2016).

Abroad there exist several models of service quality, which are often concerned about this problem however, with different aspects, different from conditions of railway transport. It is therefore necessary to apply those tools of the quality model that will be suitable for rail transport. In regards to rating a company's service quality, it is important to take into mind the approaches of quality methods, and the techniques and models of quality, which connect objective and subjective aspects of the rating.

1 Faculty of Operation and Economics of Transport and Communications, University of Žilina, vladimira.stefancova@fpedas.uniza.sk
2 Department of Economics, Management and Marketing, International School of Management Slovakia, Prešov, satanova@ismpo.sk
3 Faculty of Operation and Economics of Transport and Communications, University of Žilina, danka.harmanova@fpedas.uniza.sk
That was the initial impulse for creating a scientific research study, of which one of the results is this article (Nedeliaková, Sekulová, & Nedeliak, 2015).

While solving any issue, accurate information is very important. In accordance with analyzing the current state it is essential to have constant data available intended for understanding the interrelations in order to improve the processes. Furthermore, the quality of information is correlated to the precise ability of the staff to collect data objectively and should be correctly entered into the information system (Majerčák & Majerčák, 2015).

The main indicator of train delay is the punctuality of trains. This is measured regularly and represents the comparison between the time stated in the train timetable and the factual running time of a train. In general terms the range of train delay is usually reported in minutes. The continued provision of dynamic information on train movement are the basis for further in-depth analysis of the delay causes. The complete effect of train delays is considerable not only for passenger themselves but also for the Infrastructure Managers and for Railway Undertakings. (ŽSR, 2009).

One of the methods which can be applied in processes of railway transport is a flow diagram. The flowchart is a versatile tool for describing any process where the structure and sequence of activities is depicted by blocks showing operational activities and blocks showing decisions (Nenadál, 2008). It defines the continuity of the process and is used to gain a better understanding. Figure 1 shows a flowchart when the train is delayed. The initial sample consists of data about the passenger trains and there is a decision-making process if a train is delayed or not. If the train is late, the entrusted employee will assign to the train number its delay code. Otherwise, it is not necessary to deal with trains that arrive on time. Individual delay codes are defined in the Regulation (SR 1012) concerning operational information system (PIS) of infrastructure manager in Slovak Republic.

**Figure 1: Flowchart of the train delay process**

![Flowchart of the train delay process](image)

Source: Authors

According to the circumstances, it is needful to properly identify the reasons for the delay and also it is recommended a coding system is used.

**Utilization of an Ishikawa and Pareto diagram to improving the quality of processes in the railway sector**

The requirements for quality service is increasing therefore it is necessary to look for new ways of improving quality that will meet international standards and reflect the increasing demands of customers (Nedeliaková & Sekulová, 2016).

The implementation of processes is fundamental to create a successful and functioning enterprise. While the processes have constantly been changing, there must be connectivity between input and output (Fišer, 2014). That's the reason why particular elements, which enter into the process have to be continuously controlled.

The methods in an Ishikawa and Pareto diagram are included among the quality management methods for continuous improvement. These methods can also serve for monitoring problems in railway transport. The cause-and-effect diagram (Ishikawa diagram) is one of the fundamental tools used in the Six Sigma methodology. The line (spine) represents the effect and is typically labeled on one end as
the head of the fish, each diagonal line (major bone) branching out from the spine corresponds to a major cause or group of causes (Brue, 2005).

The initial Ishikawa diagram consists of five groups (materials, machines, methods, measurements, men), but nowadays there are more used in a modified version such as management, environment and so on. The specification of delay reasons is a rather complicated creative process, which is usually carried out within a team where it is appropriate to use brainstorming or brainwriting. (Lusková, Hudáková, & Buganová, 2013).

Figure 2: Ishikawa diagram in railway processes

<table>
<thead>
<tr>
<th>Ishikawa diagram of train delays</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vehicle</strong></td>
</tr>
<tr>
<td>Train formation</td>
</tr>
<tr>
<td>Maintenance</td>
</tr>
<tr>
<td>Train travel time</td>
</tr>
<tr>
<td><strong>People</strong></td>
</tr>
<tr>
<td>Passenger</td>
</tr>
<tr>
<td>Staff</td>
</tr>
<tr>
<td><strong>Operations</strong></td>
</tr>
<tr>
<td>Rail accidents</td>
</tr>
<tr>
<td>Train jumper</td>
</tr>
<tr>
<td>Animal slaughter</td>
</tr>
<tr>
<td>Obstruction on line</td>
</tr>
<tr>
<td><strong>Surroundings</strong></td>
</tr>
<tr>
<td>Passenger</td>
</tr>
<tr>
<td>Train path</td>
</tr>
<tr>
<td>Shunting movements</td>
</tr>
<tr>
<td><strong>Machine</strong></td>
</tr>
<tr>
<td>Track</td>
</tr>
<tr>
<td>Signalling installations</td>
</tr>
<tr>
<td>Level crossing installations</td>
</tr>
<tr>
<td>Telecommunication</td>
</tr>
<tr>
<td><strong>Management</strong></td>
</tr>
<tr>
<td>Timetable</td>
</tr>
<tr>
<td>Information</td>
</tr>
<tr>
<td>Laws and legislative</td>
</tr>
<tr>
<td>Infrastructure Managers</td>
</tr>
<tr>
<td>Railway Undertakings</td>
</tr>
</tbody>
</table>

Source: Authors

Figure 2 above represents using Ishikawa in practice for the conditions of railway transport from the point of view of an infrastructure manager and for railway undertakings. The purpose of the Ishikawa diagram is to lead a company in the direction of never-ending and continuous improvement which is pursued by continual application of eligible quality improvement tools. The research shows that in the conditions of railway transport, this diagram is able to describe an objective assessment of the quality within providing transport services (Nedeliaková, Sekulová, Nedeliak, & Abramovic, 2016).

Illustratively it describes the main spine of the diagram, which is made up of seven basic parts:

- People – errors in personnel planning, disabled passengers, large amount of luggage, large number of passengers
- Operations – inadequate organization, sending a train to the wrong track, direction
- Surroundings – insufficient communication, delays caused by other infrastructure managers (previous or next), state bodies, the introduction of regulation UIC 450-2
- Vehicle – error in train composition, locomotive destruction, exceeding journey time
- Rail accidents – obstruction on line
- Machine – obsolete technical equipment, failures of signaling equipment, failures of ETCS and infrastructure components, defects in data-transmission system
- Management – mistakes in timetable compilation, late editing of timetables and other operating schedules

Another tool is the Pareto chart that can be used extensively for identifying the items that have the greatest cumulative effect in the process of railway transport. Pareto charts consist of bars, which represent the relative contribution of each cause or component of the problem and are arranged in a descending order (George, 2003).
Statistical significance is analyzed by using the Pareto principle and that is visible through the Pareto diagram in Graph 1.

Graph 1: Pareto in railway processes

Approximately 80 percent of train delays are the result of only five main delay causes. The most prominent of them are train succession, rail connection, other railways and delay caused by following railway undertakings. Other steps for more detailed analysis can be using brainstorming with experts.
in the transport sector, that can offer an explanation for delays and why these causes are so numerous and often occurring.

**Conclusion**

The aim of each enterprise is to strengthen a competitive advantage. In any organization, the hidden downside or disadvantage can also occur in common operation. Oftentimes it may be related to lack of information as well as inadequate communication between departments. The solution to this problem involves finding an acceptable way to transmit the accurate data so as to achieve comparable results. Developing reliable data collection can take lots of time but successful process improvement are dependent on it. In connection with the use of certain methods of quality management can be recognized as important factors of train delay.

The conducted research shows that some of the quality methods are applicable to the processes in railway transport, regarding to train delay. These methods were chosen because it is completely transparent. The cause-and-effect diagram is dedicated for mapping processes and consequently the Pareto diagram can be used to analyze the possible delay causes. This study was focused on evaluating the available data from information systems in order to compare the various reasons for train delays.

**Acknowledgement**

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**SELECTED ASPECTS OF SUBSISTENCE MINIMUM IN SLOVAKIA**

Alžbeta Suhányiová,1 Ladislav Suhányi2

**Abstract:** The subsistence minimum is a socially recognized minimum level of income for a person; any person whose income is below this level is considered to be in material need. It is one of the key elements of socio-political interventions; in that it binds with important functions in different areas. The level of minimum wage in Slovakia has not changed for the last four years, and now, this issue is a subject of extensive discussions in professional and scientific circles. The paper describes the subsistence minimum and presents the significant legislative changes that affect the functions of the subsistence minimum. The paper analyses, examines, and evaluates the development of the subsistence minimum of: an adult natural person, of another jointly assessed adult person, of non-dependent underage children, and of dependent children – in the period from 1998 to 2016 (the present). The paper also reflects on the current situation in dealing with the issue of the subsistence minimum and its impact on selected social benefits and personal income taxes in Slovakia. The results of the research helped us to propose recommendations on the issue of setting the subsistence minimum and the whole issue as such.

**JEL Classification Numbers:** E64, H24, I31; DOI: http://dx.doi.org/10.12955/cbup.v5.968

**Keywords:** subsistence minimum, legislative changes, social benefits, income tax.

**Introduction**

According to the Act no. 601/2003 Coll. on the subsistence minimum, it is the socially recognized minimum level of personal income below which a person is considered to be in material need.

The first federal law on the subsistence minimum (Act no. 463/1991 Coll.) came into force in July 1991. Originally the subsistence minimum served two important functions. First, it served as a threshold for assessing a person’s entitlement to social benefits. This function of the subsistence level has remained unchanged. Secondly, it served as a guaranteed minimum income threshold for those who were without any other income or their income did not reach the subsistence minimum. Income lower than the subsistence minimum was considered insufficient to ensure the livelihood and other basic needs of the person. The progressive nature of this legislation is evident when one considers the fact that it had been drawn up one year before the Recommendation 92/441 /EEC on common criteria concerning sufficient resources and social assistance in social protection systems.

After the split of Czechoslovakia the law on the subsistence level remained a key component of the social security system in the Slovak Republic. During the 90s a series of amendments to this law has been adopted. The aim of these amendments was to valorize the subsistence minimum to reflect inflation.

The new Act no. 125/1998 Coll. on the subsistence minimum and on fixing of the amounts for the purpose of state social benefits, as amended, was the result of a comprehensive policy and research efforts encouraged by the Concept of social sphere transformation. This law defined the subsistence minimum in the same way as the previous one (a socially recognized minimum level of personal income below which a person is considered to be in material need) the subsistence minimum continued to function as a reference point of the social security system. Act no. 195/1998 Coll. on social assistance which was adopted concurrently with the Act on the subsistence minimum served as a basis for the implementation of the minimum income guarantee system. This law thus made the first steps towards the division between the subsistence minimum and social assistance (minimum income schemes) and disrupted the function of the subsistence minimum guarantee as socially recognized minimum income.

The Ministry of Labour, Social Affairs and Family of the Slovak Republic is entitled to take steps governing the subsistence minimum on July 1 of each calendar year based on the growth rate of net cash income per capita or the growth rate or the cost of living of low-income households for the decisive period. The decisive period in which the growth of the cost of living of low-income households is being ascertained is: the period from April of the previous calendar year to April of the current calendar year (Horváthová, 2016a). The data are provided by the Statistical Office of the

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1 University of Prešov, Faculty of Management, Konštantínova 16, Prešov, Slovakia, alzbeta.suhanyiova@unipo.sk
2 University of Prešov, Faculty of Management, Konštantínova 16, Prešov, Slovakia, ladislav.suhanyi@unipo.sk
Slovak Republic. The subsistence minimum according to Art. 5 par. 2 of Act no. 601/2003 shall be adjusted by multiplying the subsistence minimum with the following:

- growth rates of net cash income per capita published by the Statistical Office of the Slovak Republic - if the growth rate of net cash income per capita resulting from the comparison of the first quarter of the current calendar year and the first quarter of the previous calendar year is lower than the growth rate of the cost of living of low-income households for the decisive period, or
- the growth rate of the cost of living of low-income households published by the Statistical Office of the Slovak Republic - if the growth rate of the cost of living of low-income households for the decisive period is lower than the growth rate of net cash income per capita published by the Statistical Office of the Slovak Republic for the period of the first quarter of the current calendar year in comparison with the first quarter of the previous calendar year.

The amount of the subsistence minimum is not amended if one of the above-mentioned coefficients is lower than one or equal to one. This measure prevents the reduction of the subsistence minimum and the benefits associated with it.

The analysis of the development of the subsistence minimum

The subsistence minimum is therefore a socially recognized minimum level of personal income below which a person is considered to be in material need. Its level is adjusted annually, usually on July 1 of the calendar year. The following section examines the development of the monthly subsistence minimum amounts in Slovakia. The reference period is nineteen years, starting with the date on which Act no. 125/1998 Coll. came into force to the present (2016).

<table>
<thead>
<tr>
<th>Valid from</th>
<th>One adult person in EUR</th>
<th>Change in EUR (in %)</th>
<th>Another jointly assessed adult natural person in EUR</th>
<th>Change in EUR (in %)</th>
<th>Independent minor child and dependent child</th>
<th>Change in EUR (in %)</th>
<th>Regulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/7/1999</td>
<td>107.22</td>
<td>+7.62 (7.65%)</td>
<td>75.02</td>
<td>+5.31 (7.62%)</td>
<td>48.46</td>
<td>+3.65 (8.15%)</td>
<td>Regulation no.160/1999</td>
</tr>
<tr>
<td>1/7/2000</td>
<td>115.85</td>
<td>+8.63 (8.05%)</td>
<td>80.99</td>
<td>+5.97 (7.96%)</td>
<td>52.45</td>
<td>+3.99 (8.23%)</td>
<td>Regulation no.187/2000</td>
</tr>
<tr>
<td>1/7/2001</td>
<td>125.80</td>
<td>+9.95 (8.59%)</td>
<td>87.96</td>
<td>+6.97 (8.61%)</td>
<td>57.09</td>
<td>+4.64 (8.85%)</td>
<td>Regulation no.232/2001</td>
</tr>
<tr>
<td>1/7/2002</td>
<td>130.45</td>
<td>+4.65 (3.7%)</td>
<td>91.28</td>
<td>+3.32 (3.77%)</td>
<td>59.09</td>
<td>+2.00 (3.50%)</td>
<td>Regulation no.285/2002</td>
</tr>
<tr>
<td>1/7/2003</td>
<td>139.75</td>
<td>+9.30 (7.13%)</td>
<td>97.60</td>
<td>+6.32 (6.92%)</td>
<td>63.40</td>
<td>+4.31 (7.29%)</td>
<td>Regulation no.213/2003</td>
</tr>
<tr>
<td>1/7/2004</td>
<td>152.03</td>
<td>+12.28 (8.79%)</td>
<td>106.22</td>
<td>+8.62 (8.83%)</td>
<td>69.04</td>
<td>+5.64 (8.90%)</td>
<td>Regulation no.372/2004</td>
</tr>
<tr>
<td>1/7/2005</td>
<td>157.01</td>
<td>+4.98 (3.28%)</td>
<td>109.54</td>
<td>+3.32 (3.13%)</td>
<td>71.37</td>
<td>+2.33 (3.37%)</td>
<td>Regulation no.262/2005</td>
</tr>
<tr>
<td>1/7/2006</td>
<td>165.31</td>
<td>+8.30 (5.29%)</td>
<td>115.51</td>
<td>+5.97 (5.45%)</td>
<td>75.35</td>
<td>+3.98 (5.58%)</td>
<td>Regulation no.415/2006</td>
</tr>
<tr>
<td>1/7/2007</td>
<td>170.28</td>
<td>+4.97 (3.01%)</td>
<td>118.83</td>
<td>+3.32 (2.87)</td>
<td>77.67</td>
<td>+2.32 (3.08%)</td>
<td>Regulation no.291/2007</td>
</tr>
<tr>
<td>1/7/2008</td>
<td>178.92</td>
<td>+8.64 (5.07%)</td>
<td>124.81</td>
<td>+5.98 (5.03%)</td>
<td>81.66</td>
<td>+3.99 (5.14%)</td>
<td>Regulation no.225/2008</td>
</tr>
<tr>
<td>1/7/2009</td>
<td>185.19</td>
<td>+6.27 (3.50%)</td>
<td>129.18</td>
<td>+4.37 (3.50%)</td>
<td>84.52</td>
<td>+2.86 (3.50%)</td>
<td>Regulation no.252/2009</td>
</tr>
<tr>
<td>1/7/2010</td>
<td>185.38</td>
<td>+0.19 (0.10%)</td>
<td>129.31</td>
<td>+0.13 (0.10%)</td>
<td>84.61</td>
<td>+0.09 (0.11%)</td>
<td>Regulation no.300/2010</td>
</tr>
</tbody>
</table>
Since 1998, the subsistence minimum of one adult person increased by 98.49 EUR (nearly 98.89 %), of another jointly assessed adult person by 68.48 EUR (98.24%) and of independent minor child and dependent child by 45.61 EUR (101.79 %).

The highest increase of the subsistence minimum was recorded on July 1 2004. In the case of an adult person the increase of the subsistence minimum amounted to 12.28 EUR (8.79%), in case of another jointly assessed adult person the increase of the subsistence minimum amounted to 8.62 EUR (8.62%) and in case of independent minor child and dependent child the increase of the subsistence minimum amounted to 5.64 EUR (8.90 %).

In recent years, the coefficients for the valorization assessment of the subsistence minimum are below one (Horváthová, 2016b). We can therefore conclude that given the negative development of the growth rate of the cost of living of low-income households (now 0.994), the subsistence minimum level has remained "frozen" in the past years. Therefore, the Ministry did not issue any regulation that would alter the subsistence minimum level, and according to available information the Ministry does not plan to do so in 2017 either.

The currently valid amount of the subsistence minimum per household is specified in the table below.

<table>
<thead>
<tr>
<th>Date</th>
<th>Amount (EUR)</th>
<th>Increase (%)</th>
<th>Subsistence Minimum</th>
<th>Regulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/7/2011</td>
<td>189.09</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/7/2012</td>
<td>194.58</td>
<td>+4.75 (2.50%)</td>
<td>135.74</td>
<td></td>
</tr>
<tr>
<td>1/7/2013</td>
<td>198.09</td>
<td>+3.51 (1.80%)</td>
<td>138.19</td>
<td></td>
</tr>
<tr>
<td>1/7/2014</td>
<td>198.09</td>
<td></td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>1/7/2015</td>
<td>198.09</td>
<td>0</td>
<td>138.19</td>
<td></td>
</tr>
<tr>
<td>1/7/2016</td>
<td>198.09</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

Source: Author³

As already mentioned above, the subsistence minimum remains unchanged for the third year in a row: one adult person 198.09 EUR per month, for another jointly assessed adult person in the household 138.19 EUR per month, the independent minor child or dependent child 90.42 EUR per month. The subsistence minimum is calculated according to the following formula: 100% for the first adult in the household, 70% for each another jointly assessed adult person in the household, and 45% for each child.

³ The table was prepared by own processing based on data from Measures of the MoLSAF (from 1999 to 2016).

⁴ The table was prepared by own processing based on the Regulation by MoLSAF no. 186/2013.
The analysis of the impact of the subsistence minimum on the selected social benefits and taxes on personal income

The economic indicator "subsistence minimum" has an impact on social benefits (Palíderová, 2016), the amount of which depends on the subsistence minimum. It influences, for example, parental allowance, child allowance, the supplement to the child allowance, minimum maintenance, maintenance payments, allowances to support substitute care for a child, repeated financial contributions to compensate severe disability, early retirement or the amount of the minimum pension. The subsistence minimum has an impact on the level of the tax bonus, the amount of tax allowances, the amount of the tax base above which an individual is a subject to a higher rate of income tax (25%).

The following section analyzes the impact of the subsistence minimum on the amount of selected social benefits and the amount of income tax.

Early retirement pension – according to paragraph 2 of the Act no. 461/2003 Coll. the entitlement to early retirement pension arises, in addition to other factors, only to an insured person whose early retirement pension is greater than 1.2 times the subsistence minimum for an adult person as of the date a person requested such an allowance. The minimum amount of early retirement pension is therefore 237.80 EUR per month.

Minimum pension – the amount of the minimum pension is affected by, among other factors, the subsistence minimum in force on January 1 of the current calendar year. The minimum pension is at the level of the subsistence minimum 198.09 EUR and increases depending on the number of years worked. For example, for 30 years worked, the minimum pension is 269.50 EUR (1.36 times the subsistence minimum), for 40 years worked the minimum pension is 311.10 EUR (1.57 times the subsistence minimum), for 50 years worked the minimum pension is 370.50 EUR (1.87 times the subsistence minimum).

Income execution – the levy on an income execution (wage deductions or pension deductions) shall not withhold basic amount, which is 100% of the subsistence minimum. At present, this amount is 198.09 EUR.

Child maintenance – minimal maintenance under Art. 62 paragraph. 3 of Act no. 36/2005 Coll. is 30% of the subsistence minimum of a dependent child, which currently amounts to the 27.13 EUR for 1 child.

Tax bonus – tax bonus is a form of tax relief for a dependent child living with a taxpayer in a shared household, which reduces the income tax paid by a taxpayer. A taxpayer is entitled to the tax bonus provided he had a taxable income in the calendar year:
- from employment of at least 6 times the minimum wage (2 430 EUR),
- from business or other self-employed activity at least equal to 6 times the minimum wage and reported the tax base from these activities.

Tax bonus increases on January 1 of the tax year on the basis of the same coefficient as the subsistence minimum. The amount of monthly tax bonus for a dependent child is 21.41 EUR. The annual amount of the tax bonus that a taxpayer could claim per 2016 is 256.92 EUR. In 2017, this amount remains unchanged since the living wage in 2016 has not increased.

Nontaxable part of a base tax – the taxpayer may annually apply the nontaxable part of the tax for a dependent spouse or himself.

<table>
<thead>
<tr>
<th>The tax base for the taxpayer in EUR</th>
<th>Nontaxable part of a base tax in EUR</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 19 809 (100-times the subsistence minimum)</td>
<td>3 803.33 (19.2-times the subsistence minimum)</td>
</tr>
<tr>
<td>&gt; 19 809</td>
<td>8 755.578 (44.2 times the subsistence minimum) - 1/4 of the tax base</td>
</tr>
<tr>
<td>≤ 35 022.31 (176.8-times the subsistence minimum)</td>
<td>0</td>
</tr>
</tbody>
</table>

Source: Author³

³ The table was prepared by own processing in accordance with the Act no. 595/2003 Coll. on Income Tax, as amended.
The taxpayer may annually apply the nontaxable part of the tax if the tax base is less than 100-times the subsistence minimum – 3,803.33 EUR per year, which is equivalent to 19.2 times the current amount of the subsistence minimum. Monthly nontaxable part of the tax is 316.94 EUR (3,803.33 : 12 = 316.94 EUR). If the tax base exceeds 100-times the subsistence minimum, then the tax allowance is calculated as the difference between 44.2 times the subsistence minimum and 1/4 tax base. If the result is equal to or less than zero, the tax allowance on the taxpayer will be zero.

The taxpayer is entitled to apply the nontaxable part of the tax for the spouse who lives with the taxpayer in the shared household and meets at least one of the following conditions: takes care of a dependent minor child, receives a financial allowance for nursing a member of family, or has been registered with the Labour office, or is considered a disabled person. The amount of the nontaxable part of the tax for the spouse showed in the table below depends not only on the amount of the taxpayer’s tax base, but also on the amount of spouse’s income.

<table>
<thead>
<tr>
<th>The tax base for the taxpayer in EUR</th>
<th>Spouse</th>
<th>Nontaxable part of a base tax in EUR</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 35 022.31</td>
<td>does not have own income</td>
<td>3 803.33</td>
</tr>
<tr>
<td></td>
<td>has own income</td>
<td>3 803.33 – spouse’s income</td>
</tr>
<tr>
<td></td>
<td>income &gt; 3 803.33 EUR</td>
<td>0</td>
</tr>
<tr>
<td>&gt; 35 022.31</td>
<td>does not have own income</td>
<td>12 558.906 (63.4-times the subsistence minimum) - 1/4 base tax</td>
</tr>
<tr>
<td></td>
<td>has own income</td>
<td>12 558.906 - 1/4 of base tax - spouse’s income</td>
</tr>
<tr>
<td>&lt; 50 235.63</td>
<td>income is not taken into account</td>
<td>0</td>
</tr>
</tbody>
</table>

Source: Author

Table 4: Determination the nontaxable part of a base tax for spouse

It follows that the subsistence minimum has a significant impact on personal income taxes. Specifically, the subsistence minimum influences the amount of nontaxable part of a base tax for a taxpayer and spouse (see Tables 3 and 4), as well as the obligation to file a tax return, minimum tax, and the use of the appropriate tax rate. Due to the limited extent of the paper we will not research this issue any further.

**Conclusion**

The subsistence minimum can be easily described as the sum necessary for one’s survival. It should be sufficient for basic needs, namely one hot meal a day, necessary clothing and shelter. The highest increase in the subsistence minimum was recorded in 2004, almost 9%. Since 2013, the growth rate of the cost of living of low-income households (≤ 1) has been developing negatively, therefore the subsistence minimum is also stagnating. If the subsistence minimum does not increase, the contributions that state pays parents, students, families in need, etc. also do not increase.

We see the current form and function of the subsistence minimum in a very negative light since the subsistence minimum stopped serving its original purpose – to protect those in need. Since the subsistence minimum should cover the basic human needs, its current form needs a serious revision. The subsistence minimum should reflect the actual needs and purchases of low-income families. We expect the subsistence minimum to become much more meaningful.

According to Kusá (2010), too low income makes it impossible for the household to “behave as it should.” The minimum income (the subsistence minimum, however, has no longer the character of a minimum income) in other civilized societies saves households from bad decisions (hunger, not paying bills, absenteeism in schools, etc.) and prevents households from getting into poverty.

This paper is an outcome of the projects VEGA no. 1/0909/16 and KEGA no. 058PU-4/2015.

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6 The table was prepared by own processing in accordance with the Act no. 595/2003 Coll. on Income Tax, as amended.
References


Government Regulation no. 268 [from 2006, April 19] on the extent of deduction from wages when enforcing the decisions in the Slovak Republic


Measures of the MoLSAF (Ministry of Labor, Social Affairs and Family of the Slovak Republic) on the regulation of subsistence minimum, effective for the years 1999 to 2016


The Act no. 125/1998 Coll. on the subsistence minimum and on fixing of amounts for the purpose of state social benefits, as amended

The Act no. 195/1998 Coll. on social assistance, as amended

The Act no. 36/2005 Coll. on Family, as amended

The Act no. 461/2003 Coll. on social insurance, as amended

The Act no. 463/1991 Coll. on subsistence minimum

The Act no. 595/2003 Coll. on Income Tax, as amended

The Act no. 601/2003 Coll. on subsistence minimum and on amendment of certain acts, as amended

COLLABORATIVE ECONOMY AS AN INDICATION OF SUSTAINABLE CONSUMPTION IN RESULTS OF EXAMINED PEOPLE

Agnieszka Tłuczak,1 Sabina Kaufl

Abstract: Sustainable consumption takes inspiration from the newest trends in economics which is a collaborative economy. This type of economy changes the model of organization and distribution based on sharing, using and creating together. The basic aim of this study is pointing out a purpose of a collaborating economy in the accomplishment of sustained consumption rules and in a conscious and self-motivated limit of personal consumption to the purpose of co-sharing. This task is going to be achieved with empirical verification of consumers behavior based on answers to a questionnaire. Research has confirmed the suggested hypothesis. People want to attend in collaborative consumption, which is positively correlated with the level of self-satisfaction from life and income. The results presented in this paper shouldn't be treated as final, because it was pilot research.

JEL Classification Numbers: E03, E21, E29; DOI: http://dx.doi.org/10.12955/cbup.v5.969

Keywords: collaborative, consumption, co-sharing, sustainable.

Introduction

The last two decades of 21st century mark themselves in the growth of the meaning of consumption described as sustainable and being the answer of consumers to the growing social and environmental issues. It is said that it has its source in a report from Bruntland which sketched directions of development of the modern economy systems (Our 1987, p. 16).

Sustainable consumption is in the center of concern of the economy, studies about rational managing limited resources and alternative ways of using it (Sowell 2000; p. 66, Mont, Plepys 2008, p. 532). It is an alternative for consumerism, spare consumption that crosses a level which is necessary to appease people’s needs (Baudrillard 2005). It means that optimal, conscious and responsible use of available natural resources, goods and services according to rules of sustainable development. We are able to see it in the reorientation of behaviors, change of egocentric basis in an egocentric direction and purchasing decisions which include the needs of others and the environment. Sustainable consumption is also a conscious limit of consumption – anti-consumption which doesn’t mean quitting from satisfying your needs but making it more rational, responsible and ethical (Binkley & Littler, 2011; Iyer & Muney, 2009; Chatzidakis & Lee, 2013, Hogg et al., 2009; Shaw & Newholm, 2002).

Sustainable consumption takes inspiration from the newest trends in economics which is a collaborative economy which changes the model of organization and distribution based on sharing, using and creating together (Botsman & Rogers, 2010, Pearson, 2014; Ozanne & Ballantyne, 2010). The basic aim of this study is pointing out a purpose of a collaborating economy in the accomplishment of sustained consumption rules and in a conscious and self-motivated limit of personal consumption to the purpose of co-sharing. This task is going to be achieved with empirical verification of consumers behavior based on answers in a questionnaire.

Collaborative economy as an element of sustainable consumption – literature review

The problem of sustainable consumption gets more and more attention. Its main idea is increasing the disequilibrium between using resources and their availability on earth and the big differentiation of the standard of living among people who live in regions with different rates of growth (Evans 2011; Lorek & Fuchs, 2014). This is evident in gained behaviors which support using products that consummate basic needs and minimize the abortion of natural resources. The increased prevalence of sustainable consumption opens up wide abilities to creating new business models based on rules of the collaborative economy. This has been started in the new technology era with easy access to the internet. It is defined as sharing, bartering, lending and ranting of products and technology (Botsman & Rogers 2010; Schor & Thompson 2014b, pp. 4 – 6). It is opposite to the usual business economy which leads to having and getting, the expression of my own “me” and identification with objects (Kleine et al., 1995, p. 328). Schor names the collaborative economy a social, sustainable innovation with the ability to improve and develop new technologies for communication and informatics and web

1 Opole University, atluczak@uni.opole.pl
2 Opole University, skauf@uni.opole.pl
communities (Schor, 2011). A Collaborative (or sharing) economy is meant to get relationships with strangers through cyber platforms (Schor, 2015).

The author of “sharing economy” is M. Weltzman, the economist who used it in 1984 for the first time in the book named “The share economy.” This saying means “collaborative consumption made by the activities of sharing, exchanging and rental of resources without owning the goods (Lessing, 2008). Collaborative consumption shows the tendencies of consumers to involve themselves into systems and consumption webs, which gives them access to products and services without paying obligatory fees that come from property of law (Botsman & Roger, 2010; Gansky, 2010). It is a symptom of common digitization and actualize era of prosumers (Ritzer & Jurgenson, 2010; Toffler, 1980). Nowadays almost every consumer has an ability to become a producer by only using commonly available web platforms, which give the consumers a variety of opportunities to express their identities (Belk 2013a, Belk 2013b). It means the subject of a sharing economy are resources, services and transport (BlaBlaCar, Turo, Uber) accommodation and space (Airbnb, Landshare, JustPark), abilities and time (Killshare, Skilltrade, Khan Academy) and other resources like for example tools.

The Internet and social media do not guarantee the sense of independence. Web connections have contributed to creating a new form of community where property doesn’t have any economic value. What is very important is affiliation, trust, and devotion. In an economical context collaborative consumption is an economical model sustained by the common use of products (ex. physical good or service) in webs C2C and B2C (Hamari et al., 2015, p.1). In the first case those webs have been coordinated through social websites which help in social interaction (Liand & Turban, 2011), in the second case through an agent. In every single one of them, the main condition is specific information about the reputation on the social website of people from the exchange. R. Bosman and R. Rogers highlight that social websites (Facebook, Twitter, Freecycle) increase the ability of consumers to exchange and cooperate and not see any risk (Botsman & Rogers, 2010).

Collaborative consumption is social movement against isolation, separation and grouping, which keeps getting more and more popular among consumers, especially young, because it precisely gives them their basic needs: low prices, individualism, comfort. It is possible thanks to the effective collaboration free sources (ex. car, flat, abilities). Even though collaboration isn’t based on sharing properties, it needs transaction mechanisms C2C, like for example: making bookings (of a bike, car) or payments. The sharing economy is not always only kindness and charity, it’s also profit that matters and the need of saving and confrontation with ability to get profits is the thing that makes it work. It will be possible according to decreasing costs of transactions made with the help of the Internet. Just like Rifkin said: in the future, there will be community of zero final cost, in which the costs of using a certain good through next subjects will be very low (Rifkin, 2015). Through Internet platforms it will be possible to widen a size of users of a goods and Internet services will earn on advertisements or payments for help. Even though in the literature of the subject there is highlighted the positive role of consumption in promoting “positive” materialism which means connection to the meaning of quality of goods, their background, kind of used sources and extend a cycle of using a product (Schor, Thompson 2014b, p.14) it is hard today to describe how collaboration is really promoting the matter of sustainable consumption. As Schor said widely shared beliefs about the good influence of the sharing economy and anti-consumption show the basis of consumers against sustainable consumption.

**Methodology and results of studies**

The main subject of study is the collaborative economy, which makes up an integral element of sustainable development. Authors of this theory think that collaboration is shown in resignation, reduction and reuse of goods shows sustainable style of living. It was established additional that consumers using sharing are more pleased from their life and they spent their money more rationally. Those assumptions make us enunciate two hypothesis:

H1: Collaborative consumption is positively connected to happiness in life

H2: Sharing economy is positively connected with how much we have.

Verification of the hypothesis was made based on a questionnaire made by group of professors I. Balderjahn from University of Potsdam. The research was conducted during spring 2016 in Poland, in opolskie voivodeship, on 250 randomly chosen and connected people. According to age, sex, and
income, the research was compatible to the structure of the general population (tab 1.). This research was a kind of pilot. These were pilot studies, the location was chosen deliberately.

### Table 1: Demographic profiles of the samples

<table>
<thead>
<tr>
<th>Gender</th>
<th>Age</th>
<th>up to 30 years old</th>
<th>from 30 to 40</th>
<th>from 40 to 50</th>
<th>more than 50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td></td>
<td>51%</td>
<td>48%</td>
<td>56%</td>
<td>51%</td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td>45%</td>
<td>52%</td>
<td>44%</td>
<td>49%</td>
</tr>
</tbody>
</table>

Source: Author.

### Table 2: Correlation between will to share and self happiness

<table>
<thead>
<tr>
<th></th>
<th>self-happiness</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>I’d rather borrow this product from friends</td>
<td>0.7070</td>
<td>0.213*10^-5</td>
</tr>
<tr>
<td>I’d rather share this with others</td>
<td>0.5732</td>
<td>0.146*10^-3</td>
</tr>
<tr>
<td>I’d rather lend it to someone</td>
<td>0.7101</td>
<td>0.001*10^-8</td>
</tr>
</tbody>
</table>

Source: Author.

### Table 3: Correlation between will to share and self happiness level of income

<table>
<thead>
<tr>
<th></th>
<th>Income</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>I’d rather borrow this product from friends</td>
<td>0.870416</td>
<td>0.041*10^-8</td>
</tr>
<tr>
<td>I’d rather share this with others</td>
<td>0.804301</td>
<td>0.621*10^-2</td>
</tr>
<tr>
<td>I’d rather lend it to someone</td>
<td>0.792103</td>
<td>0.102*10^-4</td>
</tr>
</tbody>
</table>

Source: Author.

The gained results supported the made hypothesis. Collaborative consumption is correlated to the level of self-happiness from living of the studied people. Additionally, what’s worth more attention is a fact that it is a positive correlation, so as the will to share a good of stabile use is bigger, the more self-happy is the studied person.

As the analysis have shown, answers according to characteristics of studied people are differentiations between attending in the sharing economy and the level of self-happiness between male and female. Male mark their level of self-happiness higher than female, but their will to share is smaller. Among the described items which the studied people pointed as those that they are able to share, in the first place was a drill, then snow skis, then a washing machine and finally a camera.

Income that divides polish community is also positively correlated with will to share. Often having more income lead to buying additional, not necessarily useful products. Among the studied people there is bigger will to leave their money in single use in the share economy. Those people think that rather than having something, they would like to have a free access to some other goods. Even though if they already have something they are not necessarily connected to it, but they can share it with other people.

As a main reason of being part of sharing economy, the studied people say it’s their saving (32%), ability to meet other people (26%) and a will to help others. Their attitude to property changes and approval of services and applications which are based on sharing rule. More and more people see how important is access to goods and not actually having it. Some part of them is doing it because of economic reasons, but some are fully into the idea of sharing it (goods).

**Summary**

There is a new trend in Western Europe countries, it is a continued new idea in the Polish country. The consciousness of limit of natural resources should incline consumers to share certain goods of permanent use (and not only those). The sharing economy should make consumers feel positive and they show this with a connection to certain motivations. More of the studied people agree that it is more affordable to use someone else’s goods than having it for themselves. Consumers see real advantages from someone’s resources in place of actually having it for example savings, feeling comfortable and elasticity: empowering social connections, positive influence to the environment, and a bigger satisfaction from interaction. Research has confirmed the made hypothesis. The will to participate in collaborative consumption is positively correlated with a level of self-satisfaction from life and income. Our theoretical and empirical assumptions give basic ideas to making a study directed
to Polish consumers. The results presented in our work should be treated as final because the research we made was only a pilot and in the future authors are going to widen the presented topics.

**Final Comments**

Sustainable consumption takes inspiration from the newest trends in economics which is a collaborative economy. It is a new trend in Western Europe countries. The main reason of being part of sharing economy, the studied people say it’s their saving (32%), ability to meet other people (26%) and a will to help others.

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A NEW SIMPLIFIED DECISION MAKING SYSTEM FOR SMALL PROJECTS

Secărea Tudorel¹

Abstract: Making decisions on funding or not funding projects is the most difficult process in management, especially for the state services that have a limited budget. The aim of this study is to establish a new simplified system for evaluating small projects based on translating all values into economic terms. The new system tries to simplify the Cost-Benefit Analysis (on which it is based) to the bare minimum and still keep a high degree of relevance to the decision-making process. The conclusions were somewhat remarkable, mostly because the system gives accurate and relevant data for comparing projects despite its simplicity. The other big benefit of this system is its simple nature and ease of understanding even for people with no economic studies.

The applied part of this paper involves an analysis of real projects in Brasov County – Romania and the results of applying Cost-Benefit Analysis and the new method for evaluating projects.

The paper concludes proposing a new, modern and simple system for improving decision making on small projects.

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Keywords: decision making, efficiency, project

Introduction

Investment decisions represent the main problem of any development strategy. They pose a great obstacle for any management structure, especially in the public sector. A decision has to be made after research results to determine the costs and returns for each option. When an investment decision has to be taken to implement a small project (usually with local impact), one form or another of weighing costs against benefits is involved. The current system used to calculate future benefits versus cost is the Cost-Benefit Analysis. This analysis is best used for big projects that have impacts measurable in monetary terms. In a real-world application, this analysis is too complex for small projects so the aim of this study is to create a new simplified system for evaluating the impact projects will have. The new system will incorporate the core components of the Cost-Benefit Analysis.

The Financial Analysis of a project

The most used system for analyzing the opportunity of an investment that can be financed by grants consist of six steps (Florio, 2008):

- A presentation and discussion of the socio-economic context and the objectives;
- The clear identification of the project;
- The study of the feasibility of the project and of alternative options;
- Financial Analysis;
- Economic Analysis;
- Risk Assessment.

Our research is based on the Financial Analysis – that is the core of the Cost-Benefit Analysis and which dictates the value of the project in the long term (Dinwiddy, 1996). The financial Analysis is based on the discounted cash flow approach. A system of accounting tables should show cash inflows and outflows related to (Florio, 2008):

- total investment costs;
- total operating costs and revenues;
- financial return on the investment costs: FNPV and FRR;
- sources of finance;
- financial sustainability;
- the latter takes into account the impact of the grant on national (public and private) investors.

For the projects to be funded the Cost-Benefit Analysis must generate results that respect the indicators provided in the Guides for the European Union Programs. This analysis responds to the question: What will be the impact of the project on the target groups in society? (Belli, 2001)

The main purpose of the financial analysis is to use the project cash flow forecasts to calculate suitable net return indicators (Drèze, 1987). In the European Union Guides, a particular emphasis is placed on

¹ Transilvania University, Brasov, Romania, e-mail: secarea_t@yahoo.com
two financial indicators: The Financial Net Present Value (FNPV) and the Financial Internal Rate of Return (FRR) (Florio, 2008).

Investment analysis

For our study, we took 12 real projects that have been implemented in the Brasov County – Romania with funding from the European Union. The projects range from constructions to services and provide the communities with different benefits.

The majority of the guides, especially those in rural area (The Agency for Financing Rural Investment, 2017) state that the Cost-Benefit Analysis results influence the project selection and funding. In the case of construction projects, the Cost-Benefit Analysis is mandatory, but in the service area this analysis is not used. For services the project is scored on the quality of the proposition and on the estimated impact.

The project performance indicators are the basis for the investment analysis. According to the guidelines the analysis is based on the total investment (which is form from European Grant and local/national contribution), the operating costs and revenues. These inputs are used to calculate the financial net present value (FNPV) and financial internal rate of return (FRR).

The financial net present value is defined as the sum that occurs when the expected investment and operating costs of the project (suitably discounted) are deducted from the discounted value of the expected revenues:

\[ \text{FNPV} = \sum_{t=0}^{n} a_t S_t = \frac{S_0}{(1+i)^0} + \frac{S_1}{(1+i)^1} + ... + \frac{S_n}{(1+i)^n} \]

Where \( S_t \) is the balance of cash flow at time \( t \) (net cash flow) and \( a_t \) is the financial discount factor chosen for discounting at time \( t \).

The financial internal rate of return is defined as the discount rate that produces a zero FNPV:

\[ \text{FNPV} = \sum [S_t / (1+FRR)^t] = 0 \]

More specifically, the financial net present value (FNPV), and the financial rate of return (FRR), on the total investment cost, measure the performance of the investment independently of the sources or methods of financing.

The European Guidelines state that for a project to be funded by grant the FNPV must be negative and FRR be smaller than 5% (Florio, 2008).

In Table 1 below there are the results of the financial analysis for the projects studied.

From this financial analysis of all 12 projects we immediately see that all the FNPV are negative and FRR are smaller than 5% so is clear that all the projects need European Grant funding. But the problem occurs when we try to differentiate between them. Let’s say that we could only finance 6 out of the 12 projects proposed. The financial analysis is a very complex tool from which result are very complex. For a trained economist, these result can be very helpful, but for ordinary people to understand and make decisions based on this numbers is hard, harder still is the possibility to re-calculate these indicators if we tweak the variables that generated them – especially the total investment and the revenues and/or costs.

Also we must take into account that the Cost-Benefit Analysis is used and effective especially for large scale projects. Its complexity is fully justified on massive projects (Pearce, 2006), but for smaller projects with local implication this analysis with all the financial and economic indicators seems too complex. We consider that investments that impact only local communities, smaller than 30,000 people and with simple to estimate costs and benefits need a new type of efficiency measure unit.

Investment opportunity number

The investment opportunity number is a financial indicator proposed by the author that resulted from the research and analyses of projects and their efficiency - the usage of European Grants – that are a limited resource. This indicator factors in the most important numbers for calculating efficiency of using the funds, but relays on a very simple equation.

The process of calculating this indicator has two stages:
Stage 1 – calculating the basic indicators from the data that is generated by the project:

A = \frac{(\text{Revenues on 5 Years that includes indirect revenues})}{(\text{EU Grant})}

B = \frac{(\text{Revenues on 5 Years that includes indirect revenues})}{(\text{Operating costs on 5 Years})}

C = \frac{(\text{Revenues on 5 Years that includes indirect revenues})}{(\text{Local / national contribution})}

### Table 1: Results of the financial analysis of the studied projects.

<table>
<thead>
<tr>
<th>Project type and description</th>
<th>Total investment costs (RON)</th>
<th>Local / national contribution (RON)</th>
<th>EU Grant (RON)</th>
<th>Operating costs (5 Years) (RON)</th>
<th>Revenues (5 Years) – including indirect revenues (RON)</th>
<th>FNPV</th>
<th>FRR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction – Kindergarten Drăguș</td>
<td>872,494,71</td>
<td>130,874,21</td>
<td>741,620,51</td>
<td>96,919,10</td>
<td>659,350,80</td>
<td>-668,180,10</td>
<td>-24,21</td>
</tr>
<tr>
<td>Construction – Sewer system Rucăr</td>
<td>5,587,393,43</td>
<td>1,075,406,43</td>
<td>4,511,987,00</td>
<td>122,709,78</td>
<td>5,738,794,00</td>
<td>-4,230,723,79</td>
<td>-21,80</td>
</tr>
<tr>
<td>Construction - Sewer system Cincu</td>
<td>14,285,605,24</td>
<td>285,712,10</td>
<td>13,999,893,14</td>
<td>350,640,00</td>
<td>3,801,000,00</td>
<td>-9,378,352,53</td>
<td>-2,23</td>
</tr>
<tr>
<td>Construction – Multifunctional Social Building Vulcan</td>
<td>2,378,397,20</td>
<td>495,787,80</td>
<td>1,882,609,40</td>
<td>459,100,00</td>
<td>605,000,00</td>
<td>-1,667,544,93</td>
<td>-2,11</td>
</tr>
<tr>
<td>Construction – Water adduction system Voila</td>
<td>749,800,00</td>
<td>224,940,00</td>
<td>524,860,00</td>
<td>324,525,00</td>
<td>683,731,00</td>
<td>-222,419,93</td>
<td>1,42</td>
</tr>
<tr>
<td>Construction – Building takeoff ramp for ski jumping Râșnov</td>
<td>38,380,000,00</td>
<td>602,000,00</td>
<td>37,778,000,00</td>
<td>1,331,970,00</td>
<td>12,490,000,00</td>
<td>-28,774,112,14</td>
<td>-3,64</td>
</tr>
<tr>
<td>Services – Tourist promotion of Bran</td>
<td>997,836,05</td>
<td>168,112,34</td>
<td>829,723,71</td>
<td>399,134,42</td>
<td>2,993,508,16</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Services – Tourist promotion of Cristian</td>
<td>950,212,00</td>
<td>156,058,70</td>
<td>794,153,30</td>
<td>332,574,20</td>
<td>3,040,678,40</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Services – Tourist promotion of Feldioara</td>
<td>969,618,00</td>
<td>160,485,15</td>
<td>809,132,85</td>
<td>349,062,48</td>
<td>3,296,701,20</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Services – Tourist promotion of Fundata</td>
<td>877,761,28</td>
<td>145,465,99</td>
<td>732,295,29</td>
<td>263,328,38</td>
<td>1,843,298,68</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Services – Tourist promotion of Sânpetru</td>
<td>1,032,721,60</td>
<td>217,130,62</td>
<td>815,590,98</td>
<td>289,162,05</td>
<td>2,065,443,20</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Construction and services – Tourist promotion of Râșnov by building a Tourist Centre</td>
<td>629,164,80</td>
<td>167,023,46</td>
<td>462,141,35</td>
<td>380,990,00</td>
<td>1,062,000,00</td>
<td>-429,707,42</td>
<td>-2,16</td>
</tr>
</tbody>
</table>

Source: Author

This first stage takes into account the revenues (the most important indicator) that also contain the indirect revenues (for example for a sewer system the revenues from the taxes and also generated from the improving the health of the community – indirect revenue). The revenues are divided by the Grant the Operating costs and the Local / national contribution to justify the funding better.
This system of comparing the direct revenues over the main cost indicators has a natural logic, but these 3 numbers can’t generate a decision. The three numbers must be united in a simple to understand equation:

\[ A \times 35\% + B \times 45\% + C \times 20\% = ION \] (Investment opportunity number)

Table 2: The Investment opportunity number calculated for the 12 projects

<table>
<thead>
<tr>
<th>Project type and description</th>
<th>Total investment costs (RON)</th>
<th>Local/national contribution (RON)</th>
<th>EU Grant (RON)</th>
<th>Operating costs (5 Years) (RON)</th>
<th>Revenues (5 Years) – including indirect revenues (RON)</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>ION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction – Kindergarten Drăguș</td>
<td>872,494,71</td>
<td>130,874,21</td>
<td>741,620,51</td>
<td>96,919,10</td>
<td>659,350,80</td>
<td>0,89</td>
<td>0,41</td>
<td>5,04</td>
<td>1,50</td>
</tr>
<tr>
<td>Construction – Sewer system Rucăr</td>
<td>5,587,393,43</td>
<td>1,075,406,43</td>
<td>4,511,987,00</td>
<td>122,709,78</td>
<td>5,738,794,00</td>
<td>1,27</td>
<td>0,57</td>
<td>5,34</td>
<td>1,77</td>
</tr>
<tr>
<td>Construction – Sewer system Cincu</td>
<td>14,285,605,24</td>
<td>285,712,10</td>
<td>13,999,893,14</td>
<td>350,640,00</td>
<td>3,801,000,00</td>
<td>0,27</td>
<td>0,13</td>
<td>13,30</td>
<td>2,82</td>
</tr>
<tr>
<td>Construction – Multifunctional Social Building Vulcan</td>
<td>2,378,397,20</td>
<td>495,787,80</td>
<td>1,882,609,40</td>
<td>459,100,00</td>
<td>605,000,00</td>
<td>0,32</td>
<td>0,14</td>
<td>1,22</td>
<td>0,42</td>
</tr>
<tr>
<td>Construction – Water adduction system Voila</td>
<td>749,800,00</td>
<td>224,940,00</td>
<td>524,860,00</td>
<td>324,525,00</td>
<td>683,731,00</td>
<td>1,30</td>
<td>0,54</td>
<td>3,04</td>
<td>1,31</td>
</tr>
<tr>
<td>Construction – Building takeoff ramp for ski jumping Râșnov</td>
<td>38,380,000,00</td>
<td>602,000,00</td>
<td>37,778,000,00</td>
<td>1,331,970,00</td>
<td>12,490,000,00</td>
<td>0,33</td>
<td>0,16</td>
<td>20,75</td>
<td>4,34</td>
</tr>
<tr>
<td>Services – Tourist promotion of Bran</td>
<td>997,836,05</td>
<td>168,112,34</td>
<td>829,723,71</td>
<td>399,134,42</td>
<td>2,993,508,16</td>
<td>3,61</td>
<td>1,64</td>
<td>17,81</td>
<td>5,56</td>
</tr>
<tr>
<td>Services – Tourist promotion of Cristian</td>
<td>950,212,00</td>
<td>156,058,70</td>
<td>794,153,30</td>
<td>332,574,20</td>
<td>3,040,678,40</td>
<td>3,83</td>
<td>1,74</td>
<td>19,48</td>
<td>6,02</td>
</tr>
<tr>
<td>Services – Tourist promotion of Feldioara</td>
<td>969,618,00</td>
<td>160,485,15</td>
<td>809,132,85</td>
<td>349,062,48</td>
<td>3,296,701,20</td>
<td>4,07</td>
<td>1,85</td>
<td>20,54</td>
<td>6,37</td>
</tr>
<tr>
<td>Services – Tourist promotion of Fundata</td>
<td>877,761,28</td>
<td>145,465,99</td>
<td>732,295,29</td>
<td>263,328,38</td>
<td>1,843,298,68</td>
<td>2,52</td>
<td>1,14</td>
<td>12,67</td>
<td>3,93</td>
</tr>
<tr>
<td>Services – Tourist promotion of Sânpetru</td>
<td>1,032,721,60</td>
<td>217,130,62</td>
<td>815,590,98</td>
<td>289,162,05</td>
<td>2,065,443,20</td>
<td>2,53</td>
<td>1,12</td>
<td>9,51</td>
<td>3,29</td>
</tr>
<tr>
<td>Construction and services – Tourist promotion of Râșnov by building a Tourist Centre</td>
<td>629,164,80</td>
<td>167,023,46</td>
<td>462,141,35</td>
<td>380,990,00</td>
<td>1,062,000,00</td>
<td>2,30</td>
<td>0,97</td>
<td>6,36</td>
<td>2,51</td>
</tr>
</tbody>
</table>

Source: Author

The percentage for the importance of the individual indicator has been chosen by the author for the local environment. The local / national contribution is smaller in size for this program, so the impact in the bigger picture is diminished to 20% from the indicator. By contrast the revenues versus operating cost has a bigger importance because the financial support from the EU stops after the initial investment and the local entities must finance the operating of the structure / services.

This percentage could be changed to be adequate for the local environments where they are calculated. For projects where the local / national contribution is greater, the percentage can be adequately changed.
The period of 5 years had been chosen for this analysis because all the EU Grants stipulate a 5-year period of sustainability for the projects. This period is the minimum in which the project structures must operate according to the initial purpose of the project. Also, this period is best suited for small local projects that usually have a smaller lifespan.

From the Table 2 above we can see that the ION indicator is calculated for all the projects, regarding if they are construction or services based.

Also, this system is easy to transform into a formula in a spreadsheet that can be calculated automatically based on the inputs made. This ease of use and the ability to be understood and calculated by almost everyone regardless of their education, makes this indicator a powerful tool for understanding a project value and comparing it to other projects or even other options of the same project.

The projects can be arranged according to this indicator:

![Figure 1: Project type, description and Investment opportunity number](source: author)

We can observe that the service based projects took the first 3 positions due to the small costs of the projects and the big indirect revenues. All the projects are in direct relation to the economic impact that they had in the local region. We can clearly see that the promotion of tourism and close by, the sewer systems, are investments that have proved the most viable. At the bottom is the Multifunctional Social Building from the Vulcan village that has been proved to be a very minor improvement in the local social and economic sector.

**Conclusion**

This indicator is the first step in simplifying the process of decision making for local projects. This analysis, like its more complex counterpart – the Cost-Benefit Analysis – doesn’t give the full answer to the viability and economic/social impact of a project. But it does put the basis for reversing the trend in which the whole economic system goes – from simple to complex and even more complex.

It is true that in this simple analysis we didn’t take into account all the economic factors and uncertainties, but on local projects, especially ones with lifespans of around 5 years, these externalities could, at least in theory, have a less of an effect on the overall percentage – about 1 – 5%. So, in the bigger picture these external factors will not affect the final result. Also, the model could be modified to take into account more complex factors if needed.

In conclusion, this tool is created as a response to the growing complexity of decision making, especially for project funding. It is a tool that can be used and customized to the need of the entity that finances or want to implement a project. Its purpose is to make project analysis easier and accessible for everybody. This method is intended for use especially in developing countries to order a large number of alternatives and/or projects in a rapid manner and with a high degree of confidence. We must mention that this indicator is only a part of the decision-making process and it must be used with the other steps in analyzing a project (socio-economic context, the analysis of objectives, study of the
feasibility, risk assessment). Its importance comes from simplifying the financial analysis and providing a fast, easy to calculate, and dependable indicator for total value over total costs for a project.

Acknowledgment
All the data from the projects come from 8 years of analyzing and implementing projects for the Brasov County – Romania. Special thanks to the Administrations of: Bran, Cincu, Cristian, Drăguș, Feldioara, Fundata, Râșnov, Rucăr, Sânpetru, Voila, Vulcan.

References
INCREASING THE SOCIAL EFFECTIVENESS OF PUBLIC TRANSPORT

Svetla Tzvetkova

Abstract: The functioning of public transport as a primarily social phenomenon leads to the realization of a significant social effect. The more deployed and high-quality the level of transportations is, the larger the social effect is. This also elevates the culture of passenger service and the use of modern environmentally friendly means of transport. The social effect has a multilateral manifestation, but the most significant one is its manifestation in the following trends: satisfying the population’s various travel needs; reducing travel time and increasing free time, thus increasing the time for rest, relaxation, entertainment, educational and sport activities. The social effect is also achieved through the use of modern and environmentally friendly means of transport with reduced harmful emissions and noise impact on the population’s health. The primary goal of socially effective public transport is to be accessible to everyone, to provide comfort, awareness, safety and security during passenger travel by incorporating efficient and stable urban intelligent transport systems and modern integrated environmentally friendly public transport with better emission indicators. The present report is dedicated to the main trends of increasing the social effectiveness of public transport in cities.

JEL Classification Numbers: R41; DOI: http://dx.doi.org/10.12955/cbup.v5.971

Keywords: public transport, social effectiveness, quality transport, stable urban transport systems

Introduction
Increasing the social effectiveness of public transport has a defining role in the social and economic development of major cities. Quality transport contributes to the improvement of cultural and economic relations between separate regions, the trouble-free transportation of passengers for production needs and personal needs, and it becomes a basis for enhancing citizens’ living conditions and standard. The issue of the social effectiveness of public transport and the quality of freights has become particularly topical in recent years. Because the dynamic of urban traffic and the growing number of personal vehicles are the main reasons for traffic jams in European metropolises and environmental pollution with about 40% of CO₂ emissions and 70% of other air pollutant emissions, the European Commission has unsurprisingly focused on these problems, compiling the Green Book of Urban Mobility. It is a global strategy that defines the challenges that European cities face in their drive to provide stable mobility and social effectiveness by facilitating traffic in cities, reducing environmental pollution and noise and improving the organization, accessibility, security and safety of public transport.

The primary objectives of public transport in major European cities have to be: increasing social effectiveness through the use of higher-quality and more environmentally friendly transport; convincing citizens to use their personal cars less and aim at using public transport more frequently; fully satisfying their needs and covering their criteria for high-quality transport services.

Social effectiveness and quality of public transport
The social effectiveness of public transport is shown in the results of expenses for achieving a certain social effect. The results related to the degree of satisfying citizens’ needs for public transport are regarded as social effects. The higher the quality of public transport, the higher its social effectiveness (Vasilev, 1997).


It is especially important that firms dealing with transport services strive to fully satisfy users’ needs and, ideally, attempt to offer them such quality that best suits their needs. Therefore, the target quality of the service has to be as close to customers’ marketing criteria and their ideas of higher-quality transport services as possible. The literature does not provide a uniform standpoint on the hierarchy of individual indicators measuring the quality of public transport due to the subjective nature of satisfying travel needs, which means that it not always accurately defined or simple. People from different cities and states can have different habits, traditions and expectations regarding quality. The hierarchy of consumer criteria in regards to satisfying needs is a variable because customer expectations are not consistent and they can become larger, depending on the advancement in other sectors (for example, by

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1 UNWE – Sofia, svetlatzvetkova@abv.bg
introducing new technology, air conditioning and increasing comfort standards).

However, there is a uniform opinion in transport literature about the degree of importance of the “time” indicator, or the quantity of time spent on traveling with public transport is accepted as defining the quality of the service. Another important indicator directly linked to time is the “availability” indicator, which defines the degree of regularity of vehicle movement on preliminarily defined routes, which is determined by the available and planned in the schedule number of vehicles, especially in the peak periods of the day. Transport operators have to keep a constant eye on the percentage of trains traveling on time; the threshold of delay has to be between 2.5 to 5 minutes. The percentage of freight regularity has to be 97-98% in order to achieve the necessary quality of urban population service. This is especially important due to the circumstance that irregularity in public transport vehicle traffic is linked to a number of negative consequences.

In order for urban passenger traffic to be appealing, it has to be both regular and easily accessible to all passengers; 96% of the passengers cannot waste a lot of time and they need to have easy access to vehicles. Accessibility concerns primarily people with impeded mobility, disabled people, elderly people, families with small children who need to have easy access to the infrastructure of public transport as well as to automatic ticket machines.

The “comfort during trips” indicator is defining for the quality of public transport in Europe’s larger capitals. Comfort while traveling usually means the number of people per square meter. According to the standard in peak urban transport moments, the number of passengers per square meter cannot exceed four people (Mutafchiev, 2000). Creating conditions for a comfortable and pleasant travel experience also suggests that the temperatures and the level of cleanliness in vehicles have to be in accordance with the preliminarily defined standards.

The “awareness” indicator is also vital to quality customer service. Traveling citizens have to be kept updated on current information about the vehicle schedules at stations, stops and the vehicles themselves, as well as receive timely and immediate information about impending delays or irregularity of vehicles in case an operator’s performance is impaired.

Caring about customers’ satisfaction with transport services has to be a priority of transport operators carrying out passenger freights, which is another important indicator regarding the level of the provided transport service. The company has to keep an eye out for incoming citizen complaints and adopt quick and appropriate measures to remove the problems that arise during or in relation to freights.

The “traffic safety and security” indicator also determines a large portion of citizens’ decisions to use one mode of transportation or another. Safe and accident-free travel, as well as maintaining the security and peace of citizens during trips is one of the most important indicators regarding the degree of quality of public transport.

**Directions for increasing social effectiveness**

In order to increase the social effectiveness of public transport, public transporters have to adopt effective measures for increasing the quality of the transport services they offer. Public transport enterprises have to successfully convince citizens to use public transport through the high-quality transport services they offer and make them aware of its social effects. In order to achieve this, they have to reduce the travel time and provide comfortable, secure and environmentally friendly public transport. This can be achieved through introducing modern high-speed vehicles into service, increasing the number of public transport routes and the availability, regularity and rhythm of vehicles, especially in the peak and most bearing periods of the day.

The necessity to modernize urban infrastructure so it corresponds with the city’s needs is crucial to increasing the quality of public transport freights. Modern stops equipped with information panels need to be built. It is necessary for the city to be equipped with available parking lots near subway stations, next to which there need to be parking spaces for bicycles. Access to bus or tram transport has to be provided next to each subway station. Trams are preferable because of their high environmental friendliness and passenger capacity. Overall, in order to increase the quality of public transport and reduce travel time, it is necessary to improve intermodal connections and create more comfort during the whole trip. However, one of the most important issues related to the effective functioning of urban passenger transport is coordinating the work of its separate types. The good integration of the work of different urban passenger transport types is a good prerequisite for improving the transport service of
the population, which simultaneously creates an opportunity for the most rational use of transport vehicles possible.

The safety and security of stations, stops and vehicles has to be at the necessary level for both passengers and vehicle drivers, i.e. by introducing a security strategy through equipping stops and vehicles with cameras and creating better safety conditions for stations and the surrounding territories. Regular security and safety training also have to be organized, as well as increasing vigilance.

Traffic safety has primary significance for secure passenger trips with public transport. The main trends of increasing vehicle reliability and traffic safety are aimed at updating vehicles and increasing drivers’ qualification. A typical trait of transport manufacturing activity is that its nature is too cyclic and it is directly related to the specifics of transport and the probability for the occurrence of risky situations and traffic accidents. Its employees are required to have more specific qualities and skills which are necessary during the sometime extreme situations that arise during work. Transport workers have to be able to react quickly and appropriately; sometimes, within a very limited time frame, they have to make important and responsible decisions upon which people’s lives depend. In addition to high qualification and professionalism, it is necessary for transport employees to possess other qualities such as high psychological stability.

In addition, the rolling stock within the public transport system has to be modernized constantly. The rolling stock has to be renewed gradually, with vehicles with modern technical characteristics and high parameters of comfort and environmental friendliness, which will increase comfort and safety during travel and will remove even the smallest prerequisites for the occurrence of traffic accidents. By introducing modern, environmentally friendly and energy-saving vehicles into service, better environmental parameters will be reached, such as air quality and harmful emissions, reduction of pollution, greenhouse effect and energy consumption; noise reduction and climate change are necessary for improving the population’s health status and reducing healthcare expenses.

It is necessary to implement intelligent transport systems which will aid public transport management and organization in major cities. Their implementation can improve cities overall vision and image. These are innovative and modern decisions that guarantee bigger safety and security for citizens and can improve their living standards as a whole. They can improve significantly traffic situation in cities, make various urban zones more accessible and secure access to workplaces and services for all citizens. The appeal and quality of the urban environment can be improved as a whole.

Based on operational experience, some of the benefits of implementing intelligent transport systems are measured quantitatively, with regard to the following key aspects of exploitation concerning the city of Sofia: management of the network and road safety.

<table>
<thead>
<tr>
<th>Figure 1: Network Management Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduction of interruptions</td>
</tr>
<tr>
<td>Minimum</td>
</tr>
<tr>
<td>0%</td>
</tr>
<tr>
<td>10%</td>
</tr>
<tr>
<td>20%</td>
</tr>
<tr>
<td>30%</td>
</tr>
<tr>
<td>40%</td>
</tr>
<tr>
<td>50%</td>
</tr>
<tr>
<td>60%</td>
</tr>
</tbody>
</table>

Source: Author
The incorporation of such systems can reduce travel time by about 20%, greenhouse gas emissions from cars by about 15%, improve public transport traffic observation by 40% and reduce traffic accidents by about 35% (Strategy for ITS development for Sofia, 2010).

Increasing the social effectiveness and partially the quality of urban passenger transport has to be aimed at current and potential users, with the primary beneficiaries being passengers with impeded mobility, elderly people and families with children. Safety and security measures also have to be introduced for the protection of public transport drivers. It is advisable to analyze the current situation of supply and demand in public transport and to identify the zones that are inaccessible or are sparsely visited through public transport. Preliminary marketing studies are also necessary to determine the specific demands and needs of target groups as well as the political support and willingness of local decision-making authorities to change the way that public transport is perceived and supported in order to stimulate different target groups to use this form of transportation.

**Conclusion**

The development of socially effective and integrated public transport is in accordance with the EU’s transport policy for achieving urban mobility of citizens. It involves encouraging the use of environmentally friendly transport, providing accessibility and mobility for citizens and reducing the use of their personal vehicles. International experience shows that in regards to company management in the field of urban bus transport, the measures for improving electronic billing, car pool management, providing passengers with information, right of way at intersections with traffic light regulation, etc. can lead to significant results when it comes to increasing the number of travels (passengers) by public transport (Gatovski, 2016). This will guarantee successful economic and social development for cities, high quality of life for their citizens, traffic jam reduction and environmental protection. Special attention is given to the provision of higher-quality and more accessible public transport for disadvantaged people, people with impeded mobility, disabled people, elderly people, families and small children.

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THE PROGRAM “FAMILY 500 PLUS” – IMPLICATIONS FOR HOUSEHOLD FINANCE IN POLAND

Agnieszka Wiśniewska, Marta Musiał, Beata Świecka

Abstract: Household finance is heavily dependent on the phase of a family’s development. As the family grows, the household’s financial needs change. Young Poles choose not to create families, mostly because of their financial situations. In order to increase the number of births, the “Family 500+” program was introduced in Poland, where parents can receive a benefit of 500,00 PLN (about 120 euros) per month for a second and every further child. It is indicated that the effects of the 500+ program are both positive and negative. Some effects of the program are already visible, although many forecasts have not yet been confirmed in the statistics due to the short duration of the program. The purpose of the article is to identify the impact of the government’s family policy program: “Family 500+,” introduced in April 2016. This article describes the assumptions and instruments of family policy in Poland, a description of the assumptions of the “Family 500+” program and the implications for household finances in Poland in terms of consumption, income, debt, the labor market or poverty.

JEL Classification Numbers: H D14; G21; J13; DOI: http://dx.doi.org/10.12955/cbup.v5.972

Keywords: household finance; family policy; family benefits

Introduction

Most authors equate the concept of household finance with personal finance (Campbell 2006; Korenik and Korenik 2004; Bywalc 2009; Taijuga 2007; Waliszewski 2010; Bogacka-Kisiel (ed.) 2012). For the purposes of this article, the author adopts the definition of personal finance sensu largo by Świecka (2014): „Personal finance sensu largo is a sub-discipline of finance related to funds management by household members. In other words, personal finance on the one hand are related to collecting funds, on the other hand, to spending, saving, and investing them by members of households. In this case, the concept of personal finance sensu largo can be synonymous with the concept of household finances”. Household finance is heavily dependent on the phase of a family’s development. As the family grows, the household’s financial needs change. In Poland, the phenomenon of an aging society is observed, due to e.g. low birth rate. Young Poles choose not to create families, mostly because of their financial situations. In order to increase the number of births, the “Family 500+” program was introduced in Poland, where parents can receive a benefit of 500,00 PLN (120 euros) per month for a second and every further child. According to many reports, the program ”Family 500+” affects both the finances of households as well as the whole economy. It is indicated that the effects of the 500+ program are to be both positive and negative. Some effects of the program are already visible, although many forecasts have not yet been confirmed in the statistics due to the short duration of the program. The purpose of the article is to identify the impact of the government’s family policy program: "Family 500+" introduced in April 2016. This article describes the assumptions and instruments of family policy in Poland, a description of the assumptions of the "Family 500+" program, and the implications for household finances in Poland in terms of consumption, income, debt, the labour market or poverty.

Family politics in Poland

Family policy is very important in the workings of the state as part of its social policy. The concept of “family policy” was used for the first time in the 1940s, during debates on social policy which took place at that time in Europe. The first activities addressed towards families were taken in France and Sweden at the turn of the nineteenth and twentieth century’s (Myrdal 1941). “Family policy” is defined as all means, actions, and legal norms which are carried out by the state and whose aim is to create acceptable living conditions for all aspects of family existence - its beginnings, appropriate functioning and its fulfilment of all socially important roles (Kamerman 1994). In the literature, two types of family policy are distinguished: indirect policy (implicit) and direct policy addressed to families (explicit). There are activities taken within implicit policy which are not aimed directly at households but have consequences on family functioning - such as in the case of preventing unemployment, or tax policy. Explicit family policy comprises clearly defined actions, programs and benefits addressed to families as such or family members (Balcerzak-Paradowska 2004).

1 Faculty of Management and Economics of Services, University of Szczecin, agnieszka.wisniewska@wzieu.pl
2 Faculty of Management and Economics of Services, University of Szczecin, mart.a.musial@wzieu.pl
3 Faculty of Management and Economics of Services, University of Szczecin, beata.swiecka@wzieu.pl
Family policy in Poland has been evaluated and changed many times over the years. From 1989 to 2015 three most important periods may be distinguished: transformational (1989-1997), transitive (1997-2005), mature (2005-2015). The first of these periods (transformational) was characterized by a limited family policy with the state’s efforts addressed mostly to the unemployed. The first, transformational, phase lacked mostly explicit programs and strategies addressed to families, with a decline in the number of places in nurseries and kindergartens. In the following period, starting in 1997, family policy took a different form – addressed directly to family functioning. It was characterized by activities such as: extending maternity leave, the introduction of a child tax credit and a single payment at child birth (the so called “becikowe”), and a gradual increase in the number of places in nurseries and kindergartens. In the last period, the mature period, family policy takes the form of improvement of the previously introduced solutions and aims at reimbursing families for the expenditure they have to make in keeping a household and balancing professional life and looking after children (Sobociński 2016).

State family policy is implemented through instruments in the form of legal means (these comprise all legal norms, which regulate the relationships of a family with the state and other institutions), financial benefits (all kinds of benefits and allowances), in-kind benefits (comprising material aid given to families) as well as benefits in the form of services (services provided by different kinds of institutions with the aim of supporting families in their basic functions – for example: nurseries, kindergartens, after-school clubs). Table no. 1 shows selected instruments of the Polish family policy.

<table>
<thead>
<tr>
<th>Instrument type</th>
<th>Instrument name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial benefits</td>
<td>– Family allowance and supplements to it</td>
</tr>
<tr>
<td></td>
<td>– Care allowance (related to providing care for a disabled child)</td>
</tr>
<tr>
<td></td>
<td>– Single payment at child birth (the so called “becikowe”)</td>
</tr>
<tr>
<td></td>
<td>– “Pro-family” child tax credit</td>
</tr>
<tr>
<td></td>
<td>– Maternity allowance</td>
</tr>
<tr>
<td></td>
<td>– Parental leave allowance</td>
</tr>
<tr>
<td></td>
<td>– “Family 500+” program</td>
</tr>
<tr>
<td>Non-financial benefits (in – kind benefits, benefits in the form of services)</td>
<td>– Nationwide Large Family Card</td>
</tr>
<tr>
<td></td>
<td>– Paternity leave, maternity leave</td>
</tr>
<tr>
<td></td>
<td>– Personal care for a child under the age of 3 – nurseries, private nurseries, childminders</td>
</tr>
<tr>
<td></td>
<td>– Kindergartens</td>
</tr>
</tbody>
</table>

Source: Authors

Program “Family 500+”

Particular attention should be drawn to the “Family 500+” program, which has been operating in Poland since 1 April, 2016. According to its assumptions, the program is aimed at supporting families in a broad, long-term perspective. The program aims to provide assistance in raising children and money paid under it is supposed to reimburse at least partially the cost of satisfying living needs and raising a child. Furthermore, apart from improving the material conditions of Polish families, it is also aimed at improving the birth rate in Poland (currently, the fertility rate in Poland is approximately 1.3 children per woman). This benefit is available to every Polish family - parents (carers) of children until they reach the age of majority (18 years). A benefit under the “Family 500+” program is PLN 500 (120 euros) paid to families every month. A family with two minor children receives this benefit for the second and subsequent child irrespective of the family’s income in a given month and year. In the case of families whose income per capita in a given household is below PLN 800 net, this benefit is also granted for the first (or an only) child. In the case of families with a disabled child, the income criterion is PLN 1200 net per capita. This benefit is also granted to foster parents and children’s homes.

A benefit under the “Family 500+” program is paid by local authorities, welfare centers or social benefits centers. To be granted the “Family 500+” program benefit, a family has to file an appropriate application with one of the above mentioned institutions. Upon being granted the benefit, one should
apply for it in every given year. In the case of applying for a benefit for the second and every subsequent child, a family (an applicant) is not required to file a statement on income. The exception is applying for financial means for the first (or an only) child. The payment of benefit commences in the month in which the parents applied for it. Noticeably, the award of the benefit of PLN 500 and above is not included in the family’s income for the purpose of establishing its rights to other benefits (for example from the maintenance fund, family benefits or various housing allowances). Furthermore, a benefit under “Family 500+” program is not taxed, so parents of the children who have been awarded this benefit receive PLN 500 per child and do not have to pay any tax or contributions on this amount – this rule applies also to parents who conduct economic activity. The benefit cannot be claimed by a family which receives financial means of a similar character abroad (http://www.program500plus.pl/).

**Implications of Program “Family 500+” for household finance in Poland**

The “Family 500+” program has already covered more than 3.82 million children up to the age of 18 by the end of February 2017. More than 2.57 million families have received almost 21 billion zlotys. Throughout Poland, the "Family 500+" program covers 55% of all children under 18 years old. In the country, this percentage is 63 percent. In municipalities it is 49%, and in urban – rural areas 58%. The highest number of supported children are in Mazovia (almost 554,000), Silesia (over 383,800) and Greater Poland (over 379,600) (MPiPS 2017). According to GUS data, the "Family 500+" program has a positive effect on the number of births. In November and December 2016 and January 2017 there has been as much as 13-15 percent increase in childbirth in relation to the same period of previous years. The most frequently mentioned phenomena influenced by the "family 500+" program, along with the number of births, are an increase in consumption and savings while simultaneously reducing household debt, as well as lowering professional activity (especially among women) and reducing poverty among families and children.

Consumption, savings, and debt of households

The ING Financial Barometer (2017) shows that due to the program, parents could purchase clothes (31%), shoes (29%) and family holidays (22%). An important element is education: 22% of the respondents spent resources on books and aids, and 20% on extra activities for children. As many as 17% of the participants financed holiday and school trips for children through the program.

The study shows that 21% of people receiving resources from the 500+ program have started saving for the first time, and another 36% are putting off more than before. In total, only 32% of program beneficiaries admit that they spend all 500+ funds on a regular basis.

According to BIG InfoMonitor data, over 12 months, from the end of February 2016 to the end of February 2017, the number of people with overdue payments for amounts up to 2 thousand PLN grew at a slower rate than all debtors. In the case of unreliable debtors listed in the BIG InfoMonitor, their share fell during the year from almost 40% to less than 35%.

Those that earned less have resigned from high-speed consumer loans (data show that the least-paid 20 percent of households spend more than they earn and are financed by such loans), so the 500+ program has reduced debt rather than significantly increased consumption.

The NBP (2016c) suggests that the 500+ beneficiaries are not willing to save for future due to their greater optimism. While in households that do not benefit from this subsidy, the assessment of the current and future situation is negative, the people with government support positively see both the present and the future. The state of mind, as claimed by the central bank, has a significant impact on the financial attitudes of Poles, for whom a significant motive for saving is a sense of threat. This is also confirmed by research done by Deutsche Bank (2016), which shows that the proportion of people saving for a rainy day has increased in relation to 2015. This is due to the increased uncertainty among people not receiving additional family benefits from the budget, which is fully consistent with the NBP's observations. The percentage of rainy-day savers among those that do not use 500+ is as much as 51 percent, while only 26 percent are beneficiaries of the program.

Labour market

More and more reports show the impact of the "Family 500+" program on the labor market’s situation in Poland. For a few years, Poland has been experiencing the effects of an aging society. According to the NBP report (2006) on the labour market, due to the recently introduced institutional changes -
particularly the reduction of the retirement age and the introduction of the "Family 500+" program, there is a great risk of lowering professional activity and thus diminishing the labour supply.

The "Family 500+" program provides non-work-related income, which does not give incentives for the professional activation of women taking care over children. As a result, it may even encourage the deactivation of a person (mostly women) who have been unsuccessfully seeking employment or working in poorly paid jobs. Data for the first full quarter in which the Family 500+ funds have been paid show that the activity rate has decreased, but the number of inactive people has also declined. This is primarily due to demographic changes affecting the sources of inactivity in the form of an ever-lower number of young people who are not professionally active due to learning. On the other hand, the number of economically inactive people due to retirement is increasing systematically (NBP 2016a). There are also negative effects, i.e.: the fall of actively engaged parents, which affects mainly women. 235,000 people are said to resign from work, mainly women in families where both parents work (over 200,000) and single parents (25,000). To summarize, the program will discourage the active participation of parents in families 3+ and those with one and two children (Szarfenberg 2016).

Right at the beginning of 2016, information on transfers of 500 PLN to the second and every subsequent child in the family reduced the threshold wage of non-working family members that receive them by about 6%, i.e.: 120 PLN. It is unclear what effect this change has on the willingness to provide work. The declared threshold wage of inactive persons is relatively low - it remains at about 200 PLN below the minimum wage applicable from 1 January 2017 (NBP 2016b).

Poverty

The introduction of the Family 500+ program significantly affects the reduction of poverty among children and their parents, according to a report by the European Network for the Prevention of Poverty. Positive factors include a huge decrease in poverty. Extreme poverty is reduced by 48 percent and extreme poverty among children by 94 percent (Szarfenberg 2016). The program has also significantly improved the material conditions of families. We are seeing fewer and fewer people benefiting from social assistance and nutritional support - a 10% decrease compared to the previous year. It is about periodic, targeted, child-raise benefits. With the program, total poverty has declined by 48 percent and extreme poverty by 98 percent.

Conclusion

The theoretical framework of family policy is that the state can support families both indirectly and directly, and instruments supporting family units can take financial or non-financial forms. Introduced in Poland in April 2016, the "Family 500+" program aims to support families and pay them an allowance of 500 PLN per month for their second and each subsequent child (also for the first one if the income per family member is lower than 800 PLN). The "500+ Family" program is designed to help the poorest families on one hand, and on the other hand to increase births in Poland (this indicator is gradually increasing). Many forecasts have been made regarding the consequences of the program, but due to its short duration, not all of them have been confirmed. According to a partial study, consumption is rising, debt is reduced, households are giving up on short-term loans, and the scale of poverty is limited. On the other hand, there is a decrease in the professional activity of women, and savings are gradually increasing but rather for those people who do not benefit from the program and not those who receive benefits.

References

http://www.program500plus.pl/


RESEARCH ON THE IMPACT OF THE CORPORATE IMAGE ON THE COMPETITIVENESS OF INTERIOR DESIGN ENTERPRISES

Vyara Kyurova, Dilyana Yaneva

Abstract: In striving to secure a competitive advantage in the market, companies endeavor to create a high level of trust and attachment of customers to the company. Building a positive image is a prerequisite for businesses to enhance their competitiveness. In this regard, the main objective of this paper is to identify measures of corporate image, competitiveness of enterprises, and the relationship between them. This paper uses statistical methods (variance, regression, and correlation analysis) to study the influence of corporate image on the competitiveness of enterprises in the field of interior design. A questionnaire method is used to gather the primary data. Examined indicators are assessed using a 7-point Likert scale. The results of the survey indicate a strong correlation between the level of corporate image and that of competitiveness of enterprises. The conclusion includes a summary concerning the use of the corporate image as an important tool for a sustainable market presence and achieving a strong competitive edge.

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Keywords: corporate image, competitiveness, interior design enterprises, indicators

Introduction

In a highly dynamic business environment of ever increasing competition and globalization, a business’ main task is to search for new ways of enhancing their competitiveness. A successful implementation of market objectives requires enterprises to build positive attitudes, trust, and loyalty to their product, brand, and the company itself. This, in turn, lays the foundations of forming a corporate identity and achieving organizational objectives.

Building a positive corporate image is key to expanding influence and leadership in the market for any company. It is a major factor in forming consumer opinion and achieving the competitive advantage of enterprises.

In a highly competitive environment, only companies that implement effective marketing tools become successful. In this respect, the corporate image plays a crucial role as a strategic marketing tool. It allows the company to influence the consumer’s purchasing decision, helps in attracting new clients and forming loyal customers, and these outcomes inevitably lead to an increase in sales and profit and foster the development and competitiveness of the company (Yaneva, 2016).

In this context, a study examining the value of the corporate image would benefit management decisions with respect to improving the competitiveness of an enterprise based on its competitive advantages.

Literature Review

The corporate image is associated with the behavior and profile of a company (Olins, 2003). It defines the financial relations of the company, as well as the relations between stakeholders and consumers (Brun, 2002). In this respect, Jones and Sasser (1995) emphasized that consumer behavior correlates with loyalty to the company. Moreover, the image relates to the way stakeholders, not only perceive, but also interpret their experience, beliefs, values, and experiences of the organization (Wood, 2001). Thus, corporate image plays a prominent role in customer satisfaction and in influencing customer’s willingness to lay trust in the company (Andreasen & Linestad, 1998).

The main goal in building the corporate image is the effectiveness of communication. According to Kim and Lee (2010) with the help of the corporate image, social responsibility and capability of the company are formed. A set of tools and instruments are used, such as ideas, symbols, and events (Schultz, 2007). Another way to achieve competitiveness is through advertising because it contributes to a better understanding of the corporate image. In this regard, Kiryakova-Dineva (2016, p. 217) particularly comments on “the relationship of symbols, images, and company names.”

The corporate image is a targeted communication strategy and is a direct consequence of interpreting information (Venelinova, 2012). It consists of planned and unplanned verbal and visual elements that

1 Faculty of Economics, South-West University “Nefot Rilski”, Blagoevgrad, Bulgaria, verivasileva@abv.bg
2 Faculty of Economics, South-West University “Nefot Rilski”, Blagoevgrad, Bulgaria, d_janeva@swu.bg
are conveyed by the corporation and are aimed at creating an impression on the viewer (Abratt, 1989). In this regard, Afanasiev (2003) views the corporate image as containing descriptive and evaluative components.

It should be recognized that the impact of the attractiveness of the offered products reflects the competitiveness of the enterprise, which can be considered a result of the specific behavior of the company. Gorbashko (2015) defines this competitiveness as the potential for efficient operation in the market to achieve certain competitive advantages. The Great Britain Department of Trade (1994) defined competitiveness as “the ability to produce the right goods and services of the right quality, at the right price, at the right time. It means meeting customers’ needs more efficiently and more effectively than other firms” (cited in Edmonds, 2000, p. 20). The Dictionary of Business and Management (Law, 2009) views competitiveness as the ability of an organization to compete successfully with its commercial rivals. Therefore, the analysis and evaluation of competitors are ongoing conditions, allowing the company to achieve the best market position and to meet the needs of consumers fully.

Filipova (2004) contended that today, among the main competitive factors that determine competitiveness, such as price, quality, technology, innovation, and time, corporate image is gaining increasing importance.

Building a corporate image is a fundamental tool of management for marketing enterprises in the field of interior design. This activity is crucial for boosting up consumer loyalty and evolving the corporate’s competitive advantage and competitiveness.

Revealing the importance of a corporate image for the competitiveness of an enterprise requires appropriate measuring methods. The scientific literature suggested several approaches.

For example, Islam (2010) offered an evaluation based on the business name, architecture, and products or services. Kim and Lee (2010) emphasized service quality, satisfaction, and customer loyalty. Certain authors considered the corporate image as part of communication, and on this basis, they offered an assessment based on strategic intent, mission, vision, goals, and identity (Leuthesser & Kohli, 1997; Van Riel & Balmer, 1997).

Regarding competitiveness, certain authors offered an evaluation based on corporate flexibility (Galbraith, 1990; Rumelt, 1982; Bruning & Lockshin, 2000; Pettigrew, 1987), product quality (Kumar, Motwani & Stecke, 1999a; 1999b; Swan & Targhavi, 1992), and return on assets (Besanko, 1996; Goddard & Wilson, 1996; Mueller, 1990; Waring, 1996). Others referred to the level of resource productivity (Porter, 1998; Allen, 1996), level of quality, price, service, and return on assets (Skinner, 1996), as well as marketing experience (Pratten, 1991). A comprehensive and accurate system of indicators was offered by Velev (2004) in relation to enterprises: product competitiveness; labor productivity; financial performance; innovation; change in the production volume; production and marketing flexibility; and adaptability to the market.

**Data and Methodology**

The study used data from a questionnaire-based survey, conducted in November to December 2016, of 28 enterprises in the field of interior design in Bulgaria. This research instrument was used because of its adequacy regarding the specifics of both the study topic and the data being sought. A qualitative assessment of the corporate image and competitiveness of enterprises in the field of interior design followed.

Each indicator characterizing the corporate image and competitiveness of enterprises in the field of interior design was assessed by respondents using a 7-point Likert scale, including estimates of 1 (very poor) to 7 (exceptional). Averages for each indicator were calculated and used in analyses.

For assessing the competitiveness of enterprises, the study used the indicators suggested by Velev (2004), since these were considered the most comprehensive and accurate system for the study.

Dispersion (Fisher Distribution), linear regression, and correlation analyses were used to explore the relationship between corporate image and competitiveness of enterprises.

The presence or absence of correlation between corporate image and competitiveness of enterprises was established using an analysis of variance (ANOVA). The test was based on the following hypotheses:
- \( H_0 \) – there is no statistically significant difference between the level of corporate image and competitiveness of enterprises;
- \( H_1 \) – differences in the level of value of the corporate image substantially affect the competitiveness of the surveyed enterprises.

A single factor regression analysis was conducted to test the relationship between the corporate image of enterprises in the field of interior design, the factor (\( X_i \)), and their competitiveness, the result (\( Y_i \)).

A correlation analysis (coefficient of Pearson) was used to determine the strength of the relationship between the variables of corporate image and competitiveness of enterprises. To define what part of the overall changes in (y) was due to variations in the studied factors, the coefficient of determination was calculated.

**Results and Discussion**

The survey results regarding the level of value of the corporate image showed that a relatively low share of businesses defined their image as poor (14.3%). In particular, 25.0% of businesses rated it as fair, and 28.6%–32.1% as good to very good. It should be noted that none of the surveyed enterprises indicated an excellent level of value of the corporate image.

The dispersion analysis assessed the effect of the corporate image on competitiveness. The estimated value of the empirical feature was 16.70 (F – Fisher criterion) with a theoretical value of 3.07 at the level of significance \( \alpha = 0.05 \). Thus the null hypothesis was rejected, and the alternative hypothesis confirmed. Hence, differences in the level of significance of the corporate image substantially affect the competitiveness of the surveyed enterprises, i.e., in the field of interior design, based on the assessments given by the respondents.

The regression analysis results (\( b = 0.74 \)) revealed a positive relationship between the assessments of corporate image and competitiveness of the surveyed enterprises, in the field of interior design. Thus, the increase in the average evaluation of the corporate image by a unit resulted in an average increase in the grade of the competitiveness of enterprises in the field of interior design by 0.74.

The estimated value of the correlation coefficient of Pearson (\( r = 0.84 \)) showed a strong correlation between corporate image and competitiveness of enterprises in the said field.

The resulting coefficient of determination (0.7056) indicated a substantial part (70.56%) of the total change in the result, ‘competitiveness,’ was due to variations in the factor, ‘corporate image.’

**Conclusion**

The study results suggest that the corporate image has a significant impact on the competitiveness of the surveyed enterprises in the field of interior design. The increase in the assessment of corporate image by one unit led to an increase in the assessment of the competitiveness of enterprises in the field of interior design by 0.74. The presence of a strong correlation between the level of corporate image and competitiveness of enterprises was observed. It was found out that the majority (70.56%) of the total change in the competitiveness was due to change in the corporate image. Hence, the importance of corporate image for the competitiveness of enterprises in the field of interior design requires continuous, targeted management actions, aimed at optimizing marketing activities and developing and implementing an effective, adequate, and innovative strategy to deal with the dynamic changes in the competitive environment. Possibly, enterprises in the field of interior design need to embrace innovation as a strategic priority with the aim of effective use of a corporate image as a prerequisite for further gaining competitive advantage, as well as to preserve and increase market share.

**References**


TRANSITION AND AGRICULTURAL COOPERATIVES IN BULGARIA

Darina Zaimova,1 Julia Doitchinova,2 George Zheliazkov3

Abstract: One general characteristic of Eastern European countries (EEC) countries is that at the early stage of transition from a central-planned to a market economy the majority of land was returned to the rural population, which resulted in large numbers of relatively small and dispersed land plots. Geographical proximity and the similar institutional model of these countries identify common development constraints: generally small farm sizes, unclear cooperative legislation or inappropriate taxation policies, individualism and general unwillingness by the farmers to collaborate, absence of value chain activities and entrepreneurial spirit. This paper is purposed towards identifying, analyzing and evaluating the causes of economic and social changes in the development of agricultural cooperatives in Bulgaria in the past two decades.

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UDC Classification: 334, 338

Keywords: Bulgaria, agriculture, cooperative model, development

Introduction

One general characteristic of Eastern European countries (EEC) is that at the early stage of transition from a central-planned to a market economy the majority of land was returned to the rural population, which resulted in large numbers of relatively small and dispersed land plots. Geographical proximity and the similar institutional model of these countries identify common development constraints: generally small farm sizes, unclear cooperative legislation or inappropriate taxation policies, individualism and general unwillingness by the farmers to collaborate, absence of value chain activities and entrepreneurial spirit. Political and cultural environments may be barriers to the adoption of collective action, as well as a perceived complication in setting up cooperative channels. The lack of knowledge of how cooperatives function also plays a role, as does the consequences of historical and political events, financial and land reform and fragmentation.

Cooperative concept from perspective of the transition process

Hillborn (1998) addressed cooperatives as schools of democracy being acknowledged for their significant role and impact over the turbulent process of transformation of the European map. Several authors recognized cooperativism as a process of shaping community culture and economic growth, especially in rural areas (Chloupková, 2002). Still it was also recognized as a core element of building a new model of society urged by the discrepancies within social classes, and inspired by the socialist ideology. Being part of the planned economy, cooperatives grew in scale to structure the state production and working system (Schilthuis et al., 2000). Cooperative relationships were imposed, instead of being built as a credible commitment based on the principles of mutualism and social economy. Their natural feature of being primarily economic enterprises driven by the market principles was also violated, which prevented cooperatives in certain Eastern European countries to develop and contribute as a steady mechanism for economic and social development.

Offe (1991) argues for a triple transition of the post-communist regimes: the transition to statehood, the transition to a capitalist economy, and the transition to a democratic political regime (Jan Steijn, 2007). According to Bryant and Mokrzycki (1994) we have witnessed the exhaustion of the development potential of the state socialist mode of production and the inability of communist party-states to resist demands for transformative change. Even more, there is neither model nor precedent for the transition from real socialism to democracy and capitalism. Kornai (1986) also states that the limits of reforming socialist economy were reached. The “gradualist” or evolutionary” approach of changing the system by partial and phased reforms was to keep lower social costs and also to deliver sustainable standards of life.

Political change in Bulgaria and the radical shift of control over production from state to private entities was considered as an essential step, which automatically would lead to market improvement;

1 Darina Zaimova, Trakia University, Bulgaria, dzaimova@gmail.com
2 Julia Doitchinova, Trakia University, Bulgaria, julia.doj@abv.bg
3 George Zheliazkov, Trakia University, Bulgaria, george-zh@mbox.digsys.bg
economic criteria application, and irreversibility of the reforms under way. Nevertheless, the results were far from the expected optimistic ones instead leading to institutional instability, declining economic sectors, insufficient level of domestic demand, restricted export.

High physical fragmentation of land imposed significant constraints to farming and the development of the agricultural sector. This brings forward three key factors, which Swinnen (1997) hypothesizes to have constrained or influenced governments in their choice of land reform strategy: the precollectivization concentration of land ownership together with postcollectivization ownership status; the ethnicity of precollectivization owners; and the equality of postcollectivization asset distribution. This refers to the more recent interpretations, specific to Eastern European theorists, who draw on the sociopolitical reasons for avoiding cooperatives as organizational form in certain economic sectors. Burawoy and Verdery (1999) suggest a property analysis that evokes the total system of social, cultural and political relationships. Sabates-Wheeler (2005) acknowledges that while the evidence against the existence of economies of scale are robust, and empirical research indeed shows that free-riding and labor incentive problems do plague large collective farms.

**Logic framework and context analysis**

A step-wise approach is employed to build a conceptual framework for comprehending and analyzing cooperativism and its institutional environment specific factors for Bulgaria; and to also share the knowledge about the role of the various actors involved in stimulating and promoting cooperative movement (Table 1).

<table>
<thead>
<tr>
<th>Context analysis</th>
<th>Structural analysis</th>
<th>Activities</th>
<th>Participation</th>
<th>Short</th>
<th>Outcomes</th>
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<td>Cooperative organizations</td>
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<td>Medium</td>
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<td>Marketing</td>
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<td>Product diversification</td>
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<td>Socioeconomic</td>
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<td>Development activities</td>
<td>Level of commitment</td>
<td>Industrial support</td>
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<td>Trading</td>
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<td>Planning of production</td>
<td>Research and development</td>
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<td>Lobbying</td>
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<td>Market access</td>
<td>Developing networks</td>
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<td>Product diversification</td>
<td>Regional stability</td>
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<td>Decision-making</td>
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<td>Improvement of production rates, sales, profits, etc.</td>
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<td>Accountability</td>
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<td>Labour-intensity</td>
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<td>Large-scale agri</td>
<td>Alternative business models</td>
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<td>Improved bargaining power</td>
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<td>Value-chain governance</td>
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<td>Contract farming</td>
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<td>Closed supply chain</td>
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Source: Author

The analytical framework involves the following key elements: the role of the institutional framework and policy instruments; cooperative development within agricultural sector versus alternative business models, incl. single farming; and expected outcomes and positive co-relation.

In 1998 as a result from the restitution process 75% of the agricultural lands in Bulgaria were restored to their previous owners. The strong polarization in the size of the land farms was confirmed by the results from the Census of agricultural farms in 2003. Statistics signify for a prevailing number of small-scale farms (0.1-0.3 ha) and a small number of farms with over 50 ha utilized agricultural land. By this period the EU was still concerned about the progress in the agricultural sector, where considerable efforts will be needed (European Commission, 1998). During the pre-accession period through the SAPARD program were allocated 52 million euro with the aim to improve agricultural production and the food-processing sector, and promote sustainable rural development. Over the period 2005 – 2007 the process of reduction in all types of holdings, while increasing the average size of farms continued. According to the economic size of holdings, the largest group is the group of small farms i.e. farms having a size up to 4 economic units (more than 96% of total number of farm). 77.9% of the total number of holdings were up to 1 economic size unit, primarily subsistence farms; followed by farms having an economic size of 1 – 4 economic size units, considered to be semi-subistence farms. Results of the agricultural census in 2007 on the structure of the agricultural sector showed that
the numbers of holdings in Bulgaria continued to decrease. Until 2007, the total number of holdings declined by 26.4 % as the average size of farms increased by more than 42 %. The most substantial is the decline in number of cooperatives (41.4 %) followed by associations and others (39.7 %). A substantial re-distribution of land among the different legal type is observed as the area cultivated by cooperatives declined by nearly 38 % as the land used by all other types of farms increased as the most substantial increase is observed in land used by companies.

**Structural analysis of the post-accession period**

Data Envelopment Analysis (DEA) is applied both to rate efficiency and to estimate sources and amounts of the inefficiency components for two consequent years – 2007 and 2008 – when significant institutional and economic stimuli have been provided to level up the organizational rate in the agricultural sector (Table 2).

<table>
<thead>
<tr>
<th>Table 2: Variables in DEA</th>
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<tbody>
<tr>
<td><strong>Output (Y)</strong></td>
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<tr>
<td><strong>Production value</strong></td>
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<tr>
<td>The value of economic production that it is produced and performed (finished or unfinished) in the 2 – year period.</td>
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<tr>
<td><strong>Sales</strong></td>
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<tr>
<td>Total sales of products and/or services in a trading year.</td>
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<tr>
<td>Production costs</td>
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<tr>
<td>Operational costs*</td>
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</table>

*Operational costs include only these costs that are made at an organizational level for further processing of production

Source: Author

Only for one year the number of cooperatives operating under CRS increases more than twice, positively influenced by the membership in producer organizations (cooperatives and limited liability company), which led to an adjustment and positive change in production, the pricing process and marketing (Graph 1).

<table>
<thead>
<tr>
<th>Graph 1: Estimated returns to scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
</tr>
<tr>
<td>7,29</td>
</tr>
<tr>
<td>81,25</td>
</tr>
<tr>
<td>11,46</td>
</tr>
<tr>
<td>2007</td>
</tr>
<tr>
<td>39,58</td>
</tr>
<tr>
<td>38,54</td>
</tr>
<tr>
<td>21,88</td>
</tr>
</tbody>
</table>

Source: Author

In 2007 the average efficiency result under constant returns to scale is 0.90; and as it has been expected under variable returns to scale the efficiency coefficient is higher amounting to 0.93 (Table 3). Of the total number of producers, under assumption for constant returns to scale 44 % belong to the efficient production frontier or they are estimated as benchmarks with an efficiency coefficient of unity. This percentage increases slightly under variable returns to scale, when 56 % of producers are estimated with unity efficiency coefficient.
In 2008 the average efficiency coefficient estimated under constant returns to scale is 0.91; and under variable returns to scale the estimated coefficient is expectedly higher – 0.94. Almost 60% of decision-making units under variable returns to scale belong to the efficient frontier. Input optimization and the lower and the upper bounds of the stability region are calculated with the sensitivity analysis of both CRS and VRS (Table 4).

The presented hypothetical frontier points of the minimum and maximum points of this increase are given in the percentage values of the lower and upper bounds in the following Graph 2 and Graph 3.

The calculated results reveal by how much the inputs could be increased, without influencing estimated efficiency levels. For producers with no calculated input slacks, it is expected that any increase in the input or decrease of the output will cause less efficiency. The relationship between input utilization, the efficiency coefficients and the size of utilized area is presented on Table 5.
As previously estimated members of cooperatives have managed to gain higher efficiency and to improve it during the period. The presented results show that the most efficient seem to be the large-scale producers, who obtain significantly higher efficiency levels and achieve better economic performance. For 2007 the in-proportional change of used production inputs discloses that the optimization of the both costs categories – production and operational costs is close to 3.3 % (Table 6). This change on average increases their efficiency results by 3.6 %. The most inefficiently utilized production resource appears to be the salary costs category – for 2007 the overall change in data set of this input on average is 23 % and expectedly would improve efficiency by 25 %. Optimization of land input is in terms of redistribution of cultivated area and the average change among decision-making units in data set is 17.4 % with expected efficiency improvement on average by 18.9 %. The percentage change in its redistribution is estimated to 11 %.

Table 6: Sensitivity analysis (2007)

<table>
<thead>
<tr>
<th></th>
<th>Average change in the data set (%)</th>
<th>Optimal λ (%)</th>
<th>Increase of the efficiency coefficients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UAA</td>
<td>17.4</td>
<td>10.9</td>
<td>18.85</td>
</tr>
<tr>
<td>Salaries</td>
<td>23.46</td>
<td>46.4</td>
<td>25.52</td>
</tr>
<tr>
<td>Production costs</td>
<td>3.3</td>
<td>7.57</td>
<td>3.59</td>
</tr>
<tr>
<td>Operational costs</td>
<td>3.3</td>
<td>7.57</td>
<td>3.59</td>
</tr>
</tbody>
</table>

Source: Author

In 2008 there has been a change and redistribution in production and operational costs, which is estimated to 14 % among the total decision-making units (Table 7). The optimization of the costs is estimated to 14 % and it resulted in 1.5 % increase of efficiency results. The estimated overall change in labour expenses is 16.3 % and 14.29 % of the costs have been decreased or redistributed to other budget items. The same conclusion is applicable to the utilized area input – 14.2 percent of producers have redistributed on average 6.48 % of their land input. This resulted in a 15.4 % increase of the efficiency coefficients.

Table 7: Sensitivity analysis (2008)

<table>
<thead>
<tr>
<th></th>
<th>Average change in the data set (%)</th>
<th>Optimal λ (%)</th>
<th>Increase of the efficiency coefficients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UAA</td>
<td>14.2</td>
<td>6.48</td>
<td>15.14</td>
</tr>
<tr>
<td>Salaries</td>
<td>16.3</td>
<td>14.29</td>
<td>17.43</td>
</tr>
<tr>
<td>Production costs</td>
<td>13.48</td>
<td>14.36</td>
<td>1.53</td>
</tr>
<tr>
<td>Operational costs</td>
<td>13.48</td>
<td>14.36</td>
<td>1.53</td>
</tr>
</tbody>
</table>

Source: Author

By the end of the studied period it is reasonable to look for a relationship between specialization of production and the obtained efficiency levels. Such supposition is consistent with the estimated significant relationship between the increased re-distribution of the agricultural area and the two cost categories – production and operational.

A Malmquist index comparative methodology is also applied to the present data set in order to measure the change of efficiency over time and the change in the efficient frontier (Appendix 1).
Efficiency coefficients are decomposed into pure and scale efficiency. The calculated “catch up” effect does not signify for an increase in the relative efficiency, as the average coefficient of efficiency change is less than unity, estimated to 0.986. This result could be interpreted as a regress or no change in the efficiency frontier. Therefore, a more detailed conclusion is provided by the calculated individual results. According to these, 19.8% of decision-making units have achieved catch-up effects with estimates more than 1, which infers that they have managed to improve their efficiency. Producers who have experienced no change during the period represent 46.9% of the total evaluated units. The rest 33.3% have experienced regress in their efficiency. According to the type of registration – natural or legal person, there is significant improvement of producers who are registered as single persons and are members in a cooperative. This category of producers is among the estimated percentage for increase and no change in the efficiency frontier.

The last estimated coefficient “frontier shift” signifies whether efficiency change is due to improvement in production technology. The calculated frontier-shift effect signifies for slight progress in the frontier technology, as its value is 1.005. Of the total number of producers 67.7% have indicated for progress in production technology and 30.2% experienced regress in production technology. Only 2 producers remained with no change in their efficiency level – positive or negative in their production technology.

The average value of the Malmquist index is 0.991; which is close to unity, but still according to the theoretical explanations signifies for the deterioration in the total factor productivity. This result is mostly justified by the small percentage of producers that have managed to improve their efficiency.

One of the most hopeful prospects derived from the performed analysis is that cooperatives have managed to prove their competitiveness along with the company not only in terms of achieved efficiency results, but also considering their sustainability during the studied period (Graph 4).

Graph 4: Total factor productivity (2007-2008)

The decision-making process is revealed as a permanent process and consequences from each decision-making phase have particular impact not only over the individual producer, but also over the organization once he decides to become a member. Taking into account that the majority of problems, which an agricultural producer faces stem from inefficient organizational structures, collective organization of production is assumed to be a sufficient choice.

Several reasons could be pointed in favor of the assumption that cooperatives promote efficiency, such as: increase in optimal scale; reduction of transaction costs; engagement in different but complementary activities and thus releasing scale economies; and improvement of management and internal organizational coordination and control as well.

Results and achievements during the first programme period (2007-2013) and priorities for the second programme period (2014-2020)
During the first programming period, there have been substantial structural changes, resulting in the increased importance of commercial companies and holdings of sole traders, while at the same time limited role of the agricultural cooperatives. In 2010, the largest amount of land is managed by farms owned by individuals (34% of UAA) followed by commercial companies (31.6% of UAA). Compared to 1998 only 27.5% of the cooperatives are functioning, even more in some regions the land cultivated by cooperatives has declined by more than 10 times. At the end of the first programming period, cooperatives handle less than 15% of the total agricultural land. In 2014 the number of registered agricultural producers has almost reached statistics at the beginning of the period (Graph 5).

Graph 5: Agricultural producers in Bulgaria (2006-2014)

Source: Department “Agro statistics” Ministry of Agriculture and Food in Bulgaria

Increasing awareness of the role of agricultural cooperatives in reducing poverty and improving food security; facilitating the formation of agricultural cooperatives’ networks, and supporting the development of enabling environments and better governance frameworks for agricultural cooperatives is perceived as a mission to create sustainable rural employment through business models that are more resilient to economic, social and environmental problems.

The rural development program for the program period 2014-2020 is built therefore upon six thematic priorities and fifteen priority areas aimed at program interventions, innovations and transfer of knowledge, etc. (Table 8).

Table 8: Development priorities of the two program periods

<table>
<thead>
<tr>
<th></th>
<th>RD 2007-2013</th>
<th>RD 2014-2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Competitiveness</td>
<td>Stimuli for transfer of knowledge and innovation in the field of agriculture and forestry in rural areas</td>
<td></td>
</tr>
<tr>
<td>Improvement of environment and natural resources</td>
<td>Competitiveness and viability of any type of agricultural activities and business units</td>
<td></td>
</tr>
<tr>
<td>Improvement of quality of life and diversification</td>
<td>Organization along the value chain and risk management</td>
<td></td>
</tr>
<tr>
<td>LEADER – Local Action Groups (LAGs)</td>
<td>Sustaining ecosystems</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Efficiency in utilizing natural resources and low carbon sustainable economy</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Social inclusion, poverty alleviation and economic development of rural areas</td>
<td></td>
</tr>
</tbody>
</table>

Source: Department “Agro statistics” Ministry of Agriculture and Food in Bulgaria

Conclusion

Collective organization of production is assumed to be a sufficient choice taking into a consideration several reasons why mergers of existing farms promote efficiency: increase in optimal scale: combining farms may reduce duplication or otherwise benefit from an increased size; reduce transaction costs: an important source or transaction costs is opportunistic behavior. When farms agree to a future transaction, each farm may try to interpret the terms of a contract to its advantage. Similarly, a farmer that has more information than another – asymmetric information – may take
advantage of the relatively ignorant farmer; synergies: farms that engage in different by complementary activities may benefit from mergers because of the economies of scope, where it is less costly for one farm to perform two activities than for two farms to perform them separately; and the improvement of management and coordination.

Acknowledgement

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MARCH 22-24, 2017, PRAGUE, CZECH REPUBLIC
WWW.CBUNI.CZ, WWW.JOURNALS.CZ

Appendix 1 Malmquist productivity index
Technical
Technical
Effic.
Effic.
efficiency change Malmquist change Frontier
efficıency chang. Malm. change Front.
index
2007shift
Pure Scale
Pure Scale index 2007- shift
No. Total
No. Total
2008
2008
effic. effic.
effic. effic.
1 0.824 0.840 0.981
0.940
0.929
1.012
49 0.824 0.824
1
0.940 0.929 1.012
2 0.824 0.824
1
0.940
0.929
1.012
50
1
1
1
1.052 1.000 1.052
3 0.824 0.824
1
0.940
0.929
1.012
51
1
1
1
0.980 1.000 0.980
4 0.824 0.831 0.992
0.940
0.929
1.012
52
1
1
1
1.018 1.000 1.018
5 0.824 0.824
1
0.940
0.929
1.012
53
1
1
1
1.018 1.000 1.018
6 0.824 0.844 0.976
0.940
0.929
1.012
54
1
1
1
0.984 1.000 0.984
7 0.824 0.824
1
0.940
0.929
1.012
55 0.770 0.770
1
0.994 1.000 0.994
8 0.824 0.824
1
0.940
0.929
1.012
56
1
1
1
1.018 1.000 1.018
9 0.824 0.824
1
0.940
0.929
1.012
57
1
1
1
1.018 1.000 1.018
10 0.824 0.824
1
0.940
0.929
1.012
58
1
1
1
1.000 1.000 1.000
11 0.826 0.913 0.905
0.942
0.934
1.009
59
1
1
1
1.018 1.000 1.018
12 0.824 0.824
1
0.940
0.929
1.012
60 0.739 0.739
1
1.025 1.023 1.002
13 0.824
1
0.824
0.940
0.929
1.012
61
1
1
1
1.007 1.000 1.007
14 0.824
1
0.945
0.940
0.929
1.012
62 0.971
1
0.971 1.015 1.052 0.964
15 0.824 0.824
1
0.940
0.929
1.012
63
1
1
1
1.018 1.000 1.018
16 0.824 0.824
1
0.940
0.929
1.012
64
1
1
1
1.017 1.000 1.017
17 0.824 0.824
1
0.940
0.929
1.012
65
1
1
1
0.980 1.000 0.980
18 0.824 0.824
1
0.940
0.929
1.012
66 0.824
1
0.824 0.940 0.929 1.012
19 0.828 0.931 0.889
0.947
0.939
1.009
67
1
1
1
0.994 1.000 0.994
20 0.829
1
0.829
0.951
0.942
1.010
68
1
1
1
1.018 1.000 1.018
21 0.824 0.900 0.915
0.940
0.929
1.012
69 0.720
1
0.720 1.006 1.013 0.993
22 0.824 0.824
1
0.940
0.929
1.012
70
1
1
1
1.018 1.000 1.018
23 0.824 0.824
1
0.940
0.929
1.012
71
1
1
1
0.976 1.000 0.976
24 0.824 0.824
1
0.940
0.929
1.012
72 0.824 0.824
1
0.940 0.929 1.012
25 0.824
1
0.824
0.940
0.929
1.012
73 0.758 0.758
1
0.994 1.004 0.989
26 0.824 0.824
1
0.940
0.929
1.012
74
1
1
1
0.981 1.000 0.981
27 0.824 0.824
1
0.940
0.929
1.012
75
1
1
1
1.018 1.000 1.018
28
1
1
1
0.976
1.000
0.976
76 0.871
1
0.871 0.966 1.025 0.942
29 0.915 1.000 0.915
1.011
1.010
1.000
77
1
1
1
1.018 1.000 1.018
30 0.758 0.758
1
0.994
1.004
0.990
78
1
1
1
1.018 1.000 1.018
31
1
1
1
1.018
1.000
1.018
79
1
1
1
1.018 1.000 1.018
32 0.809 0.809
1
0.974
0.992
0.982
80 0.770 0.770
1
0.994 1.000 0.994
33
1
1
1
1.018
1.000
1.018
81 0.968 0.968
1
1.026 1.006 1.019
34
1
1
1
0.991
1.000
0.991
82
1
1
1
0.980 1.000 0.980
35
1
1
1
1.018
1.000
1.018
83
1
1
1
0.986 1.000 0.986
36
1
1
1
0.980
1.000
0.980
84
1
1
1
1.018 1.000 1.018
37 0.739
1
0.739
1.025
1.023
1.002
85 0.781 0.781
1
0.992 1.003 0.989
38
1
1
1
1.035
1.000
1.035
86
1
1
1
1.052 1.000 1.052
39
1
1
1
0.996
1.000
0.996
87 0.758
1
0.758 1.024 1.020 1.004
40
1
1
1
0.976
1.000
0.976
88 0.868 0.868
1
1.022 1.009 1.013
41
1
1
1
1.018
1.000
1.018
89 0.931 0.931
1
1.117 1.136 0.983
42
1
1
1
1.018
1.000
1.018
90 0.876
1
0.876 0.909 0.931 0.976
43
1
1
1
1.018
1.000
1.018
91 0.894 0.894
1
0.995 1.001 0.994
44
1
1
1
0.998
1.000
0.998
92 0.927
1
0.927 1.133 1.146 0.988
45
1
1
1
1.007
1.000
1.007
93 0.927
1
0.927 1.133 1.146 0.988
46
1
1
1
1.014
1.000
1.014
94 0.927 0.927
1
1.133 1.146 0.988
47
1
1
1
1.018
1.000
1.018
95 0.805
1
0.805 1.045 1.032 1.012
48
1
1
1
1.041
1.000
1.041
96 0.873 0.873
1
1.058 1.054 1.004

507


GLOBAL SUPPLY CHAINS AND THE SUSTAINABLE DEVELOPMENT
Bistra Nikolova Boeva,1 Stela Georgieva Zhivkova,2 Ivan Stoyanov Stoychev3

Abstract: Sustainable development issues are considerably popular subjects within the international research community. On the other hand the importance of the issues related to global supply chains has also increased significantly. This paper will also mention a change in one of the main economic paradigms: from international exchange between countries and individual companies there is a transition to exchange between the participants along the global supply chains. The interest in global supply chains and their management is provoked by the fact that they are a major source of competitive advantage on global markets. Nowadays, global supply chains are an integral part of the activities of a number of companies operating abroad. Every business operation finds its place in one or more supply chains. Within the contemporary context of scarce resources and the widely spread sustainable development idea, the companies compete on a global economic scale where the main business unit is the world as a whole, not an individual country or region. All these trends and global developments provoked our scientific interest and with the project “Corporate governance and the global supply chains” we tried to find out how the global supply chains are actually influenced by the issues of sustainable development. Within the course of the project we have reviewed and analyzed quite a lot of scientific literature, we studied the publicly available information of the big international corporations related to their social corporate responsibility and sustainable development issues. In addition, we have made empirical research among local suppliers of big international companies as well as a number of international NGOs dealing with sustainable development and social policy issues. Some of the findings from our project are presented in the current paper.

JEL Classification Numbers: F23, M14, Q01; DOI: http://dx.doi.org/10.12955/cbup.v5.975

Keywords: corporate governance, sustainable development, global supply chains

Introduction
The interest on global supply chains (GSC) and their management has been provoked by the fact that they are a major source of competitive advantage on the global market. Nowadays, global supply chains are an integral part of the business of a number of companies operating abroad. Every business sphere finds its place in one or more supply chains. The companies compete in the global economy where the business unit of analysis is the world as a whole, not the individual country or region. Kotler (1997) states that "when companies go global, they realize that regardless of their size they lack the necessary resources and tools to achieve success. Looking at the entire supply chain as a chain that creates value they realize the need for partnership with other organizations". That is why today there is an increasing interest both from academia and from the business community, to the specificities of the global supply chains’ management as a new way of doing business, in order to increase the competitiveness of companies involved in the international business. On the other hand, sustainable development is another aspect of the global economic environment. The sustainable development concept enters into every detail of the production process and the way the companies are doing business worldwide. Therefore, it also inevitably influences the global supply chains. All these trends and global developments provoked our scientific interest and with the project “Corporate governance and the global supply chains” we tried to find out how the global supply chains are actually influenced by sustainable development issues on one hand and on other hand how they reflect on the corporate governance. The methods used in the project are the review and analysis of academic literature and different projects papers, study of the publicly available information on the big international corporations’ websites as well as empirical research among local suppliers of big international companies as well as a number of international NGOs dealing with sustainable development and social policy issues. Some of the findings related to the global supply chains are presented below.

Sustainable development and the supply chains
Sustainable development is the most discussed issue nowadays. There is a variety of definitions for sustainable development and its characteristics.

Sustainable development is not a modern concept but in our century it gains a lot of popularity. It is seen as the development that ensures the well-being of the present generation without threatening the

1 University for National and World Economy, Sofia, Bulgaria; bboeva@gmail.com
2 University for National and World Economy, Sofia, Bulgaria; st_zhivkova@yahoo.com
3 University for National and World Economy, Sofia, Bulgaria; i_stoytchev@yahoo.com
survival and the normal living of future generations (Brundtland, 1987). Sustainability stands on the most important bases of the life of every society - economic development, social equity and environmental protection. These characteristic of sustainable development will be taken as a base for determining the main changes in the supply change management.

On the other hand the Global supply chains connect businesses all over the world (Boeva, 2015). The supply chains usually are related to the activities of the business and the public entities in respect to their production and economic activities. Supply chain can be described as an assembly of organizations and processes whose main aim is to develop products or services and to provide them to the end users (Dimitrov and Tolev, 2010). The supply chain leads to the transformation of the production materials and streams and encompasses the whole range of processes and activities related to manufacturing and supply.

“Greening” the supply chains

Management of the supply chains is becoming more and more popular. The supply chain is a dynamic process that involves continuous flow of materials, funds and information in several functional areas within and between participants in the chain (Jain et al., 2009). Given the fact that the supply chain covers the entire product life cycle from the processing of raw materials to delivery of finished products to the end user the focus on supply chains is a step towards the wider acceptance and development of sustainability (Ashby et al., 2012).

By focusing attention towards the environmental protection, the behavior of the deliverers in respect to the environment becomes more and more important. The suppliers are expected to cover specific criteria defined by their partners and employers for environmental protection. This leads to the establishment of environmentally friendly deliveries and products. Thus, the supply chain is ‘getting greener.’

Sustainable supply chains

Sustainable management of processes is defined as a set of skills and levers that allow the company to structure its business processes in such a way as to achieve sustainable results (Gimenez et al., 2012). A sustainable supply chain is defined as an integral part of the traditional supply chain, integrating economic, social and environmental performance. In this supply chain the social indicators (i.e. non-environmental) refer to the stakeholders along the supply chain, including customers, shareholders and employees, etc…; economic performance is related to the financial profitability of the chain; and environmental indicators are associated to those activities that are not directly related to the production of a good, but result more from the policy imposed by the countries where different actors in the chain are located and function (Ji et al, 2014).

The sustainable development topic in the context of the supply chain management is discussed in the literature using a number of terms. The two concepts that most clearly connect sustainability and supply chain management are green supply chains and sustainable supply chain management.

An idea about the supply’s sustainable management concerns the plans and activities of the company that integrate environmental and social issues in the supply chain in order to improve the environmental and social behaviour of not only the company itself but also its suppliers and customers, without compromising economic efficiency (Gimenez et al., 2012). This definition implies that companies adopt programs to improve the environmental and social consequences of their internal processes (eg. manufacturing processes in their plants) as well as initiatives to improve the impact of their suppliers and customers’ activities.

Another definition of supply chains’ sustainable management is given by Ahi and Searcy (2013). Based on a thorough review of the theoretical literature in the field of supply chains and sustainable development, they develop the following definition of supply chains’ sustainable management:

“The creation of coordinated supply chains through the voluntary integration of economic, environmental, and social considerations with key inter-organizational business systems designed to efficiently and effectively manage the material, information, and capital flows associated with the procurement, production, and distribution of products or services in order to meet stakeholder requirements and improve the profitability, competitiveness, and resilience of the organization over the short- and long-term” (Ahi and Searcy, 2013).
On the other hand, green management of supply chains occurs as an organizational philosophy that helps companies and their partners to achieve profit and market share by reducing the risk and impact on the environment while improving environmental efficiency (Rao and Holt, 2005). The increased pressure from the public and consumers have led to the imposition of strict environmental regulations such as the EU Directive on waste electrical and electronic equipment. These regulations force the manufacturers to incorporate the environmental considerations into their management practices (Azevedo et al., 2011). In addition, the participants in the global supply chains of any company can be held responsible for the environmental and social performance of its suppliers.

Management of the green supply chain is defined as “the integration of environmental concerns in the management of the supply chain, including product design, choice of materials, production process, delivery of the final product to the customer and product management after the end of its life” (Boeva et al., 2012). A study on the methods for the relationship between environment and trade even concludes that the supply chain is "embedded" in nature as all human actions depend on the resources that nature provides such as the necessary raw materials and the energy for the production processes (Faße et al., 2009).

**Sustainable supply chains in terms of strengthened regulations to protect the environment**

Deepening the problems with the natural resources protection, forces the legislators in the different countries to continuously develop and implement a range of policies for environmental protection, covering the various stages of production, distribution, use and disposal of the produced products. The greatest attention by regulatory authorities is paid to the environmental components related to climate change mitigation and the increasingly worsening quality of the soil. In this sense, new regulations and policies have been developed that are related to more than one sector of the environment (eg. concerning soil and atmosphere), and which the companies should comply with simultaneously. In this way "double" regulations for environmental protection appear (Ji et al., 2014). For instance the EU Directive on Waste Electrical and Electronic Equipment (WEEE) requires discarded electronic products to be suitable for recycling, while the Directive on end-of-life vehicles (ELVs) adopted by the EU in 2006 requiring vehicle manufacturers to ensure that 85% of the raw materials used in the cars production will be recycled. Both can be considered as regulations concerning soil protection, as discarding obsolete electrical and electronic equipment to the landfill might result in leakage of dangerous (harmful) substances in the soil. These regulations and a number of similar ones are based on the "producer responsibility" concept, prompting producers to internalize external factors in their production and turn the open chain of direct production and distribution into a closed system that encourages all participants in the chain to recycle, recover and improve product design (Ji et al, 2014).

Another practice – the one of the United States, applies the concept of product liability (product stewardship). This concept is similar to the European "producer responsibility", whose importance grows mostly on the development of waste management strategies. China in 2009 also adopted a regulation for the administration of the recovery and disposal of waste electrical and electronic equipment, which is also based on the re-buy and processing of products. All these regulations in different countries are focused on the effect of solid waste disposal on the environment and aim to force manufacturers throughout the supply chain to actively take measures to reduce their environmental impact in such a way as to achieve improvements in both their economic and environmental performance. On the other hand, during various conferences and summits on climate change it was agreed that carbon emissions are the major source leading to global warming. Thus, more and more countries and governments adopt measures aimed at protecting the atmosphere by imposing a policy to reduce emissions by introducing a carbon tax or creating different market mechanisms such as emissions trading.

All these activities result in a kind of double regulations that aim to achieve the same result - environmental protection – by affecting separate elements and the companies are forced to take action (voluntary or under specific regulation) to reduce their environmental impacts within the scope of all these elements. It should be noted that the influence of companies on the environment is mostly a result of the different stages of the product life cycle. Moreover, there is a close relation between the phases of the product life cycle and stages in the supply chain, so that the impact on the environment should be directed to the interaction between all partners in the supply chain (Diabata and Govindanb, 2011).
Conclusion
Sustainability is part of our life nowadays and this is an undoubted fact. The activities in this area have started back in the 70s but in the last decade they have become inseparable from the economic life of every society. Business operations do not make an exception from this trend. Within the academic project “Corporate governance and the global supply chains” we have tried to find out how this trend influences one of the major parts of the contemporary international business namely global supply chains. It turned out that these chains have been modified by sustainable development as well. The requirements of the suppliers along the global supply chains have significantly changed and they are expected to work in an environmentally friendly manner thus “greening” the supply chains themselves. Also, a new type of supply chain occurs namely the sustainable supply chain, which integrates economic, social and environmental performance. These are only a small part of the project’s findings but they are quite demonstrative for the influence sustainability has on international business activities.

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EVALUATION OF MANAGERIAL COMPETENCES THROUGH SELF-REFLECTION

Eva Živčicová¹, Monika Gullerová,²

Abstract: This qualitative research paper examines managerial competences through self-reflection. The main purpose of the evaluation is to identify strategic goals for developing and educating managers. Managerial competences are perceived as intellectual potential, through which the functions and roles of managers are performed. In the paper, managerial competences are evaluated through the self-reflection of middle managers. Due to the recommended extent of the paper, self-reflection results were presented as a case study using a SWOT analysis. The results were incorporated into the development strategy of managers. The study represents an atypical example of defensive development strategy of managers, i.e. the strategy of strong managers in adverse working environment. The main purpose of the study is to highlight the possibilities of applying SWOT analysis for self-reflection of managers and subsequent incorporation of results into development and education programs.

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UDC Classification: 658
Keywords: managerial competences, self-reflection, SWOT analysis

Introduction
No uniform standards regarding managerial competences have been developed in the European Union due to different opinions on the mission, roles and functions of managerial work. The efforts on defining managerial competences have progressed mostly in France, Germany and the UK. The French standards fully focus on the personality of managers, while applying a psychological approach to the assessment of managerial competencies. While, on the other hand, much less attention is paid to the personality of managers, and technocracy is dominant in the German standards. The British standards prefer a multi-layer orientation, placing importance on the expertise as well as personality traits of managers, both social and psychological ones. Currently, we have been witnessing attempts to elaborate a universal model of managerial competences for the European Union. Efforts to develop European standards of managerial competences have been made by the Institute of Management in Great Britain.

Current views on managerial competencies
The need for managerial competences is displayed at a workplace by the need to demonstrate one’s soft skills and hard skills. The term of a competency was first used by Boyatzis (1982) in his work “The Competent Manager” which stated that a "person’s capability or talent is consistent with the needs of the job demands and the organizational environment.” In 1982, he elaborated a model for effective performance with twelve competencies applicable to different organizations. The model was based on results gained from a large-scale study with 2,000 managers holding different jobs in organizations (Hronik and Vedralová, 2008).

There are two basic approaches to defining managerial competencies, i.e. performance-based and personality-based ones. The performance-based approach established a link between a competency and performance. Woodruffe (2000) referred competency to the dimensions of behavior leading to competent performance. Advocates of the personality-based theory look at managerial competencies from the personality point of view. Spencer et al. (1990) perceived competency as any measurable characteristic of an individual that can be used to distinguish between effective and non-effective performance markedly. Another approach under the personality-based theory identified the key characteristics and competencies of managers needed for effective performance. They were specialized knowledge, intellectual maturity, entrepreneurial maturity, interpersonal maturity and professional maturity. The above two approaches were combined to develop standards of managerial competencies. As a result, the Management Charter Initiative (HLavenka, 2000) delineates competencies as inputs and outputs of behavioral patterns of managers. The Management Charter Initiative distinguished between personal and functional competencies. "Personal competencies refer to the inputs for work performance, such as knowledge, skills, abilities, attitudes, values and

¹ Faculty of Social and Economic Relations, A. Dubček University in Trencín, eva.zivcicova@tnuni.sk
² Faculty of Social and Economic Relations, A. Dubček University in Trencín, monika.gullerova@tnuni.sk
personality traits” (Hlavenka, 2000). These, however, are only the prerequisites for and not the direct indicators of real performance of managers. The outputs refer to the functional competencies that are employed to measure the performance of managerial work. We believe that the systematic approach to managerial competencies is the most complex one for highlighting readiness of managers to perform their roles as well as their actual performance in management positions. The argument is also supported by Petříková (2007) who said that a competency includes two elements – the potential for performance and the actual performance.

**Managerial competencies and self-reflection**

Mastering management functions and roles is as important as self-management. We maintain that self-management is a part of personal competencies covered by managerial competences. The importance of personal competencies was underscored by Porvazník (2013) who distinguished the following activities under personal competences: self-acceptance; self-actualization (incl. self-planning, self-organization, self-control); self-development or self-learning. Personal competencies go hand in hand with a personal paradigm, i.e. the way a person perceives and understands oneself (Sojka, 2007). This is an important starting point for the assessment of managerial competencies through self-reflection. Self-perception is a starting point for self-knowing oneself. There are several techniques of self-knowledge and self-perception, such as metacognition and self-reflection. While changes and mental processes are only registered under introspection, in the process of self-reflection they are analyzed and explained. Self-reflection refers to “thinking about one’s past actions, ideas, attitudes, feelings, summarizing a particular portion of one’s life and decision-making in critical situations” (Průcha et al., 2003). A personal SWOT analysis technique can be used to perform self-reflection in managerial competencies.

**Case study with SWOT analysis**

In the presented case study, the following questions were formulated:

1. What are the key internal and/or external factors related to failures of the manager?
2. What are the right development strategies for the manager?

In analyzing the given case, a personal SWOT analysis was conducted.

**Problem description:**

Mr. M., aged 37, is a middle manager working in a department store. He supervises 32 subordinates – sales assistants, section heads and shift supervisors. He was appointed manager after a new owner took over the store and after cutbacks in personnel were made. New objectives were set in order to restore the organization. The main goal was to meet the sales goals set. He devoted most of his time running meetings, delegating and checking task completion. Employee performance improved, but the pressure by the owner was increasing. The manager tried to motivate his employees with bonuses and fringe benefits. Employee performance increased slightly, but the owner was still not satisfied. The manager conducted customer satisfaction surveys and communicated the survey results to his employees. Continuous customer dissatisfaction made him tetchy. His attitude towards employees changed, he was critical, kept reassigning employees and those working not perfectly were punished. Interpersonal relations worsened, employees started competing with one another, and there was no cooperation among employees. Group performance was decreasing. Mr. M. fell ill more frequently and was criticized by the owner for failing to fulfill the tasks.

**Analysis:**

The respondent was given an inventory of managerial competencies, which were ranked using a 7-point Likert scale (1=strongly disagree, 7=strongly agree). The results were used to perform a SWOT analysis. The outcomes are given in Tables 1 and 2.

Table 1 shows the manager’s strengths and weaknesses. His strengths outnumbered his weaknesses. It was found that the difference between strengths and weaknesses was 19.

In Table 2, opportunities and threats, being external factors affecting managerial work, were compared. It was established that the difference between opportunities and threats equalled to -6. Threats were found to be the most critical. The respondent is under constant pressure. Having performed the SWOT analysis (Figure 1), the strategy of the manager was found to be defensive.
Table 1: Manager’s strengths and weaknesses

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Assessment</th>
<th>Weaknesses</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am not afraid of changes, I can adapt to new circumstances</td>
<td>5</td>
<td>I am impulsive when dealing with subordinates</td>
<td>2</td>
</tr>
<tr>
<td>I analyze problems before solving them</td>
<td>6</td>
<td>The slightest mistakes irritate me</td>
<td>6</td>
</tr>
<tr>
<td>I try to learn from my own mistakes</td>
<td>7</td>
<td>I have jitters when negotiating with others</td>
<td>6</td>
</tr>
<tr>
<td>I am ready and willing to help my colleagues and subordinates</td>
<td>7</td>
<td>I make decisions before having all the relevant information available</td>
<td>5</td>
</tr>
<tr>
<td>I am capable of controlling myself</td>
<td>7</td>
<td>I perform my work best myself, I do not like delegating</td>
<td>5</td>
</tr>
<tr>
<td>I can be assertive</td>
<td>6</td>
<td>I feel bad about being criticized</td>
<td>7</td>
</tr>
<tr>
<td>I can grasp the ideas of my subordinates and develop them</td>
<td>7</td>
<td>I tend to underestimate myself</td>
<td>3</td>
</tr>
<tr>
<td>I try to focus several interests towards one goal</td>
<td>6</td>
<td>I mostly do things at the last moment</td>
<td>3</td>
</tr>
<tr>
<td>I try to get feedback from my subordinates</td>
<td>6</td>
<td>I consider the needs of others not important</td>
<td>2</td>
</tr>
<tr>
<td>I can predict changes about to come</td>
<td>5</td>
<td>I do not like competition in the workplace</td>
<td>4</td>
</tr>
<tr>
<td>Σ₁</td>
<td>62</td>
<td>Σ₂</td>
<td>43</td>
</tr>
<tr>
<td>Difference between strengths and weaknesses: ΣF₁ = Σ₁ - Σ₂ = 62 - 43 = 19</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Authors

Table 2: Manager’s opportunities and threats

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Assessment</th>
<th>Threats</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>I can make new connections</td>
<td>5</td>
<td>I cannot keep my promises</td>
<td>2</td>
</tr>
<tr>
<td>There is a real chance of getting my salary increased</td>
<td>2</td>
<td>My age is an obstacle to my career progression</td>
<td>3</td>
</tr>
<tr>
<td>I develop my international business relationships</td>
<td>1</td>
<td>I cannot rest when not working</td>
<td>4</td>
</tr>
<tr>
<td>I feel that my work is appreciated by my superiors</td>
<td>1</td>
<td>I spend more time working than spending with friends</td>
<td>5</td>
</tr>
<tr>
<td>My work is respected and recognized by others</td>
<td>4</td>
<td>I am under constant pressure</td>
<td>7</td>
</tr>
<tr>
<td>I can develop and continuously educate myself</td>
<td>4</td>
<td>I have no time for sports activities nor for medical check-ups</td>
<td>5</td>
</tr>
<tr>
<td>My work lets me use my creative abilities</td>
<td>4</td>
<td>I feel overburdened at work</td>
<td>6</td>
</tr>
<tr>
<td>My job supports my professional and personal development</td>
<td>7</td>
<td>My personal problems affect my performance at work</td>
<td>1</td>
</tr>
<tr>
<td>I am provided above-average fringe benefits by my employer (allowances, vouchers, etc.)</td>
<td>5</td>
<td>I hate for asking help</td>
<td>6</td>
</tr>
<tr>
<td>I can objectively assess how my actions affect others</td>
<td>1</td>
<td>I like being in risky situations at work</td>
<td>1</td>
</tr>
<tr>
<td>Σ₃</td>
<td>34</td>
<td>Σ₄</td>
<td>40</td>
</tr>
<tr>
<td>Difference between opportunities and threats: ΣF₂ = Σ₃ - Σ₄ = 34 - 40 = -6</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Authors

Results and Discussion

Assessment and prognosis:

The analysis given is an example of a strong manager working under unfavorable working conditions. The research questions can be answered as follows:
1. The external factors (threats) are the key reasons for failures of the manager.
2. A defensive strategy is an appropriate way for the development of the manager.

<table>
<thead>
<tr>
<th>Figure 1: Manager Development Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="Image" alt="Manager Development Strategy Diagram" /></td>
</tr>
<tr>
<td>Source: Authors</td>
</tr>
</tbody>
</table>

It is advisable to make use of the strengths in order to eliminate external threats, which are, in this case, demands for higher performance. It is also recommended to make the position of a manager stable and protect it. Setting strategic goals means making goals, actual performances and employer demands stable.

**Conclusion**

There is no consistent theoretical framework and there are too many perspectives on managerial competencies. There is not only no consensus on defining competencies but also in describing their components. The structure and hierarchy of managerial competencies are critical for making the theoretical basic research on the issue. In addition to inconsistencies in the theoretical background, competency identification and measurement are of key importance in applied research. The purpose of the paper was to point to the possibility of using a SWOT analysis in assessing managerial competencies and setting manager development priorities. There are two fundamental problems associated with the issue, such as the selection of competency components and measurement of the factors. An effective employment of a SWOT analysis needs factors to be correctly identified. It is in the identification phase when some weaknesses may be misinterpreted as threats or strengths may be misinterpreted as opportunities. As a result, the final assessment may be biased and may lead to mistakes in setting the right strategy. In order to reduce mistakes, the inventory of competence components was developed and the respondent assigned numerical values to the statements given. Results obtained from more than one respondent can be compared, and thus the strategy can be set more precisely. Moreover, a SWOT analysis can be used to identify ways for further manager development, such as improving their strengths through education, training, changing, modifying or adapting business external factors or competitive environment. A personal SWOT analysis can be employed in interviewing candidates for middle management, and can be used as a starting point for career development as well as initial career consultations.

**References**


EXPLORING ENTREPRENEURSHIP EDUCATION IN THE PRIVATE HIGHER EDUCATION INSTITUTIONS (HEIs) IN SOUTH AFRICA (SA)

Robert Walter Dumisani Zondo

Abstract: The role of educators in education is indispensable. Hence, students continuously search for a business education that can equip them with the necessary entrepreneurial knowledge and skills to succeed in running businesses. Consequently, this study evaluates the perception of Academic Managers in the private Higher Education Institutions (HEI) of South Africa (SA) on the significance of entrepreneurship education. It explores the reasons for offering such an education in the private HEIs in SA. There were 78 private Higher Education Institutions (HEIs) in SA that were identified for participation in this study. These institutions are registered in terms section 54 (1) (c) of the South African Act (SAQA, 2012). For the study to achieve its objectives, the South African Qualification Authority (SAQA) provided a sample frame of all the private HEIs in SA. From the 78 HEIs identified, 22 offered the pastoral courses and were excluded from the study. As a result, a target population of 56 HEIs participated in the study. This research has two objectives. That is, examining the perception of Academic Managers on entrepreneurship education, and the reasons for offering such education in the private HEIs in SA. This study uncovers the need for entrepreneurship education in private HEIs of SA. The results present the value of entrepreneurship education as a practice that develops students into cross-functional innovative thinkers. It provides valuable data relating to the significance of entrepreneurship education for developing students into business-minded individuals.

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Keywords – entrepreneurship education, entrepreneurs, opportunities, skills, students

Introduction

It has been noted that a significant number of entrepreneurship courses have been introduced worldwide as a result of an emergence of entrepreneurship as an academic field. In SA, the trend is exacerbated by the inevitably limited job opportunities where one must compete to secure a job (Nicholaides, 2011). Based on the South African population of 54.9 million, the total number of unemployed people (as in March 2016) was 5.6 million and the not economically active population was 15.05 million (Trading Economics, 2016). Hence, many graduates are unable to get a job upon graduation. Therefore, students continuously search for a business education that can equip them with the necessary entrepreneurial knowledge and skills to succeed in running businesses or to create a job from seizing existing entrepreneurial opportunities (Henry, 2003). As a reaction to such the situation, there has been a growing diversity in the courses offered by the HEI in terms of content and depth (Matlay, 2008). An assessment of the trend reveals that most entrepreneurship courses were offered in business schools but now there is a growing trend of offering them in non-business schools (Gerba, 2012) and such courses are included in the curriculum for teachers (European Commission (EU), 2011). This study aims to determine the perception of Academic Managers on the need for entrepreneurship education in the private HEIs of SA. Generally, entrepreneurship education is needed to address a growing range of contemporary socio-economic and political challenges (Henry, Hill and Litch, 2005) and is therefore relevant for students in all disciplines. Studies on entrepreneurship education have focused on progress in entrepreneurship education (Vesper and Gartner, 1998), the status of entrepreneurship being taught to business students in the UK and USA, respectively (McKeown, Mullman and Sursani, 2006; Solomon, 2007), indicating the diversity of courses in terms of content and methods. Studies in the African context, including those by Co and Mitchell (2006), Kabongo and Okpara (2010) and Gerba (2012) show that entrepreneurship education in Africa is at the development stage and is offered in business schools, and with a few initiatives in non-business courses. Consequently, this research aims to evaluate the significance of entrepreneurship education in the private HEIs of SA. It seeks to determine if entrepreneurship education can positively motivate students towards an entrepreneurial career choice. Furthermore, it establishes the reasons for offering entrepreneurship education in private HEIs in SA.

Attitude towards Entrepreneurship Education

Entrepreneurship is a process that happens over a period of time, and its first phase is an entrepreneurial attitude (Asenjo and Barberá, 2013). This attitude is the result of a way of thinking and

1 Durban University of Technology (DUT), Faculty of Management Sciences, Durban, South Africa. E-mail: dumisaniz@dut.ac.za
behaving (personality), together with external variables (situational and social) and these form the basis of models to predict entrepreneurial behavior (Krueger, Reilly and Carsrud, 2000). In recent years, curiosity on the subject has given rise to a rapid growth in research on the introduction of business creation as a specific area of study, as well as the concern that entrepreneurial competence be taught systematically on degree courses, influencing the entrepreneurial attitude of university students (Sánchez, 2011; Fenton and Barry, 2014; Hattab, 2014). As a result, this study examines the attitude of Academic Managers in private HEIs on the influence of entrepreneurship education in SA.

The concept of entrepreneurship in education is not solely established in the academia partially because of the variety of research paradigms applied to it that resisted a clear definition (Davidsson, 2004). The interest of this study lies in entrepreneurship as a mindset and is understood to be a fundamental human feature. It is an aptitude that can be developed by anyone (Senges, 2007). Thus, this paper explores if entrepreneurship education can positively motivate students towards an entrepreneurial career choice. Whilst entrepreneurship is an intrinsically motivated practice (Senges, 2007), and entrepreneurship education is a breed of innovative system whose characteristics and activities leads to transformation of the education system; this study examines the significance of such education.

**SA's perspective on Higher Education discourse in Entrepreneurship**

It is apparent that the apartheid economic dispensation in SA provided higher education offerings which served the then needs of the industry well, in that they made available a workforce that would be trapped, in a comfort zone, working for a ‘boss’ (Nicholaides, 2011). The offshoot of such education was to instill within future university students the notion that one should graduate and then seek employment in large corporations or other such formal sector settings rather than opt for something innovative and creative as a work option. Today, SMMEs in SA are accounting for a sizeable chunk of the economic activity (Nicholaides, 2011). However, education is seen as one of the most significant barriers to entrepreneurial activity (Nieman and Nieuwenhuizen, 2014). The result is that, HEIs are increasingly obliged to redefine their role in the SA economy. The primary function of HEIs should thus seek to instill a greater entrepreneurial character among students. HEIs should strive to carefully consider local development needs and support the promotion of entrepreneurial education initiatives, and this should not only be at the tertiary level but as early as the primary school level. This research attempts to establish the perception of Academic Managers in private HEIs if entrepreneurship education should be taught at both school and Higher Education levels. The role of Higher Education is clearly to meet the socio-economic needs of the country whilst safeguarding social justice and democratic values. In addition, HEIs have an important role to play in regional innovation systems and, in what are termed as, the learning areas (Morgan, 1997). Training and development programmes should include views on and encourage entrepreneurship (Nieman and Nieuwenhuizen, 2014). More faculties are required to offer entrepreneurship as a course or at least make it a greater part of existing courses where it does indeed exist (Nicholaides, 2011).

The relationship between university education in general and entrepreneurship in specific, is not so strong and contested (Nabi and Liňán, 2011). Most of these studies have been carried out in developed countries. Few studies have been done on developing countries and these include studies by Jones, Jones, Packham and Miller (2008); Schwalb, Grosse and Simpson (1988), and Wu and Wu (2008). These studies have a common focus on analysing the role of higher education in helping develop new entrepreneurs. However, attempts to promote and implement entrepreneurship education in universities and other HEIs in developing countries have been considerable delayed, in comparison to developed countries. Consequently, SA needs to revamp its human capital strategies if it is to begin to meet the challenges of the global marketplace (Nicholaides, 2011). An effective investment in national higher education initiatives concerning entrepreneurship which will meet the needs of the population, will underpin the international standing of SA’s higher education institutions. Only by recognising the great value and importance of entrepreneurship, and by expanding education about it, can SA hope to obtain a pre-eminent position in the world of education and become truly competitive economically (Nicholaides, 2011).

**Methodology**

The target population for this study is 78 private HEIs that were registered by the Department of Higher Education of SA. Twenty two private HEIs that focus on pastoral courses were excluded from
the study. As a result, only 56 private HEIs participated in the study. Recruitment of respondents was undertaken with the aim of ensuring that all the 56 private HEIs participate in the study. As a result, the questionnaires were forwarded to the Academic Managers who represented their institutions in this study through electronic mail. Similarly, the completed questionnaires were sent back to the author via electronic mail. Forty one questionnaires were returned representing a 73.2 per cent response rate, which is considered high compared with the norm for survey responses (Baruch and Holtom, 2008). The main reason for this high response rate was due to the invitation letters sent to all the private HEIs and consistently following up on the questionnaires through telephone calls. The data collected were analyzed using the Statistical Package for the Social Sciences (SPSS) version 22.0. The descriptive statistics were used to analyze the study objectives.

**Findings**

**Perception of Academic Managers on entrepreneurship education in SA**

The following Table 1 shows results on the perceptions of Academic Managers in entrepreneurship education in the private HEIs in SA.

<table>
<thead>
<tr>
<th>Perception on entrepreneurship education in private HEIs in SA</th>
<th>Percentage response accepting this perception</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of skills is the biggest barrier to entrepreneurial success</td>
<td>72.5</td>
</tr>
<tr>
<td>Entrepreneurship education inspires individual students to become entrepreneurs</td>
<td>65.0</td>
</tr>
<tr>
<td>Students with higher level of education tend to have higher entrepreneurial intentions</td>
<td>40.0</td>
</tr>
<tr>
<td>Entrepreneurship should be taught at both school and higher education levels</td>
<td>90.0</td>
</tr>
<tr>
<td>Risk-taking propensity on business interacts with education</td>
<td>45.0</td>
</tr>
<tr>
<td>Entrepreneurship education inspire students to be innovative</td>
<td>90.0</td>
</tr>
<tr>
<td>Entrepreneurial education can positively motivate students towards an entrepreneurial career choice</td>
<td>80.0</td>
</tr>
<tr>
<td>Entrepreneurship education is suitable to those individuals with high self-efficacy</td>
<td>75.0</td>
</tr>
</tbody>
</table>

Source: Author

The Academic Managers in private HEIs strongly believe in entrepreneurship education for SA. Critical factors as presented in Table 1 include issues relating to: entrepreneurship should be taught at both school and higher education levels; entrepreneurship education inspires students to be innovative; and entrepreneurial education can positively motivate students towards an entrepreneurial career choice. These factors have bigger percentage ranges from 80 to 90 per cent. Academic Managers have also indicated that: the lack of skills is the biggest barrier to entrepreneurial success; entrepreneurship education inspires individual students to become entrepreneurs, and entrepreneurship education is suitable to those individuals with high self-efficacy.

**Reasons for offering entrepreneurship education in private HEIs in SA**

The following Table 2 presents results relating to the reasons for offering entrepreneurship education in the private HEIs in SA.

Table 2 provided high percentage response rates from Academic Managers in private HEIs on the reasons to offer entrepreneurship education in SA. The highest reasons that range from 80 to 95.5 percent include: to help reduce poverty; to enhance innate entrepreneurial qualities in students; to assist students exploit business opportunities; to engage students in business start-ups; to develop entrepreneurial culture among young people; to promote innovative thinking; and to contribute to job creation.
Table 2: Reasons for offering entrepreneurship education in private HEIs in SA

<table>
<thead>
<tr>
<th>Reasons for offering entrepreneurship education</th>
<th>Percentage response accepting the reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>To promote innovative thinking</td>
<td>92.5</td>
</tr>
<tr>
<td>To assist students exploit business opportunities</td>
<td>87.5</td>
</tr>
<tr>
<td>To inspire students to become entrepreneurs</td>
<td>77.5</td>
</tr>
<tr>
<td>To enhance the innate entrepreneurial qualities in students</td>
<td>82.5</td>
</tr>
<tr>
<td>To develop entrepreneurial culture among young people</td>
<td>90.0</td>
</tr>
<tr>
<td>To contribute to job creation</td>
<td>95.0</td>
</tr>
<tr>
<td>To engage students on business start-up</td>
<td>87.5</td>
</tr>
<tr>
<td>To help reduce poverty</td>
<td>80.0</td>
</tr>
</tbody>
</table>

Source: Author

Conclusion

This study began by reviewing the global aspect of entrepreneurship education. Minimum research has been carried out on the significance of entrepreneurship education in the private HEIs in SA. Hence, the study examines its significance. Entrepreneurship education gives students a new way of looking at the world, irrespective of whether or not they opt to start or develop their own enterprises. This paradigm should continue to receive increased attention in SA and be vigorously researched. For entrepreneurship to be successful, entrepreneurship education is paramount. The HEIs in SA should provide extra entrepreneurial capacity and this should be especially aimed at creating intention and aspiration in students towards entrepreneurship (Chenube, Saidu, Omumu and Omomoyesan, 2011). Students with high intentions in entrepreneurship will ultimately be more successful (Hirsch, Peters and Shepherd, 2008) and be able to employ others, thus alleviating the huge levels of unemployment in the South African society.

Therefore, students must be taught to identify opportunities in the marketplace and assisted to innovate and create something different in establishing a new venture (Nieman and Nieuwenhuizen, 2014). Hence, entrepreneurship education should encourage students to think and then to do (Neck and Greene, 2011).

References


INTRODUCTION

The provision of superior customer services is an important strategic objective of all companies seeking to achieve and retain their competitive advantage (Weng, 2011). Hence, the improvements in service performance have become critical to survival within the retail industry (McGregor, 2009). The retail industry functions under extreme competition in a technologically dominated environment. For a business to adapt under these external conditions, it has to undergo internal changes to respond to the external changes. During this transition, financial performance drops, quality of the service rendered declines, customer volumes decrease, and employee morale is affected (Fisher, 2005). The inability of the business to adapt to change and make use of the latest information technology systems and equipment hinders it from rendering satisfactory products and services. This ultimately results in customer dissatisfaction. According to Wang (2006), customer dissatisfaction due to the lack of retail businesses providing desired products and services is one of the factors that lead to reduced repurchase intentions in customers. On the other hand, a business transformation process that is not well communicated with the employees causes uncertainty and confusion within the workforce and results in decreased employee morale and motivation. This practice impacts negatively on employee productivity. According to Higuera (2010), unmotivated employees develop a lack of interest in their work and performance suffers, resulting in lower productivity. As a result, the overall financial performance suffers. Hence, this study investigates the impact of transformation on the provision of products and services in operational-level retail businesses, thereby improving their financial performance in KZN. It will also examine the influence of transformation in employee motivation.

THE IMPACT OF BUSINESS TRANSFORMATION ON THE PROVISION OF PRODUCTS AND SERVICES IN OPERATIONAL-LEVEL RETAIL BUSINESSES: CASE STUDY

Xolani Protus Simamane,¹ Robert Walter Dumisani Zondo²

Abstract: The retail industry is arguably one of the most prosperous sectors in the global economy. It serves as an intermediary between producers and consumers. Given its significance in the everyday lives of people in communities, and its role in national economies, the industry operates under extensive competition driven by growth in Information Technology which has dramatically changed the consumption patterns and buying behavior of consumers today. This study investigates the impact of transformation on the provision of products and services in operational-level retail businesses of KwaZulu-Natal (KZN). This is a case study and the South African Post Office (SAPO) in KwaZulu-Natal (KZN) participated in the study. Of the 101 branch managers of SAPO, 72 participated in the study, representing a 71 percent response rate. The sample frame was obtained from both the Human Capital and the Infrastructure Management departments of SAPO in KZN. Descriptive statistics and chi-square tests were used to analyze the two objectives. That is, to establish if the change brought about by business transformation activities improves the provision of products and services in retail businesses and thereby improves the financial performance. It also determines if retail businesses undergoing transformation inspire confidence amongst employees, and thereby achieving their financial goals. The findings revealed that business transformation has the ability to improve the provision of products and services of retail businesses. Continuous communication with regards to transformation inspires confidence among employees, thereby leading to productivity improvements and the achievement of the organizational goals. Productive employees contribute positively to the financial performance of the business. The original value of this study is its approach in uncovering strengths and weaknesses of business transformation in the operational-level retail businesses.

JEL Classification Numbers: L21, L25, L32; DOI: http://dx.doi.org/10.12955/cbup.v5.978

Key words: business transformation, employee motivation, financial performance; retail; products and services.

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¹ Durban University of Technology, Faculty of Management Sciences, Durban xolani.simamane@postoffice.co.za

² Durban University of Technology, Faculty of Management Sciences, Durban. E-mail: dumisaniz@dut.ac.za
needed across the organization to deliver and exceed customer expectations in order to continue the privilege of an extended, profitable relationship with the customers. McGregor (2009) states that when the need for the provision of superior service performance is communicated as an important element of the company’s vision, and one which is advocated by the leader as an important organizational goal, members of the organization are likely to pursue it with vigor. According to Liao and Chuang (2007), when transformation leaders succeed in implanting such visions, values and beliefs into their employees, such employees will feel far more motivated to produce high-level commitment, and make positive changes in their attitude towards their work. This intensifies the employees’ efforts to improve overall service performance. Nadiri and Tümer (2009) indicate that superior service quality has become a major differentiator in producing customer satisfaction and successful quality management is recognized as the most powerful competitive weapon that many leading service organizations possess. The following section discusses the importance of retail transformation in rendering of products and services.

**Importance of Transformation in Rendering Products and Services**

Retailers spend a lot of money each year to design, build, and furnish their establishments. Extensive competition prompts them to employ the store environment as a source of differential advantage (Brüggen, Foubert and Glemler, 2011). Brüggen *et al.* (2011) add that McDonald’s began redesigning its 30,000 stores in a makeover of unprecedented scale to provide the stores with a contemporary, welcoming image. Kentucky Fried Chicken (KFC) also responded to a changing environment by transforming their stores. The model store was intended to provide the optimal dining experience for a KFC customer and had to include the hottest, freshest food served daily; unparalleled hospitality and service; exciting new products; consumer choice and a variety of menu items; and a clean and comfortable dining experience. The model store would also help to promote the financial performance such as sales growth; the increased average spends and improved profitability. Furthermore, Brüggen *et al.* (2011) state that, despite the pervasiveness of store transformation, research to date does not provide sufficient understanding of customer responses to store makeovers. However, most research has revealed that customer response is influenced by individual servicescape parameters such as color, lighting as well as store characteristics such as store design and ambience. The relevant literature only focuses exclusively on store response to the servicescape. However, a complete evaluation of the transformation impact on the store performance also requires an understanding of whether transformation brings more people into a store in the first place. Dagger and Danaher (2014) state that shopping is an everyday element in most people’s lives because the in-store experience continues to have high relevance and retailers must keep their servicescape modern, fresh and in line with competitors. The look, feel and mood of a retail store or service environment are unique and constructed purposefully to contribute to the persona of the brand and ultimately its profitability. Simon, Gomez, McLaughlin and Wittink (2009) explain that, in a buying decision, the place where the product or service is purchased or consumed is often more influential than the product itself. Most retailers have created not just a retail store but a place that customers will love. Creating a place to satisfy a customer is critical to a company’s success. Simon, *et al.* (2009) indicates that, the satisfied customers may be the most consequential of all economic assets. Indeed they may be proxies for all other economic assets combined. Companies that are unable to satisfy their customers can expect to lose their market share to rivals that are offering better products and services at lower prices.

**The Role of Transformation in inspiring Confidence among Employees**

Motivation is the psychological process that gives behavior a purpose and a direction, a predisposition to behave in a positive manner to achieve specific unmet needs (Mishra and Gupta, 2009). Thus, work motivation is a key mechanism for maximizing the use of human capital for organizational success (Kanfer, Chen & Pritchard, 2008). Motivated employees are highly involved in their work; they take initiative and make extra effort to help their organizations achieve goals (Parfvonova, 2009). Hence, the self-determination theory of motivation (SDT) posits that the employee job performance and well-being depends on the satisfaction of employee needs for autonomy, competence and relatedness at work (Parfvonova, 2009). For management to be successful, managers need to be true leaders who can understand what motivates their team and enroll employee participation in a way that combines their personal needs with group goals (Sidikova, 2011). According to Thurlow, Helms and Mills (2009), employee motivation during change can be affected by fear of failing in new tasks or not being
able to adapt to change. Researchers proved that employee motivation and their performance are closely linked (Sidikova, 2011). Mishra and Gupta (2009) state that the success of retail companies is reliant on a motivated workforce. Companies use a variety of job motivators to retain employees’ motivation and satisfaction. The most important motivators used by retail stores are working conditions, skills development, recognition, role clarity, career growth and support from management. Vlad (2012) identifies human capital in all service sector organizations, like retailing, as one of the pillars of success. Proper personnel planning, recruitment, motivation and retention are crucial to maintaining operational smoothness and consistent service to customers. As the retail industry continues to mature, employee satisfaction and retention is likely to persist as a challenge. Therefore, adequate steps must be taken by the retail industry in terms of recruiting, training, retaining, motivating, and engaging employees for enhanced productivity (Mishra and Gupta, 2009). According to Kumar (2011), motivating the workforce is not just a means to get people to pursue the organization’s goal. Rather, it is an attempt to get people to buy in and take ownership of the organization’s need as well as their own. Strategies such as appreciation of achievements, individual attention, empowerment and providing opportunity for leadership roles can be a powerful means of motivating knowledge workers who are satisfied with their package. Mishra and Gupta (2009) outline that the work patterns of the retail industry require employees to put in long hours of work which generally cause fatigue and lower motivation of the employees. Huddleston and Good (1999) agree that the success of retail companies is dependent on a motivated workforce. Motivation is vital in the work environment as it influences work performance and productivity. This study is designed around the following questions.

- Does the change brought by business transformation activities improve the provision of products and services in the retail business and thereby improve their financial performance?
- Do the retail businesses undergoing transformation inspire confidence to employees, thereby achieving their financial goals?

**Methodology**

The target population for this study consists of 101 middle-level branch managers of SAPO in KZN. Of the 101 middle-level branch managers of SAPO, 72 participated in the study, representing a 71 percent response rate. Data was collected using structured questionnaires that had 8 questions. The sample frame was obtained from both the Human Capital and the Infrastructure Management departments of SAPO. Both the descriptive and chi-square analysis were used to test the study objectives. The data collected was analyzed using the Statistical Package for the Social Sciences (SPSS) version 22.0.

**Findings**

**Influence of Transformation on provision of Product and Services**

The following Table 1 presents results on the influence of transformation on the products and services in the business.

Table 1 provides high percentage response rates on the influence of transformation on the provision of products and services. The percentages range from 83.1 to 91.7 per cent on the influence of transformation to the rendering of services and 83.3 to 90.3 per cent on product offerings. The analysis is in line with the study objective that establishes if the changes brought by transformation improve the provision of products and services in retail businesses and thereby improve the financial performance.

**Employee motivation during the Transformation Process**

The following Table 2 presents results on the motivation of the workforce during the transformation process.

Findings on Table 2 show high percentage response rates on the influence of the transformation process to improve employee motivation. The percentages range from 83.3 to 93.1. The analysis indicates businesses undergoing transformation inspire confidence amongst employees, thereby achieving their financial goals. The chi-square test per each variable was also done. Hence, Table 3 presents test results for determining whether the scoring patterns across the different statements were similar.
Table 1: Items on the provisions of Products and Services in the Business

<table>
<thead>
<tr>
<th>Items on the provision of products and services</th>
<th>Yes</th>
<th>Unsure</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transformation has the ability to improve the provision of products and services.</td>
<td>Products 90.3</td>
<td>9.7</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td>Services 91.7</td>
<td>8.3</td>
<td>0.0</td>
</tr>
<tr>
<td>Upgraded facility has an impact on rendering products and services.</td>
<td>Products 87.5</td>
<td>9.7</td>
<td>2.8</td>
</tr>
<tr>
<td></td>
<td>Services 84.7</td>
<td>11.1</td>
<td>4.2</td>
</tr>
<tr>
<td>Transformation process has an influence on the provision of products and services.</td>
<td>Products 83.3</td>
<td>13.9</td>
<td>2.8</td>
</tr>
<tr>
<td></td>
<td>Services 84.7</td>
<td>13.9</td>
<td>1.4</td>
</tr>
<tr>
<td>If the provision of products and services is communicated as an important element of the company’s vision, the employees will pursue it with passion.</td>
<td>Products 86.1</td>
<td>12.5</td>
<td>1.4</td>
</tr>
<tr>
<td></td>
<td>Services 83.1</td>
<td>15.5</td>
<td>1.4</td>
</tr>
</tbody>
</table>

Source: Authors

Table 2: Employee motivation during the transformation process

<table>
<thead>
<tr>
<th>The items on employee motivation during transformation</th>
<th>Agree</th>
<th>Uncertain</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transformation has the ability to inspire confidence amongst employees.</td>
<td>83.3</td>
<td>9.7</td>
<td>7.0</td>
</tr>
<tr>
<td>Motivation increases employee productivity in business undergoing transformation</td>
<td>87.5</td>
<td>8.3</td>
<td>4.2</td>
</tr>
<tr>
<td>Intrinsic rewards improve the employee morale and result in productivity.</td>
<td>93.1</td>
<td>4.2</td>
<td>2.7</td>
</tr>
<tr>
<td>Extrinsic rewards motivate the employees to improve productivity.</td>
<td>87.5</td>
<td>5.6</td>
<td>6.9</td>
</tr>
</tbody>
</table>

Source: Authors

Table 3: Test statistics for employee motivation

<table>
<thead>
<tr>
<th>Transformation has the ability to inspire confidence amongst employees</th>
<th>Motivation increases employee productivity in business undergoing transformation</th>
<th>Intrinsic rewards improve the employee morale and result in productivity.</th>
<th>Extrinsic rewards motivate the employees to improve productivity.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-Square</td>
<td>58.139*</td>
<td>68.694*</td>
<td>94.667*</td>
</tr>
<tr>
<td>df</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Asymp. Sig.</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

a cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 14.4.

Source: Authors

The p-values for all the variables in Table 3 are less than 0.05 level of significance. This implies a significant relationship of the variables of the transformation process to employee motivation.

Discussion

Retailers must create a place that customers will love to be. Hence, the retail companies must build quality service information that will help to align them with the ever-changing environment and improve the provision of products and services. Whilst business transformation improves the provision of products and services, the process must not affect employees negatively. According to Mishra and Gupta (2009), motivation is the psychological process that gives behavior a purpose and direction, a predisposition to behave in a positive manner to achieve specific unmet needs. Work motivation is a key mechanism for maximising the use of human capital for organizational success (Kanfer, Chen and Pritchard, 2008). The success of a retail business is dependent on a motivated workforce. This is equally true in the business that is involved in the transformation process.

Conclusion

It is crucial for the retail sector to ensure an effective flow of the transformation process and the creation of retail business that will remain relevant and be profitable in the future. This highlights the importance of the retail businesses on continuously scanning the environment, thus determining the
opportunities that the market is presenting and, at the same time, identifying the threats it might face. The external environment that pose threats to retail business are economic conditions, changing consumer consumption patterns, competition and the IT. These market forces compel the retail business to change their internal environment to respond to the external environment and to adapt to the change by appropriately transforming their businesses.

References


MANAGEMENT OF STAFF FLUCTUATION IN TRANSPORT ENTERPRISES

Asya Grigorova Tsonkova

Abstract: The dynamic transport business and the ever-growing competition on the market for transport services increase the significance not just of staff management but of effective staff management as well. The staff is an inseparable part of both resources and enterprise structure however, it should be underlined that it is the most complex and most difficult one to manage, plan, organize and control. The main key factor for the success of a transport enterprise is its employees and workers. Given the ever-growing supply of transport services, customer criteria regarding their quality grow as well. European transport firms constantly strive to implement special approaches, principles and methods in the management of human resources with the purpose of improving the quality of the services they offer. However, one of the primary and an especially serious issue related to staff management in transport firms remains staff fluctuation. It is an essential part of financial relations and an indispensable component of the complex PR system. The present report studies the issues related to staff management and fluctuation within transport firms.

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Keywords: transport enterprise, transport services, competitiveness, staff management, staff fluctuation

Introduction

Human resources in a transport enterprise are a structured aggregate of people who possess specific knowledge and skills and respective practical experience through which the enterprise’s normal function and the successful execution of tasks is ensured. According to Armstrong (2006), human resources are the most valuable assets that an organization owns and their effective management is the key to its success. Staff management is viewed as a primary part of the management of transport firms, but it is also a relatively independent one, differing from the management of other production resources. The challenge that the successful development of transport organizations faces in terms of strong competition and globalization is the people. The human factor plays an increasingly significant and defining role in regard to the development and success of every modern enterprise. In order to achieve success in an organization, it is essential to take into account the factors that motivate employees to do their best and work more efficiently.

The ability to aim the staff towards successfully achieving preliminarily set goals plays a leading role in staff management. The primary goal of the management is to achieve a sense of community and to ensure harmony between the needs of the transport organization and the necessities of its employees. Staff management is characterized by a series of specific traits, presented in two directions: motivation and defining the worth of human resources (Tzvetkova, 2015).

The mechanisms for increasing transport effectiveness are aimed towards increasing competitiveness, economic growth and creating more and better work places, which is set annually in the yearly plans of major European firms, primarily the ones from Western Europe. In recent years, business in Bulgaria has also strived towards improving the management and optimizing the fluctuation in transport enterprises. Every transport enterprise builds a concept about its goals, plans and its results. Mostly with the experience of European and global management systems having influence to this concept. For the Bulgarian transport market the strategy for human resource management in the transport sector plays a defining role in its correspondence to the challenge that the Bulgarian government faces – namely, Bulgaria’s successful integration in the European Union. Each transport company determines the need for workers by planning and integrating them in the process of production and economic activities. The determination of the need for workers is influenced by various factors, amongst which are: incorporating automated systems for information processing, the seasonal nature of transport activity, as well as the uneven performance of freights during the different periods of the year. These factors suggest the necessity for recruiting extra personnel.

Trends in Western Europe: trial & training days and recruitment via business networks

Staff recruitment for transport organizations is primarily carried out through higher education institutions, industrial schools and specialized schools. In recent years, however, it has been carried...
out primarily through the “LinkedIn” online platform for Europe and through “Xing” just for Western Europe. Private companies supplying and demanding employees have also become popular in recent years. There is a tendency for multiple firms and enterprises from Western Europe to turn to mediator firms with the purpose of finding the best suited candidate for the respective job.

In Germany for example more than 50% of all companies use new internet platforms and social career networks for recruiting (ICR Recruiting Trends, 2017).

Transport enterprises use primarily psychological tests and interviews in their staff recruitment; for Western Europe this is “Trial Day,” which has become a commonly accepted practice. All potentially new employees have to spend 1 to 3 trial days in the company or enterprise, where they observe how the work day goes and they are usually given a task, followed by an evaluation of both the candidate’s performance as well as their ability to adapt in the collective and work atmosphere typical of the job specifics and the respective position. During their work, each employee receives a certain amount of training, seminars and specialization; in Western Europe there is also a practice of providing 5 extra days of leave for this type of training, financed by the employer.

It should also be noted that in recent years transport company managers, in addition to traditional methods (lectures, seminars and practice), have employed other modern active methods such as organizing various business role-playing games, managerial situations and tests. The preferred method of managerial training staff is staff rotation. It involves temporary switching of managerial places horizontally in the transport firm’s structure, without changing rewards and occupations for a certain period of time. This provides an opportunity for gaining knowledge and experience in the company’s various fields, as well as for interacting with other sections and the people working there (Tzvetkova, 2016a).

The main task of the experts from the human resources department in the transport enterprise is the constant improvement and development of staff qualification and skills. For this purpose, a “Personal Development Plan for Employees” is drawn for every new employee during their first year of assuming office. Through this plan, the respective workers are given an opportunity to grow and increase their qualification, which leads to achieving better results as well as capability for taking additional tasks. This can have a positive influence on staff fluctuation and preserve transport companies’ professional potential.
A primary issue in transport activity is the “physical” and “moral” aging of workers. With “moral” aging individual experts and managers cannot use the new methods and innovations in management processes in their work. This also reduces the professional qualities of these managers, which in turn has a negative impact on the effectiveness of the managerial decisions they make (Tzvetkova, 2016b). There are also other reasons for staff fluctuation in transport enterprises, such as motivation for work or shortage of qualified workers. It is often observed that well trained and capable experts lose their motivation to work due to inadequate pay and lack of a clear strategy for their professional and personal growth. The lack of motivation among workers can also lead to an unsatisfactory level of the quality of transport services.

A large portion of transport firms from Western Europe strive to compensate this type of situation in daily routines by providing employees with other types of stimuli such as: free public transport cards, food coupons, office cars, office phones, tablets, fitness cards, organizing field trips for employees or training employees to acquire specific knowledge and increase their qualification.

**Brand management and working conditions influence the level of satisfaction**

Recently, the “Brand Management” position has also been opened in the management of medium and larger European transport firms that have over 500 employees. The primary task of these experts is to focus their efforts on improving the company’s image, attract new workers and monitor the level of their satisfaction (PricewaterhouseCoopers, 2012). They have to hold regular polls and conversations with workers and analyse their attitudes regarding the work specifics and atmosphere, acknowledge their desires and level of satisfaction, and make offers for optimizing their work process and improving working conditions and breaks – i.e. flexible work time, “home office”, potential for creating commodities at the work place, etc. The function of brand managers is to initiate various campaigns for employees in order to strengthen their mental and physical health.

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**Figure 2: Tips for employee retention**

<table>
<thead>
<tr>
<th>Adjust working conditions</th>
<th>Support personal development</th>
<th>Make working days more attractive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improve working atmosphere</td>
<td>Regular feedback for employees</td>
<td>Support healthcare</td>
</tr>
<tr>
<td>Give benefits for performance</td>
<td>Short ways of communication</td>
<td>Fair payment</td>
</tr>
</tbody>
</table>

Source: Kerneder (2016)

It should be mentioned that, aside from having a negative influence on the transport enterprise, staff fluctuation can also be a criterion for effectiveness that can improve the quality of human resources because it selects a large number of candidates for the respective period, thus displaying new experience and knowledge. Fluctuation is the cost of replacing leaving employees, but it is also a loss of productivity due to the lack of work force that can take over the increased work load. The reduced productivity, for its part, can reflect on corporate revenues (Tzvetkova, 2016b).

Employers often assume that the employees they have already trained will prefer at any time to work in another company because of a more attractive position or better pay, which often causes tension and discontent in the company. At the same time, however, providing an opportunity for additional training or specialization reduces the risk of staff dissatisfaction and discontent. Based on analyses carried out in Great Britain, it has been determined that employees that have had 5 or more days for training and specialization during the previous year are significantly more loyal to their employers than the ones who have been trained for less than five days. In other words, training provided by employers has a positive effect on staff motivation and improves the working climate based on the
employees’ psychological assumption that their employers understand and care about the people working for them.

Staff fluctuation has economic and social functions. The economic function is represented through the redistribution of the work force between companies and the national economy’s branches, the state’s regions, the professional and qualification groups in production and managerial personnel. As for the social function, changing the place of employment allows people to satisfy certain needs, to increase their pay, to improve their working conditions, to use social privileges and additional opportunities for professional growth (Tzvetkova, 2016b).

When fluctuation varies between 3-5% of the company’s staff, it is natural and no specific or special measures by the company’s management need are necessary. It is important to stress that it is possible to have additional fluctuation that creates production, organization, staff and technical obstacles for the firm’s normal functioning.

Staff management plays a leading role in the development of every country because it influences the growth of public production. From the preceding analysis, it can be concluded that staff management in transport enterprises is a combination of principles and requirements for forming and using human resources in the organization in accordance to its interests and goals. Staff fluctuation itself is part of staff management and a primary criterion for evaluating the effectiveness of human resources management. Staff fluctuation is a real indicator for the quality of work life in transport enterprises. In the modern conditions of active market competition and dynamically changing markets where employers compete among themselves for recruiting and keeping better workers, the real risk of fluctuation is an indispensable part of the work process.

**Quality staff management plays a role in the national economy**

Management itself constantly develops and stimulates workers’ creative initiatives and creates conditions for provoking their activity. The primary goal of every transport enterprise should be the creation of a successful and functioning monitoring and active control over fluctuation. The transport sector, as an attractive and dynamic sector, starts to experience an increasingly stronger shortage of highly qualified experts in the field of transport and logistics who are fluent in several languages and work with the new and optimized programs of the so-called “cloud technology.” It is necessary to specify a strategy for the development of human resources, since it will help form a new vision for the development of the transport sector and it will be able to read the specific differences of each subsector.

Modern transport firms in Bulgaria face numerous difficulties and challenges on a daily basis. Quality staff management plays a key role both for the transport firm itself and national economy. For every successful production activity, the management and use of human resources has primary significance, thus creating new value in the production process. Through human resources, the effective activity of transport enterprises is increased substantially, which is why staff management has its leading position.

The state of the labour market also influences staff management. This influence is shown primarily through market mechanisms – supply and demand of work force and intensifying competition. Larger supply and smaller demand for a work force stimulates the motivation for work and improves discipline. Although the size of the companies influences staff management primarily through the mechanisms for carrying out managerial activities, the state also plays a key role in management through national legislation and the adopted international norms. However, the effective management of human resources is what plays a key role in the successful development, prosperity and increased competitiveness of every transport enterprise.

**Conclusion**

The human factor plays an increasingly significant and defining role in regard to the development and success of every modern company. Hire the right people and motivate them to do their best and work more efficiently is a key factor of success.

Business in Bulgaria has improved the personal management in recent years to reduce fluctuation. Coming from Western Europe there is a trend to hire high qualified people via business networks like LinkedIn and install trial & training days for new employees. Also, a “Personal Development Plan for
Employees” in combination with giving them a chance to increase their qualification (sponsored by the company) helps to improve moral motivation and to be more loyal. This helps to reduce fluctuation.

To keep well trained employees motivated, payment and company strategy are important. Quality brand management and working conditions influences level of satisfaction. Quality staff management plays a role not only in the transport companies itself but also in national economy.

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DEMOGRAPHIC RISK AND SOCIAL SUSTAINABILITY OF THE PENSION SYSTEM

Alexander Nepp,1 James Okrah2

Abstract: In the framework of this study, we have obtained a mathematical model for maintaining the financial sustainability of PAYG pension systems. We introduce the term financial soundness, by which we understand the maintenance of a balance between the contributions to the pension system and the costs of pension payments. We have proved that the financial sustainability of PAYG systems depends on the growth rates of wages, the growth rate of contribution rates. And demographic factors such as the ratio of the number of pensioners and the working population. However, in the context of countries' competition for investment and the impossibility of increasing the rates of contributions to the pension system, as well as the limited business opportunities to increase wages, the financial sustainability of PAYG systems is determined only by demographic factors. Financial stability in such conditions is violated in case of excess of the rate of increase in pension payments over the rates of Support Ratio (ratio of working population and pensioners) determined by the number of employable people; 2) influence is tenacious by the following factors: 1) demographic risk on central indicators of the pension system.

JEL Classification Numbers: D53 G28; DOI: http://dx.doi.org/10.12955/cbup.v5.s.980

UDC Classification: 336

Keywords: Demographic risks, retirement age, PAYG, Pension payment, Support Ratio, Finance sustainability, Social sustainability

Introduction

The effect of demographic uncertainty on the pension system is strenuous to overestimate. Demographic uncertainty has consequences on the financial sustainability of the pension system by means of the earning and expenditure system. The basis of such effect is the age of entry, period work and the time of retirement, time span of saving, the number of employable citizens, number of retired citizens and the life expectancy.

Demographic Risk and its effect on the pension system has been discussed by many economists such as Wills (2010) and Cossette (2007). Fehr (2009) studied the effect of macro-economic uncertainty on the financial sustainability of the pension systems. His study showed that financial stability is based on two factors, the balance of income and expenditure in pension funds with acknowledgment to macro-economic risk. Gurvich (2011) and Gurvich (2012), these two studies were focused on the impact of demographic risk on central indicators of the pension system.

The unique aspect of the work presented in this paper is the is the discussion of the way demographic uncertainty affect financial and social sustainability of the funded system and distribution.

Financial sustainability of pension systems is defined as a balance between contributions to a pension system and pension payments. Apart from financial sustainability, this research also focused on the maintenance of social sustainability, which implies preservation of the core indicators of a pension system in the current conditions. Replacement rate is understood as the ratio of an average pension in a given time period and the average. It is considered to be the main indicator of the social sustainability of a pension system. This indicator was put forward by the International Labour Organization as the key characteristic of social sustainability (effectiveness) of pension systems.3

1. Impact of demographic risks on financial and gregarious sustainability of distribution pension systems

Demographic risks are important for distribution pension systems because they affect the amount of contributions through the number of payers, or the employed populations see Gurvich (2011). In his study, Volkov (2010) took into account such demographic risks as the number of employed people and that of retired people in the economy, as well as the number of people who enjoy certain benefits, when assessing Russia's implicit pension debt for the non-contributory part of the pension. This influence is tenacious by the following factors: 1) the amount of pension contributions depends on the number of employable people; 2) the amount of pension payments and the replacement rate are determined by the number of pensioners.

1 Ural Federal University, Ekaterinburg, Russia, anepp@inbox.ru
2 Ural Federal University, Ekaterinburg, Russia, jokrah6@gmail.com
The impact of demographic risks on a distribution pension system can be presented mathematically as their impact on the core indicators of pension systems, the amount of pension payments (PV) and the replacement rate (PZ).

\[ PV = \frac{P}{n} \]  

(1)

where:

P is the amount of contributions to the pension system;

n is the number of pensioners.

The amount of funds transferred to the distribution pension system from pension contributions can be presented the following way:

\[ P = Zpl \ast (1 + r)^i \ast s \ast k \]  

(2)

Where:

Zpl is an average salary;

r is the average wage indexation rate;

i is the wage indexation period;

s stands for the pension contribution rates transferred to the distribution system;

k is a number of employed people who pay contributions.

Thus, if we plug the amount of pension contributions (formula (2)) into the formula (1), we get:

\[ PV = \frac{Zpl \ast (1 + r)^i \ast s \ast k}{n} \]  

(3)

The replacement rate, which shows the share of the pension (P) from the salary (Zpl) with regard to (3), will be calculated according to the following formula:

\[ PZ = \frac{Zpl \ast (1 + r)^i \ast s \ast k}{n} \times \frac{1}{Zpl \ast (1 + r)^i} \ast \frac{s \ast k}{Zpl \ast (1 + r)^i} = \frac{s \ast k}{n} \]  

(4)

The dynamic impact of demographic risks on a distribution pension system is revealed through the changes of demographic parameters, such as the employed population and retired people, within a certain period of time: from year ‘j’ to year ‘i.’ It is crucial to point out that actuarial models making allowance for the impact of demographic risks on pension systems were developed by economists Kwon (2008), Debon (2008), who analyzed the impact of specific demographic factors on pension payments. However, their research does not consider the financial and social sustainability of pension systems. To analyze this factor, let us make the following transformations (4). The dynamics of pension payments, that is, the ratio of the pension payments in the year ‘j’ to the pension payments in the year ‘i,’ is expressed with regard to (3) and (4) the following way:

\[ \frac{PV_j}{PV_i} = \frac{Zpl_j \ast (1 + r)^{i-j} \ast s \ast k_j \ast n_j}{n_i \ast Zpl_j \ast s \ast k_j \ast n_j} = \frac{(1 + r)^{i-j} \ast S_j \ast k_j \ast n_j}{S_j \ast k_j \ast n_j} \]  

(5)

The expression (5) shows that the change of pension payments in distribution systems from the year ‘j’ to the year ‘i’ will be determined by the average rate of wage indexation (r), the rate of insurance contributions (s), and the two demographic factors: the number of employed people (k) and the number of pensioners (n). In the conditions of economic stagnation and/or lack of increase in wages, we get the following formula by using the expression (5):
The expression (6) demonstrates that when faced with demographic risks, that is, when the number of pensioners is growing ($n_i > n_j$) and the number of employed people is falling ($k_j > k_i$), the only way to maintain the level of pension payments is to provide the proportional growth of pension contribution rates ($S_i > S_j$). Otherwise, pension payments will decrease.

In case of wages stagnation, however, or if it is infeasible or undesirable to increase the tax burden on enterprises due to the growth of pension contribution rates ($S_i = S_j$), pension payments in distribution pension systems and their dynamics will be determined only by demographic factors, that is, the number of retired ($n$) and the number of employed people ($k$):

\[
\begin{align*}
\frac{PV_i}{PV_j} &= \frac{k_i \times n_i}{k_j \times n_j} \\
r \to 0
\end{align*}
\]

(7)

The systems (5) and (7) show that in a distribution pension system, an increase (or decrease) in pension payments used to maintain financial sustainability should not exceed the growth in the number of employed population and the fall in the number of pensioners provided that the insurance contribution rates and the wages remain the same. There is another option to be considered, though: if the number of the employed and retired remains the same (it is possible for short time periods), in order to maintain financial sustainability the growth in pension payments should not exceed the wages indexation provided that there is no growth in insurance contribution rates.

The formulas (5) and (7) include the ratio of the number of the employed population and the number of pensioners, which is another demographic indicator of the support ratio ($K_p$). Studies in economic demography consider it as one of the indicators of demographic risks. Thus, the support ratio is calculated according to the formula:

\[
K_p = \frac{k}{n}
\]

(8)

If we take into consideration the formula (8), the system (5) will look like this:

\[
\begin{align*}
\frac{PV_i}{PV_j} &= (1 + r)^{j-i} \frac{S_i}{S_j} \frac{K_p_i}{K_p_j} \\
r \to 0
\end{align*}
\]

(9)

If we plug (8) into the system (7), we will get the following:

\[
\begin{align*}
\frac{PV_i}{PV_j} &= \frac{K_p_i}{K_p_j} \\
r \to 0 \\
S_i = S_j
\end{align*}
\]

(10)

Judging by the system (10), the dynamics of pension payments in distribution systems is determined only by the correlation of support ratios, if there is no increase in wages and the tax burden remains constant.

The second target indicator of pension systems, as it has been noted before, is the replacement rate. To find out the impact of demographic risks on the replacement rate, let us plug (8) into the equation (4) and calculate the balance of the replacement rate in the year ‘j’ and the year ‘i.’ The expression will then look the following way:

\[
\begin{align*}
\frac{PZ_j}{PZ_i} &= (1 - r) \times \frac{I_i}{I_j} \times \frac{K_i}{K_j} \times \frac{R_j}{R_i} = (1 - r) \times \frac{I_i}{I_j} \times \frac{K_p_i}{K_p_j}
\end{align*}
\]

(11)
Thus, the pension contribution rate \((s)\), the number of employed people \((k)\), and the number of pensioners \((n)\), that is will determine the dynamics of the replacement rate, by the support ratio \((Kp)\). It is evident that for the replacement rate two out of the three major factors are demographic ones as distinct from the amount of pension payments \((PV)\), which have two demographic factors out of the four influential ones. As a result, it can be concluded that in case of negative dynamics of demographic indicators, the only factor which makes it possible to maintain the support ratio will be the pension contribution rate, that is, the tax burden on enterprises, which is proven by the following expression (12):

\[
    \begin{align*}
        \frac{PZ_i}{PZ_j} &= \frac{Kp_i}{Kp_j} \\
        S_i &= S_j
    \end{align*}
\]

2. Impact of demographic risks on the financial and social sustainability of funded pension systems. Theoretical framework

The impact of demographic risks on funded pension systems is resolute by the following factors: 1) the amount of accumulated pension capital (pension savings) is tenacious inter alia by the accumulation period, that is, the age of starting working life and the retirement age; 2) the value of pension benefits depends on the endowment period, that is, the retirement age and the age.

The impact of demographic risks on the funded pension system can be represented by a mathematical formula through their influence on the fundamental parameters of pension systems: the value of pension payments \((PV)\) and the replacement rate \((PZ)\).

\[
    PV = \frac{Pn}{d} \quad (13)
\]

where:
- \(Pn\) is the sum of pension savings;
- \(d\) is the endowment period

The amount of pension savings can be expressed in terms of wages, the rate of indemnification contributions, and the accumulation period:

\[
    Pn = \sum_{q=1}^{w-1} sn \times Zpl \times ((1 + r) \times (1 + a))^q = s \times Zpl \times \sum_{i=1}^{w-n} ((1 + r) \times (1 + a))^q \quad (14)
\]

where:
- \(Zpl\) - the average wage;
- \(r\) - an average rate of wage indexation;
- \(q\) - a period of wage indexation and investment period;
- \(sn\) - the rate of indemnification contributions directed to the funded system;
- \(a\) - rate of investment income (in shares) received from the investment of pension savings;
- \(w\) - retirement age;
- \(v\) - age of ingress into working life. In turn, the endowment period is determined by the age of retirement (retirement age) \((w)\) and the expected life span \((z)\):

\[
    d = z - w \quad (15)
\]

Thus, by substituting (14) and (15) into (13), we obtain the following formula

\[
    PV = \frac{s \times Zpl \times \sum_{q=1}^{w-1} ((1 + r) \times (1 + a))^q}{z - w} \quad (16)
\]

characterizing the share of lost earnings replaced by pension payments. The replacement rate will be calculated accordingly:
As it is demonstrated by the obtained formulae for the main indicators of the pension systems, pension payments (16), the impact of demographic risks in a funded pension system will be largely offset by the investment income, the effect of which is amplified by a function exponent.

The dynamic impact of demographic risks is defined through pension benefits under a funded pension system for the years ‘i’ and ‘j’ and the coefficient of the main indicators of a funded pension system:

\[
\frac{PV_i}{PV_j} = \frac{s \times Zpl_i \times \sum_{q=1}^{w_i-v_i} (1 + r_j) \times (1 + a_j)^q}{z_i - w_i} \times \frac{z_j - w_j}{s_j \times Zpl_j \times \sum_{q=1}^{w_j-v_j} (1 + r_j) \times (1 + a_j)^q} \]

(17)

As it can be optically discerned from the formula (18), the impact of demographic risks on pension payments, namely the age of ingress into the labor market, the retirement age, and life expectancy, will be largely constrained by the investment income, the effect of which is amplified by the function exponent.

If there is no magnification in wages, the dynamics of pension payments in a funded pension system depends on the rate of indemnification contributions (s), rates of investment income (a) and certain demographic parameters: the retirement age (w), the age of ingress into working life (v), and life expectancy (z). However, utilizing the rate of indemnification contributions as a factor to increment pension payments to a funded pension system would authentically mean an incrementation in the tax burden on enterprises. Consequently, when it is infeasible or undesirable to increment the tax burden, the investment income and demographic factors will only influence pension payments:

\[
PZ = \frac{PV}{Zpl \times (1 + r)^w} = \frac{s \times Zpl \times \sum_{q=1}^{w} (1 + r) \times (1 + a)^q}{z - w} \times \frac{1}{z - w} = \frac{s \times \sum_{q=1}^{w} (1 + r)^q \times \sum_{q=1}^{w} (1 + a)^q}{z - w} \]

(19)

It should be noted that this issue has been described, for example by Gontmakher (2012). In the formula (7), the difference in life expectancy (z) and the retirement age (w) is the duration of pension payments (tv); while the difference of retirement age (w) and the age of ingress into working life (v) is the period of pension savings (tn). Retirement payments under a funded pension system are less susceptible to demographic risks compared with pension payments within the distribution system, as under the funded pension system the function exponent of the investment income can handle them. If there is a task of constructing a financially sustainable funded pension system, it does not require eliminating the impact of demographic risks by the investment income (a = 0), we achieve financial sustainability of a funded pension system under the influence of demographic risks the following way:

\[
\begin{align*}
\frac{PV_i}{PV_j} &= \frac{t_n}{t_j} \times \frac{t_v}{t_{v_j}} \quad &\text{or} & \quad \frac{PV_i}{PV_j} &= \frac{t_n}{t_j} \times \frac{t_v}{t_{v_j}} \\
\frac{PV_i}{PV_j} &\geq PV \\
\frac{t_n}{t_j} &\geq \frac{t_v}{t_{v_j}} \\
\Delta t_n &\geq \Delta t_v
\end{align*}
\]

(20)
Maintenance of pension payments at the current level and at the same time dealing with demographic risks, provided there is no growth of wages and investment income, is possible if the increase in the duration of pension savings exceeds that of pension distributions. It is also possible in the following situation: while the duration of the pension savings period and that of the pension distribution period are both becoming shorter, the rates of the former process should be going at a slower pace than the latter.

However, the advantage of funded pension systems as compared with the distribution ones lies in the fact that the impact of demographic risks on the former can be offset by the investment income, but not only due to the growing tax burden through incremented indemnification payments. Hence, there is a second option available to maintain the stability of a funded pension system. If the system experiences a negative impact of demographic jeopardies, for instance, in the situation of more expeditious magnification in the duration of the retirement period as compared to the duration of the working life, then pension payments will still remain identically tantamount, provided that the impact of investment income through the function exponent is more vigorous or if there is an incrementation in the rates of indemnification payments.

Thus, the compulsory precondition for the conservation of the supersession rate as well as pension payments in funded pension systems is primarily the transmutation in the duration of pension savings rather than in that of pension payments.

Growing demographic risks affect not only the Russian pension system: they make one of the major challenges faced by OECD countries’ pension systems (optically discern MacInnes, 2003).

**Conclusion**

1. In a distribution pension system, an increase (or reduction) in pension payments to maintain financial sustainability should not exceed the growth in the number of working population and the decrease in the number of pensioners (provided that the rate of insurance contributions remains the same). If the number of working population and that of retired citizens remains the same (which is possible for short time periods), then the growth (reduction) in pension payments should not exceed the indexation of wages.

2. Funded pension systems are under the influence of demographic risks to a lesser degree than the alternative distribution systems;

3. The following precondition for financial sustainability of funded pension systems is proposed: the dynamics of pension payments and the supersession rate should not exceed the dynamics of indemnification payment rates, the rates of the investment income, duration of savings and payments.

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THE EU – CHINA COOPERATION IN THE FIELD OF RESEARCH, DEVELOPMENT, AND INNOVATION

Loredana Jitaru,1 Lorena Florentina Popescul2

Abstract: The EU and China enjoy one of the most fruitful relationships of cooperation in the world. In time, this cooperation has evolved into a strategic partnership created in 2003. A central part of the development and consolidation of the Strategic Partnership was that of the cooperation between these two actors in the field of research, development, and innovation. This paper intends, on the one hand, to analyze the cooperative relationships between the EU and China in the field of research, development, and innovation, and on the other hand to offer a bigger picture of the present day relationships in the field. This paper uses methods of quality research, more precisely document analysis.

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Keywords: RDI, EU – China cooperation, global challenges

Introduction
Considering that nowadays the world faces deep, complex changes, the states of the world have started to pay more attention to the international cooperation in the field of research, development, and innovation (RDI). That is because “by international cooperation, the financial and human resources in the field of RDI that exist in the developed and developing states can be allotted more effectively to subfields which are very important for humanity. Moreover, international cooperation is an important factor that gives states or groups of states easier access to the information and knowledge needed for solving the problems that exist on the planet” (Stanculescu, 2016).

The EU promotes the enhancement of the relationships of cooperation in the field of RDI, stating that the challenges of the third millennium affect both the developed and the developing countries and that the access to information in the “Century of Speed” is much easier and faster, thus contributing to the fight against such challenges. Furthermore, the European Commission underlines the fact that “the international relationships of cooperation promote the production of new knowledge, increase scientific quality and improve the competitiveness of the research and innovation systems” (the European Commission, 2016). To that effect, the EU has international cooperation activities in the field of RDI with the US, Russia, China, Brazil, South Africa, Canada, Israel, Turkey, etc. In this context, this paper intends to offer a complex image of the cooperative relationships between the EU and China in the field of research, development, and innovation. Considering this, the paper has the following structure: section 1- Introduction; section 2 – The positions of the EU and China in the field of research, development and innovation – where we will briefly present the positions of the two actors in the field of RDI; section 3 – Bilateral cooperation relationships in the field of research, development and innovation – it is meant to analyse the EU – China relationships in the field of RDI; section 4 – conclusions.

The positions of the European Union and China in the field of research and development
It has been 42 years since the EU established cooperation relationships with China. In time, these relationships have developed into a strategic partnership whose main pillar is the RDI cooperation. During the past few years, the EU has increased its relationships with China in the field of RDI, thus becoming one of the most important partners in the field at an international level. The two actors promote a relationship based on mutual interest and common benefits. Right now, China holds the third place in the top of international partners in research, development, and innovation, after the US and Russia. Before analyzing the RDI cooperation between the EU and China, we will study the positions of the two actors in this field.

“Europe is one of the most important areas of the world in the field of research, development, and innovation. Even though the population of the EU is only 7% of the population of the world, the EU is

1 Alexandru Ioan Cuza University of Iași, Doctoral School of Economics and Business Administration, jitaru_loredana10@yahoo.com
2 Alexandru Ioan Cuza University of Iași, Doctoral School of Economics and Business Administration, lorena.popescul@student.uaic.ro
now the main center of knowledge production worldwide, yielding almost one third of the production of science and technology on the planet. At the same time, the European Union is responsible for 24% of the world’s expenses for research, 32% of the publications with great impact and 32% of the invention patent requests”. (Delegation of the EU to China, 2016a).

Moreover, right now, the EU has one of the greatest research programmes – Horizon 2020 (H 2020). This programme takes place between 2014 and 2020, with a budget of approximately 80 billion Euros. The Horizon 2020 programme is a “financial instrument stimulating the process of innovation inside the EU and beyond, having the role of increasing the global competitiveness of Europe” (UEFISCDI, 2017).

According to the political elites of the EU and the European Parliament, “research is an investment in our future and is essential for us to have an intelligent, lasting growth that favors inclusion and the creation of jobs” (European Commission, 2015a). To that effect, the EU has the objective of increasing the proportion of the RDI expenses to 3% of the Gross Domestic Product – this objective is stipulated in the Europe 2020 Strategy. According to certain estimates, the consequence of this objective could be “the creation of 3.7 million jobs in the EU and an economic growth of the EU by approximately 800 billion Euros by 2025” (Brauner, 2011).

As for China, during the recent years, it has made great progress in research and development, becoming one of the greatest global investors in the field. Thus, we can see in the figure below that the proportion of the research and development expenses in the Gross Domestic Product increased by 81.54% between 2003 and 2014, whereas, in the EU, it has only increased by 13.19% in the same interval.

![Figure 1: The proportion of the research and development expenses in the Gross Domestic Product in the EU and China between 2003 and 2014 (%)](source: World Bank)

Moreover, China has set the objective of increasing its R&D expenses to 2.5% of the GDP by 2020. Also, “in 2015, China held the first place with regard to the research and development staff – 2.5 million researchers” (European Commission, 2015b), and, as far as the number of scientific articles is concerned, in 2013, China held the third place with 401,435 articles, following the EU with 605,536 articles and the US with 412,542 articles.

Considering all this, we can conclude that the EU and China are the main actors in the field of RDI. In this context, in the next section, we will analyze the RDI cooperation relationships between the EU and China.

**Bilateral relationships of cooperation in the field of research, development, and innovation**

The RDI cooperation between the two actors started in the 1980s, but its importance was recognized only during the 16th EU – China Summit in 2013. Moreover, during the second high-level dialogue...
regarding the cooperation in the field of innovation, the European Commissioner for research, science and innovation, Carlos Moedas, “underlined the importance of the EU – China cooperation in RDI as equal partners in strategic fields of common interest, in order to approach the global challenges and to promote a sustainable growth. He stated that the People’s Republic of China had become a great power in science and technology. Europe needs to engage with China in the context of open science, open innovation and an open world policy” (European Commission, 2015c). Another document showing the importance of the international cooperation in RDI is the EU strategy in the field of research and development. According to this strategy, the European Union needs to pay special attention to the international cooperation in RDI because: “(1) it offers Europe access to the best talent, knowledge and resources, no matter where they are; (2) the EU can approach the global societal challenges in an effective way, that is in a partnership approach; (3) it offers the EU the possibility to establish new opportunities for the high technology European industries, by participating in the global chains of value and by the access to new, emerging markets; (4) it offers the EU the chance to have a leading voice in the debates and evolutions at a global level” (European Commission, 2015d).

The cooperation between China and the EU in RDI was achieved by the Framework Programme 7 (FP 7) and by Horizon 2020 (H 2020). If we take into account FP 7, the cooperation between the two actors covers approximately all the fields of interest, such as space, ICT, health, transportation, environment, energy, etc. (see Figure 2). According to the statistics, the FP 7 (2007-2013) enjoyed the participation of “383 Chinese organizations in 274 collaboration projects, with a cumulative contribution of the EU of 35.24 million Euros. Moreover, the Marie Skłodowska-Curie programme had over 880 Chinese participations” (Delegation of the European Union to China, 2016b).

The cooperation between China and the EU in RDI was achieved by the Framework Programme 7 (FP 7) and by Horizon 2020 (H 2020). If we take into account FP 7, the cooperation between the two actors covers approximately all the fields of interest, such as space, ICT, health, transportation, environment, energy, etc. (see Figure 2). According to the statistics, the FP 7 (2007-2013) enjoyed the participation of “383 Chinese organizations in 274 collaboration projects, with a cumulative contribution of the EU of 35.24 million Euros. Moreover, the Marie Skłodowska-Curie programme had over 880 Chinese participations” (Delegation of the European Union to China, 2016b).

Figure 2: The main fields of collaboration between the EU and China within FP 7 (% of the total amount that the Chinese organizations benefited from)

China also remains an important partner in the Horizon 2020 programme, as well. According to the statistics, by February 2016, 116 Chinese entities had participated in 49 projects in this programme. The cooperation between the EU and China in RDI offers the two actors both benefits and challenges. The benefits coming from the consolidation of the bilateral cooperation in RDI are economic and more. In the case of the European partners, the main benefits of the cooperation enhancement are: (1) “the access of European companies on the Chinese market” (Brauner, 2011, Stumbaum et al., 2010); (2) the effective facing “of the common global and societal challenges, such as pollution and the fact that the population is growing old” (Fan et al., 2014); (3) “the interest in accessing the specialized Chinese staff that is growing from the viewpoint of both quality and quantity; (4) adjusting the European products to the Chinese market; (5) the European researchers are interested in benefiting from the increase in the Chinese R&D expenses” (Brauner, 2011). For the Chinese partners, the main motive has been and will be getting high technology that is essential for the economic, social and military development of China.
But, unfortunately, the RDI cooperation between the EU and China also involves challenges; these pertain to the copyright which is often breached by China, to the introduction of “indigenous innovation policies” by this actor and to the fact that the Chinese entities practice unfair competition.

Synthesizing what we have said, we can conclude that, in order to remain a leader in the field of science and technology, the EU needs to consolidate its RDI cooperation with the main international partners, including China.

**Conclusions**

At the present moment, the EU and China are the greatest global investors in the field of research and development. During the recent years, the EU has increased its RDI cooperation with China, an aspect that is shown by the number of participations of the Chinese entities in the Framework Programme 7 and in the Horizon 2020 programme. According to the statistics, the number of participations of Chinese entities in the H 2020 programme has been 116 in 49 projects.

The EU–China RDI cooperation relationships contribute greatly to finding pertinent solutions to global challenges such as climate change, terrorism, migration, food safety, etc. In this context, the EU sets the objective of increasing its R&D expenses to 3% of the GDP by 2020. In order to reach that objective, there is a need for greater transparency in the cooperative relationships between China and the EU Member States and for a decrease in the difference between the Member States with regard to the proportion of the R&D expenses of the GDP. For instance, there is a great difference between Finland (3.17% of the GDP in 2014) and Romania (0.38% of the GDP the same year).

Considering what we have said, the increase in the cooperative relationships between the EU and China is recommended. But, at the same time, the EU should pay greater attention to the challenges coming from this cooperation.

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DESIGN OF THE RESEARCH BASED TRAINING IN TECHNOLOGIES AND ENTREPRENEURSHIP IN THE SECONDARY EDUCATION

Maia Angelova Stoeva,1 Sashko Plachkov,2 Diana Mitova,3 Lyubima Zoneva4

Abstract: The article presents the nature of the research approach and its application in the framework of the studied disciplines of the cycle of technological training. Presented are the results of monitoring study of the skills of 11-14 year old students for research. The design of research-oriented training in technology and entrepreneurship predisposes the increase of the interest in the learning process and the learning motivation in parallel with the implementation of basic educational goals. The suggested tools aim to diagnose the skills of the students in the research training. Described are the basic levels of administration of the research approach in the training and its influence on building skills on a high level (at meta-level) in the students. The idea is similar to Bloom’s taxonomy according to which levels that follow the logical transition from easy to difficult act in the cognitive sphere. Knowledge and basic intellectual skills formed during are explored, with an emphasis on problem-solving cognitive and practical tasks. The creative technical abilities of the students are being studied through case studies and situations, and an algorithm for key research projects has been developed. The focus is on the interdisciplinary research training project which requires a broad general culture and knowledge from various scientific fields. A critical analysis of the results and conclusions about changes in teaching practice takes a special place in the article.

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Key words: Educational design, competent approach, research-based learning, research project, technological education

Introduction

The quality education is based on the use of progressive strategies for teaching and learning, among which an important place is assigned to the research training. Modern educational transformations imply a subject-subjective pedagogical interaction and transition from the reproductive to the creative type teaching and learning. In the activity-oriented model, education is targeted at students, stimulating their productive thinking and creativity. The current educational trends help to move the focus from receiving just knowledge to independent learning through personal experience and impressions, through solving real life problems and active research.

One of the directions for upgrading the technological training and entrepreneurship in the Bulgarian educational system is to strengthen the research activity of students through direct participation in research.

Scientific research as a method of thinking and solving problems in the school environment

Each scientific research has specific characteristics which distinguish it from other research methods. Depending on the scientific method, research is described as theoretical, empirical, fundamental, and applied. It can be performed in nature or in a laboratory environment, or real objects or test models or samples. (Dimitrov, 2013)

The ability of students to think is developed using modern methods of teaching and learning as problem-based learning or training based on research approach. In the process of scientific inquiry, learners discover and solve research tasks and problems of different nature. Their ability to comprehend the learning material and its application to achieve certain scientific goals is evaluated through solving research tasks. The tasks are directly related to the skills of students to formulate objective, tasks, object, subject, and hypothesis, to select and present the methodology of his research (phases and methods of study) to seek, analyze, summarize and present scientific information, conduct scientific monitoring to model (in the course of experimental work), and to present results.

Solving problems in the process of teaching – research goes through different stages: exploration sources of information, analysis, synthesis, comparison, systematization, classification, typing, monitoring, research, experiment, and others. The process of experimentation is associated with

1 Faculty of Engineering, South-West University "Neofit Rilski" Blagoevgrad, Bulgaria, maia_angelova67@swu.bg
2 Faculty of Engineering, South-West University "Neofit Rilski" Blagoevgrad, Bulgaria, maia_angelova67@swu.bg
3 Faculty of Engineering, South-West University "Neofit Rilski" Blagoevgrad, Bulgaria, didimitova2006@swu.bg
4 Faculty of Engineering, South-West University "Neofit Rilski" Blagoevgrad, Bulgaria, zoneva@swu.bg
establishing causal connections and relationships, taking into account the variables and interactions in solving practical problems.

The ability to solve problems is one of the key competencies of the 21st century, and its formation in the school environment is of critical importance.

Competence to solve problems is related to the mobilization of cognitive and practical skills of the student, his creative abilities, values, and motivations. Solving problems is associated with the capacity of students to use the knowledge acquired in school to cope with the challenges of real life. At the core of solving the problem is the analysis of the reasons that cause it. It requires the ability to understand its nature and necessity problem to be recognized, considered and properly defined. The process includes the definition of the specific problem, the planning to find solution and choice of action strategies, performance, control and evaluation of the outcome. The problem represents a problematic situation on a smaller scale or a part of it. The formulation of the problematic situation requires creative and analytical thinking. The process of solving the problem represents specific research activity which begins with the study of the unfamiliar situation to determine the obstacles and the possibilities for the further steps. (Petrova, 2012)

The problematic situation is a state of intellectual disability, of which the student is looking for answers. It occurs when the knowledge and the experience, gained by the instant, are not sufficient for the solution of the problem. Learning how to solve problems is based on the creative abilities and comprehensive independence of the students. The Learning problem is a practical or a theoretical difficulty to which the solution is a result of the research activity of the student. It suggests a combination of knowledge from various scientific areas, giving the opportunity to the learners to independently apply the already acquired knowledge in a new situation.

We can mention the following requirements in formulating educational problem: it should be related to the already studied educational discipline and should have a logical connection with the achieved skills and knowledge; the formulation of the problem should contain both known and new terms; should contain cognitive difficulties; should be optimally difficult; should reflect contradictory information; the content of the problem should point to finding solutions; and finally it should cause cognitive interest for students.

Problematic situations require from the student's complex mental activities, oriented to alternately rising and checking of different hypothesis, self-absorption of new knowledge and experience, and reaching logically reasoned findings and conclusions. Independent work of students to solve problems is often closer to the actual research. Each problematic task provokes deductive, inductive and combinatorial thinking, thinking through analogies, and creative thinking of students.

This study focuses on the following cognitive competencies and forms of mental activity:

- Formation of terms that place the base of the abstract knowledge;
- Planning a series of activities to achieve a particular result;
- Decision-making through choice between alternative strategies;
- Problem-solving through a series of actions (steps);
- Opportunity for reflection by exposing the evidence to support these conclusions and reaching conclusions;
- Manifestation of creative imagination and create new images and objects through participation in research activities.

Research skills suggest the targeted use of scientific and technical concepts and basic scientific theories that are characteristic of the research. In particular, these are the skills the student use to identify logically justified questions: to make observations and to ask questions; to collect, analyze and present information; to compare decisions, experiences or hypotheses; to forecast and to reach conclusions with different levels of complexity; and to make objective conclusions and to assess the strengths and weaknesses of the conducted research. Research skills stimulate the scientific and technical thinking, supporting the objective interpretation of the information obtained and respectively the preparation of conclusions and predictions about future initiatives and career development in science and modern technologies.

Great attention is paid to the interrelation between these competencies here with three key competencies set out in the European Reference Framework - the digital competence, technological
competence and competence called "initiative and entrepreneurship" (Plachkov, 2013). These competencies are the foundation of building a competency profile of both teachers and students on the subject "Technology and Entrepreneurship," which in turn determines the quality and direction of formation and expression of their research skills.

**The specifics of learning and research activities of students in the course "Technology and Entrepreneurship"**

The specific objectives of training in general subjects "Technology and Entrepreneurship" in Bulgarian schools have been limited to the establishment of basic technological competence of students, launching of formation of key competence ‘initiative and entrepreneurship, formation of attitude towards a healthy and safe lifestyle and work to create conditions for conscious choice of education and profession.

Technological competence is associated with the use of the equipment for manual and machine processing of materials, self-development projects through the application of available software and digital communication and control. To manifest initiative and entrepreneurship, it is planned to enter in the real economic environment, exploring the best entrepreneurial practices and examples of entrepreneurial initiative. Considerable emphasis is placed on the key competencies and learning skills, critical thinking, problem solving, decision making, initiative, creativity, responsibility, and teamwork. (Ministry of Education and Science of the Republic of Bulgaria, 2015).

Educational and research activities of the students in the process of technological learning is a form of active learning and use of theoretical and empirical methods of scientific research. This activity is organized by the teacher who plans, creates and directs the process of learning. Content determination of training suggests opportunities to address diverse learning tasks, having the features of the research process. Educational activities have a research nature related to solving various design, technology, and organizational tasks. Structures will be analyzed, tools and technological operations – selected, the value and cost of products will be calculated, technical and technological objects will be evaluated as well as social phenomena and processes, and choice, based on certain criteria will receive argumentation. Organization of training in technology and entrepreneurship involves conducting integrated lessons, laboratory work and the development of projects that are leading teamwork and learning through search.

The laboratory training as one of the organizational forms of technological education provides the following opportunities for educational research:

- Research of physico-mechanical and technological characteristics of the materials;
- Measuring physical quantities with digital equipment and basic electrical parameters (power, voltage, resistance, size of the electric current, etc.).
- Identifying any changes in parts and products subjected to mechanical and thermal effects;
- Establishing a compliance between working process and working environment for a given profession;
- Establishing major motivational features and determining interest in a profession.

The educational content provides an opportunity for individual and team development of ideas and implementation of projects on topic, where the techniques of manual and machine processing of materials and products are used, and affordable digital software and digital means of communication and control are applied. Activities, related to entering the real economic environment, exploring the best entrepreneurial practices and platform for the entrepreneurial initiative, are stimulated. The ideas for project work are oriented to: constructive modifications to objects, design of structural assignment, development of options for family budget, research and development of ideas for entrepreneurial activity, realization of models of automatic electromagnetic and photo relay, performing market research and production of promotional materials for the company performance, the development of virtual design of a small firm, computer-aided design, engineering products from environmentally friendly materials, research and evaluation of the organizational structure of the educational company and others.

The educational research project in the content framework of technological training represents a specific learning task, related to the implementation of planned activities and aims to achieve concrete pragmatically oriented results for a set time. The project has specific objectives oriented toward
solving specific technical/technological problems. The specific objective of creative (research) project is based on research with a focus on a specific topic of the educational content of technological training. Students are required to have skills for planning, organization and time management during the implementation of the planned educational tasks. Criteria for evaluation of the project can be: the selection and formulation of the theme of the project; concretization of tasks; selection of appropriate methods for accomplishing the design research task; the presentation of the collected information; the selection of participants, resources, sites for the project, meeting deadlines, etc. (Mitova, 2011)

Methodology and research approach

The used research methodology is based on the methods of qualitative research - meaningful analysis of school records in technological training and testing (with problematic issues and practical tasks). The proposed tools aim to diagnose the interests of students to research training in the subjects of the cycle of technological training. With a view to implementing the research methodology, the following are identified:

- A complex of tasks and the respective criteria for analysis and evaluation of the level of preparation of children for research training in selected topics of the discipline “Technologies and Entrepreneurship”
- Criteria for the analysis of responses to tasks
- Measuring instruments - tests with questions and tasks tailored to specific technological training

Assessing the preparation of children for research training and skills for research is carried out through tasks for the detection and selection of certain information, questions and tasks with optional answer, questions with free and independently constructed response, and creative technical tasks in accordance with the set criteria.

The criteria for the analysis of results are reduced to: the mean scores of students; distribution of results in levels of achievement and performance, according to the measured cognitive processes and content areas.

We used the following criteria to evaluate the student responses (they match respectively low, medium and high level): completely true are the answers where the students give a correct answer or proper explanation (algorithm steps to solve the problem, creative interpretations); partially true - the answers are incomplete (partially true) without the necessary explanations; and wrong answers. In structuring the diagnostic technology assessment for the preparation of students for research training, the focus on the following components:

- Study of basic knowledge and intellectual skills formed in the process of learning, focusing on problem solving, cognitive and practical tasks from the content framework of technological training;
- Exploring the creative technical abilities of students through case studies and situations and developing conceptual algorithm designs with themes from the content of the subject "Technology and Entrepreneurship."

For a starting point in designing the diagnostic techniques are used the components of knowledge and skills of Bloom’s taxonomy.

Assessments of the study

The survey results are quantitatively processed and are correlated to levels of research training. Included are tasks for the detection and selection of certain information, questions and tasks with multiple choice answers, questions with free and independently structured answer, and creative technical tasks. The solution of the tasks for the assessment of the research abilities is consistent with the cognitive levels of Bloom: knowledge, comprehension, application, analysis, synthesis, and evaluation.

The relevance of the results obtained for the 6th and 8th grades are clearly seen from the graph of Fig. 1. The analysis of quantitative data strongly suggests that in answering questions and solving problems, the students from 6th grade there is a dominating performance average in ascending plan and high level of bearish run. There is an uneven distribution of the results at a low level, but the
trend, clearly shown in the chart with the line going upward, allows us to relate these results to the reproductive-adaptive level of expression of research skills.

It was found that tasks requiring expression skills of the highest cognitive level - evaluation, cause considerable difficulties in students from 8th grade. In tasks that require thinking through comparison of causalities and relations, abstraction, generalization of a match, and critical thinking related to the discretion of a situation, the results are the lowest regarding the levels of Bloom’s taxonomy.

Figure 1: Comparison of the results of 6th and 8th grades regarding the level of performance of research skills

Detected bottlenecks in the transfer of competence in the third and fourth tasks occur progressively at the fifth and sixth task, too. The correct answers to task 5 are 12.50% less than the correct ones in regards with the correlation “knowledge, synthesis, application.” The downward trend is clearly manifested in the sixth task in expression levels “synthesis and assessment,” where only 26.79 percent of the students give correct answers. The incorrect answers dominate with 73.21% (Fig.2).

Figure 2: Correlation between "true-false” answers at high cognitive level

Conclusion

The conducted pedagogical study provides results that at this stage do not allow outlining the contours of an optimistic picture of the research skills in technology and entrepreneurship of students in the lower secondary level of the Bulgarian school. The main problem consists in continuing adherence of the teachers to methodical schemes adhering students to express reproductive thinking.
The expected change in the standards of the educational environment, including the training in technologies and entrepreneurship will enable teachers to more easily switch to the application of modern method-based approaches of Edward de Bono (1994) to develop "lateral thinking" approaches, “learning by doing”, “learning by experience”, “project-based learning”, and so on.

References:
ON MORAL IDEAL BETWEEN PHILOSOPHY AND RELIGION
IN THE GLOBALIZING CONTEXT

Eronim-Celestin Blaj¹

Abstract: Nowadays, humanity is continuously challenged by globalization at all levels: technological, economic, political, ecological, and social-cultural. The axiological crisis we face makes us find and develop viable values – by priority, ethical values - for the present time. More than ever, man needs to look for and to reconstruct his moral ideal by discovering new points of reference concerning the choices to be done. This paper focuses on the necessity of an ethical perspective open to principles rich in philosophy and religion. The purpose is to highlight the question of the moral ideal of human life in a globalizing context by accounting the offer of these two major cultural domains.

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Introduction
Lately the phenomenon of globalization generated more and more challenges for humanity, from technological, economic, and political challenges to socio-cultural challenges. Because of this phenomenon we find ourselves in a value crisis which invites us to create new values that apply to our times. Now more than ever, people need a restriction on their moral ideals and new role models in decision making. The starting point is the reconstruction of the fundamental global humanity, reconstruction of the profound ethics, based on philosophy and theology. From this point of view, a factor to consider is the perspective offered by contemporary philosophy and also the way theology faces globalization trends today.

Thus, the globalization phenomenon even from the beginning, from 1870, when international formalization and implementation in social environment of the new ideas took shape, was described by the fight for power- at a global scale. Another important globalization characteristic is the development of communication systems and of global systems of production and exchange. Specific to this economical process, and from a social-cultural point of view, this phenomenon must be seen as way of changing the world, with the goal to overtake the borders of the old order.

An important role in developing this level of global culture is held by the ethical aspect of the globalization process, which implies the exchange of different cultural values from one part of the globe to another. Thus, we find strong communities of European citizens in other continents of the globe, and vice versa, for example, communities of the Far East in European countries each of them keeping their own individual cultural characteristics.

Globalization as a unifying process
Starting with the globalization, we face a progressive process of world unification toward one big market dominated by more and more competitive relationships and marked by serious tension. As I mentioned before, this process was developed from before the first industrial revolution and, in the last few years, had developed in a very intense and unexpected way. At its base, this development has financial, economical, informatics and political phenomenon. What takes shape, is in actual fact a type of fight between nations’ global classes, where a safe place doesn’t exist anymore, there aren’t any borders: “In this world, it is difficult to hide and, in many cases, it is almost impossible. All economies are intertwined in a competitive market and, unfortunately, in this cruel game, which takes place on this stage, the whole society has integrated; to back out this game impossible” (Dahrendorf, 2009).

From this international, national, political and cultural aspect, it is important to reflect on the person who, by importance, is above state and even above international realities involved in the globalization process. Now our considerations are becoming more of philosophical, theological and of a Christian nature. The traditional scale of values, theoretical behavioral and practical are questioned, or even ignored or disputed in many of their parts. We think about the fact that the Christian religion is isolated in the intimate sphere of the person, and it is driven out more and more in the public space, in

¹ Alexandru Ioan Cuza” University of Iași, Romania, celestinblaj@yahoo.com
the state. Today’s crises of values and profound principles create a mist in front of the view, leaving man prey to his or her uncertainties and anguish.

The value and importance of Christian diversity can disturb some; it is to notice that there is an attempt to create a new human being, without roots, lacking transcendence, adapted to new technology and economic interests. From a historical and cultural European point of view, today globalization represents the last phase to secularization of thinking and of life, which started at the end of the Middle Ages. The process is long and complex and it cannot be defined through sentences or comprehensive definitions.

Therefore, we consider that globalization is not a new phenomenon, but a present phase to a process, to a confrontation between sacred and layman, between theology and natural science, between the Church and the European states, everything evolving over many centuries. In the process, especially in the current time, we can see that the human being is not seen in their transcendent dimension. Although the fundamental human rights are respected, the right to life, to freedom of religion, or to have no religion, the human being is only a citizen on Earth and is living in a desacralized space, in an immanency spirituality, without having any superior benchmarks, always cropping the new, always reconsidering, reinventing everything, including their own nature (Gatti, 2001).

The history of the model of the contemporary human being, marked by this phenomenon, is a horizontal one, without references to the transcendent, who lives in polis which he build for himself- the global state. His identification is without an exact outline, and his routes are uncertain and in a constant change; from this uncertainty rise existential anguish and fears. It is obviously that as humans have more as material goods, the more they discover themselves being frail and needing more attention and protection. In this context rise values and constraint crises, one way, the human being at fundamentally questions the meaning of life and history, the rate between reason and faith, why does evil exist, etc...

Starting with the experience of an interior call for doing the good, human being understands that he is in a fundamental way a moral being, no matter what the contingent circumstance he is on. This call for good “corresponds the profound wish of the human being- as any being- aims in a spontaneous, natural way at what completes it fully, at what enables it to reach perfection, which is his own happiness” (Commissione Teologica Internazionale, 2009).

**On moral ideal between philosophy and religion**

According to a document of the International Theological Commission about the search for a universal ethics related to the natural law, human being -as a spiritual and rational one living in society- is not merely able to engage a conscious and mutual dialogue with others, but he also can look for the communion with God. Thus, human being is to be led by the imperative of justice within the social relations, which claims the recognition of equal dignity and mutual respect for each individual (Commissione Teologica Internazionale, 2009).

On the same tone, in his book *Psychologie Consonantiste*, Ștefan Odobleja argues that: “the moral ideal is the perfect balance between self and the others, between individual and society” (Odobleja, 1982).

Each person assumes for himself an ideal model in accordance to which the person is projecting, unwinding and appreciating his behavior. The moral ideal doesn’t reflect what is at a certain time or in a certain condition, as human reality, but what it must be; there is a need for change and self-improvement. Through this takes shape a state in which the human being desires to be, because it’s a better one than the present one, in the light of fulfilled personality (Albulescu, 2008).

In different cultures, people had elaborated and developed in a progressive way tradition of wisdom through which they express and pass on their vision about the world, so, their perception reflects the place human being hold in society and the universe. Before becoming any existential theory, these wisdoms, which are of a religious nature, send an experience which shows what favors or blocks the full manifestation of the personal life and the good function of the social life. They constitute for a kind of “cultural capital” available for the search of a general wisdom, necessary for answering the challenges of today’s ethics.
According to the Christian faith, the wisdom traditions in spite of their limits and, sometimes, even their errors, show a reflection of the divine wisdom which works in humans’ heart. Nevertheless, they constitute the testimony of the existence of values patrimony common to all people, regardless the way these values are justify in the interior of a particular vision about the world. For example, we can find in one form or another “the golden rule” in most of the sapiential traditions.

It is dharma, in Hindu traditions, which defines the social and religious obligation for human being: “The human who is practicing his religion (dharma) to not harm (ahimsa) universally he will obtain the greatest Good. [...] This human being who considers all the creatures as himself and treats them as he treats himself, laying down the punitive rood and totally controlling his anger, this will ensure his happiness” (Augustinus, 1962, III, XIV, 22).

Deep selflessness of Buddhist tradition, which translates itself by a deliberate attitude of non-violence, through friendly good will and compassion goes with the golden rule. Chinese civilization is profoundly marked by the Taoism of Lao-Tze and after, of Confucius, who was named “Kong Master”, tends to, in the context of a profound crisis of the period, restores the order by respecting the rites, based on filial piety that has to be the core of any social life.

In fact, social relationships take over the model of family relationships. Harmony is obtained by an ethic of the right measure, in which the ritual relationship (Li), that inserts the human being in the natural order, is the measure of all things. The ideal that needs to be touched is REN, the perfect virtue of humanity, formed by self control and good will for others. According to Confucius, “Is in it kindness the keyword? What you don’t want others to do to you, don’t do to them” (Entretiens de Confucius, 1981, 15, 23).

In African traditions, the fundamental reality is life itself. It constitutes the greatest good, and individual’s goal is, not only to live happily ever after, but to stay, first of all, even after death, a vital force, always reinforced and vitalized. An anthropological and vital ethics is unfolded by favouring life, keeping, protecting and developing it, especially growing the potential of community life, which goes to the good. Consequently, anything might harm the individual or community life represents the evil.

Muslim ethic is one of listening. Doing good means obeying the rules; to not obey rules leads to the evil. Human reason has to recognize the relevant character of the Law and get from it the concrete juridical implications (Commissione Teologica Internazionale, 2009).

In Christianity, more exactly in the Holy Scripture, the “Ten Words” constitute the centre; they are the essential elements of the religious experience of Israel. This Law of the Alliance contains precepts of the fundamental ethics. Alongside the texts referring to the history of salvation, with the major theological themes of choice, of promise and of the Alliance, the Bible contains a literature of wisdom which doesn’t handle first-hand the national history of Israel, but who takes interest on the place of human being in the world. There is the belief that there is a fair and wise way to do things and to plan life. In the New Testament, in a sort of moral teachings, Jesus renews on his side the golden rule: “Therefore, whatever you want men to do to you, do also to them, for this is the Law and the Prophets” (Mathew 7, 12). This positive precept completes and somehow overcomes the negative wording of the same rule from the Old Testament: “What thou (thyself) hatest, do to no man.” In its negative expression, the Golden Rule is to be found stated “in various forms by Confucius, Hillel, the Stoics, and others” (Calhoun, 2013, p.186).

Through the examination of the great traditions of moral wisdom, I wanted to highlight that some types of human behaviour are recognized, in most of the cultures as expressions of a certain excellence in the way a human being lives and accomplish his own humanity through: acts of courage, of patience in the face of challenges and difficulties of life, compassion for the weak, moderation in using materials goods, responsible attitude for the common good. These ethic elements define the great lines of the moral ideal of life “in accordance with the nature”; this is in accordance with the deep being of human subject. On the other hand, certain elements are universally perceived as being reprehensible: murder, theft, lie, anger, etc... They appear as negative attempts at the dignity of the human being and at the right precepts of life in society. There is a consensus beyond the cultural diversity, enlightening us as regards “the natural law” of St. Thomas Aquinas (I-II, a 2). The term of natural law refers to that complex of moral concepts which a human being is capable to know using reason, without the
intervention of the revelation or from God. The doctrine of natural law has a fundamental importance for two reasons: first, it stays at the base of moral, universal order and constitutes the spring of moral wisdom which Christians share with all humanity, because it is founded on that common reality of all, and second, natural law is the only protection against the political and legislative power-and constitutes the ultimate High Court against the unfair laws given by human authorities (Peschke, 1988).

Human beings accede only in a progressive way at the moral experience and become capable to give themselves rules to guide their actions. It supposes that they are part of the human relationships network from the birth moment within the family, gaining step by step self-consciousness as part of the entire world.

These are some pivotal ideas we find in a synthetic scientific theory – which since 1936 has announced a generalized cybernetics – belonging to Ștefan Odobleja. In his Psychologie Consonantiste, first published in two volumes in Paris (1938-1939), the Romanian thinker stressed the importance of understanding man – among other particularities – as an ethical being, self-fulfilling in the social relations framework, because “the moral ideal is the most perfect balance between self and others, between individual and society” (Odobleja, 1982).

Conclusion

Considering the great traditions of moral wisdom, I tried to highlight that some types of human behaviour are recognized in most of cultures as expressions of a certain excellence in the way a human being lives and accomplishes his own humanity through courage and patience dealing with challenges and difficulties of life, no less compassion, moderation and responsibility for the common good. These ethical elements define the great lines of the moral ideal of life in accordance with the law of nature and of God, supporting man to experience harmony as much as possible in a globalizing world.

The social and cultural circumstances play an important role in educating moral values. It seems that, in the context of globalization, communities and cultures must practice an honest dialogue and right exchange grounded on co-responsibility of all for the common good on the planet; before anything else, we need reach the moral values and rules, comprehending the authentic call of our very own human status in this world.

References


Abstract: The 200 year old Bánffy Castle exists as architectural evidence of the Hungarian nobility with significant importance in the garden history of Romania. The Renaissance style, late Baroque influence, and Neoclassic accents characterize the landmark, which has surpassed, through restoration, the test of time, and has since revitalized the social life in the nearby village. A cultural and physical message has already been highlighted by reconverting the ruin into a functional space, but a current approach to support the landscape as a local patrimony is lacking. This article discusses a reconstruction study of a green area within the historic garden, by analyzing another example of a Bánffy domain in Transylvania. The need for patrimonial protection of architecture, and landscape has great value in sustaining a local memory. This paper concludes with a discussion on the impact of garden rehabilitation in Modern Age.

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Keywords: Renaissance, Baroque, reconstruction, historical garden, Transylvania

Introduction

In Romania, until the last century, the region of Transylvania has benefited from the Hungarian elite, who enriched the local culture and left a unique mark on the landscape with their architecture. The local secular gardens have suffered in time transformations from one architectural style to another, being closely connected with a fortress, castle, mansion, curia, or any other form of noble or cleric settlement. Particularly relevant at this point are the Habsburg historic maps, which capture the plans of the Bánffy domains from the 18th century, both Sâncrai, and Bonțida, and help to identify certain characteristics. This theme has been studied from a historical, cultural, and architectural point of view in maintaining a local patrimony, but the gardens, in both cases, have been lost over time, creating a gap between the past and the present. From Renaissance to Baroque, from ruin to the cultural center, today, the castle from Sâncrai has been restored to its former glory. However, regarding the historical garden, much more can be done. Being the most fragile among works of art, with drought withering the plants, wars destroying their architecture, weeds invading the ornamental plantings, and the hostile nature resuming what was once lost through art (Constantinescu, 1992), restoration is often considered among specialists, stating these matters as architectural and horticultural composition of public interest that should be treated as a monument (Florența Chart, 1982).

The main purpose of this paper is to stress the importance of a green area as part of a complex restoration. Without setting boundaries between the building and the landscape, it is imperative to be aware of the essence of this relationship. Hortus conclusus, as gardens are referred to in literature, has lost its origins. There are only assumptions, from comparing historical data, that a particular affinity for this type of art first appeared in Asia (Iliescu, 2008), where the utilitas component emerged first, and the evolution of society generated sacred, funeral, imperial, public, and private gardens with changing individual needs. A fundamental aspect of this study is to reveal the history of the Sâncrai garden in connection with Bánffy Castle. The study aims to analyze 20th-century postcards and compare the castle with another Bánffy domain to determine a landscape rehabilitation of the main castle entrance that could be extended to a larger part of the settlement.

Geographical Landmark

Bánffy Castle, placed in Sâncrai village, is part of Alba county, a central region of Transylvania (Romania). Situated seven kilometers from Aiud, a famous historic city in the county, it is accessible via the Ciumbrud-Meșecreaç Road (Socaciu & Takács, 2010). Mureș River is present on the west side of the holding, creating a natural and friendly microclimate with characteristic flora disposed as a barrier (Figure 1), in which Salix (weeping willow) has been identified. In the cold season, the formation of fog is a meteorological effect often seen here.

The deciduous vegetation and the agricultural land are an essential presence of the local landscape. On the north side, a group of modern buildings stands, while in the southeast, a rural road and a paved

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1 “1 Decembrie 1918” University, Alba Iulia, Romania, ioana_borca@yahoo.com
street delimit the 17,850 m² settlement. At first sight in the historic garden, only a few old trees remain, such as *Fraxinus sp.* (ash), *Platanus sp.* (plane tree), *Juglans sp.* (walnut tree), and *Picea sp.* (spruce). Young trees, such as *Acer sp.* (maple) and *Rosa sp.* (roses), form part of the eco-farm, near the ornamental pond, while other representative vegetation near the castle have disappeared during restoration. The rose culture is popular among locals, especially in Ciumbrud, Romania, where each year an exhibition is held during summer.

**Figure 1: Aerial view of Sâncrai Castle**

![Aerial view of Sâncrai Castle](image)

**Source:** Google Maps (2017)

### Historical Settlement

Few historically documented facts remain in writings about the castle from Sâncrai, except for the mention of it as belonging to the Kémeny (Fekete, 2007) and the Bânffy families (Iliescu, 2014), while the first mention of Sâncrai was in the 13th century. The First Military Survey (Figure 2) shows the Renaissance settlement and the central symmetry of the building. From 1890, the Baroque castle with Neoclassical elements was extended, due to the Bânffy family (Băscă, 2016), in two different phases. The manner of the passage from a family to another is not entirely clear. Suppositions claiming the transfer from one owner to another involves three hypotheses: lost at gambling, through marriage, or inheritance. The last one is the most plausible and is associated with Jeno Bânffy, the baron who assigned Pâkei Lajos to direct the works, although in the architect’s biography there is no such mention (Bordás, 2013). However, Lajos’ representative artistic creations from Cluj-Napoca show a certain resemblance to the assembly from Sâncrai.

A mystery engulfs the historical context of this subject. In the 20th century, Sâncrai Castle, like many other noble mansions, has had its function dramatically changed to a school for disabled children, and was even at one point abandoned. The damage caused by these actions was permanent until the local authorities decided to recover a valuable treasure of the past through restoration. An inventory from 1953 presents details of the castle’s garden as having various floral species, and fruit and deciduous trees (Bordás, 2013). This aspect reinforces the authenticity of a postcard view from the same century, presented in the subchapter, Landscape Rehabilitation. Since 2013, the building once known as a castle had its glory successfully restored and hosted many cultural and educational activities that now enrich the local social life, but still with minimum intervention in the perimeter of the garden. A culture of roses was established as part of the eco-farm and some young *Acer sp.* (maple) were planted. The only built element in the garden that still stands is an ornamental pond that is out-of-use, almost lost in the spread of vegetation (Milea, 2011). This is the landscape that welcomes the visitors of the Cultural Center of Sâncrai in 2017, which is administrated by the local council (Moga & Rustoiu, 2013).
Bánffy Domain, Bonțida (Cluj)

Many noble families preferred the Transylvania region (e.g. families of Wessényi, Bethlen, Kendeffy, Ugron, Mikes, Haller, and Brukenthal). Its picturesque scenery, rich soils, and proximity to a water source were probably the main reasons to build their large and luxurious castles in this area (Narcis, 2002). The Bánffy name occurs in the history of Cluj county from the 14th century. At 30 km from Cluj-Napoca, one can observe the imposing castle at Bonțida, which is a remarkable example of a complex architectural ensemble, with Renaissance, Baroque, Neoclassical, and Neogothic features, comparable with Versailles or Schönbrunn (Hegedűs et al., 2015). The building is primarily said to have had curtain walls disposed in a U-shape, which can easily be confirmed by comparison with the First Military Survey of the Habsburg maps (Figure 2).

Generally, the noble families have shown a particular interest towards art being transposed into their gardens as the driving force to transform and adapt the landscape according to the brilliant minds of the landscape architects of those times. An occidental Baroque influence emerged through the personality of Dénes Bánffy VI (Jurnalul Național, 2015), a descendant who inherited the castle in the 18th century. Educated at the Imperial Austrian court, he transformed the landmark into a French parkland making of Bonțida a Transylvanian Versailles (Hegedűs et al., 2015). Iosif Biro describes in his writings three long narrow paths measuring almost one kilometre each, adorned with Linden trees that converged to the north side and united into a fourth path. The park had all the main features of the mentioned style: floral beds, obelisks, fountains, and sculptures (Marcus, 1958). Although these characteristics were transformed in the 19th century into a romantic garden, according to the plans from 1831 of Lazlo Iañoş and the works of Herman Samuel (Marcus, 1958), some large old trees from the avenues remain today, with severe pruning interventions, but as proof of an extraordinary landscape settlement created by artists, such as Johann Kristian Erras.

War World II had negative effects on the settlement, not only were works of art within the building destroyed but valuable documents were stolen during this period (Scholten, 2010). In the following years, one by one the famous trees were cut down, based on the information presented in Castle Break (2016). The garden silently disappeared, becoming only grassland and a local memory. In the 20th century, degradation became such a problem that the monument was included on the List of the Most Damaged Historical Monuments of the World, with funds being directed for the conservation of the castle, since 1999. Today, through the hard work of the Transylvania Trust (1996–2017), the cultural and social spirit is being rebuilt. For a few years now, a pioneering project, the Electric Castle music festival, has attracted many tourists during summer and the income from this event helps achieve the restoration, due to be completed by 2026, as estimated by the trust. A recent study visit, in March 2017, at Bonțida, helped acknowledge the connection between the past and the present between castle and garden (Figure 3). With many examples of similar monuments from Europe, the future is promising for restoring the green area as it was intended for the built environment.
**Figure 3**: The Park of Bânffy Domain, Bonțida (Cluj) - in the Past Century and at Present

Source: (a) Hegedűs et al. (2015); (b) Author

**Landscape Rehabilitation**

A possible landscape proposal of a small area within the restored castle from Sâncrai, accompanies the *in-situ* study of the landmark in 2015 and 2016, to acknowledge the true potential of the Cultural Center, which has been operating since 2013. The method used in this case study of a historical rehabilitation (more so than a landscape one), started with retrospective 20th century postcards that showed the castle’s surrounds. This involved comparing etchings illustrating the Bânffy domain (Bonțida), as seen in the 19th and 20th centuries (Figure 4).

These remarkable drawings showed a preference for floral beds, groups of shrubs, individual plantings, and a rose culture. The species that could be identified, conclusive for Sâncrai, was the *Agave sp.* (century plant), which is considered an exotic species that needs protection indoors during winter due to the meteorological conditions of Romania. Climbing plants observed on the building’s main façade were associated with wine species or ivy but without any certainty. On the lawn area, conifers such as *Abies sp.* (fir) adorned the garden and roses on the opposite side made the lateral path visually pleasant. Near the entrance, two pots stood symmetrically, as a reminder of the Renaissance age.

On the opposite side, the Mureș river creates a microclimate for specific water vegetation. This information gathered from the aesthetic analysis of the past is considered fundamental for the future landscape proposal. Although documented historical facts of the castle outnumber those of the garden, the concluding images provide a glimpse of the past for more tangible evidence.
The landmark of Bonțida is by far a landscape architecture that deserves to be among Transylvania’s most outstanding works of art. The etchings (Figure 4-b) show luxurious vegetation and an accurate sense of proportion, rhythm, and harmony, creating an extraordinary composition. From the drawings, corresponding to the garden’s romantic period, the study established there was a particular preference for deciduous species, possibly Fraxinus sp. (ash), Populus sp. (aspen), and Quercus sp. (oak), with a narrow upright form.

Near the western wing of the castle a small wooden bridge connected the rustic paths, while, in front of the main building, the lawn was enriched in its design with floral species. These aspects revealed an attentive perception and organization of space. Analyzing and comparing the photos of the two Bánffy domains helps one understand not only the history but the essence of the topos (place). The proposal for a hypothetical landscape intervention had a simple pattern, imitating the style in the etchings (Figure 5).

It was considered appropriate to propose a pleasant area in front of the main entrance due to the many cultural and educational activities that were likely to be held throughout the year (conferences, workshops, competitions, expositions, and concerts). The portrayal included an option for enlargement, with future studies. The historical background, strengthened by accurate documentation and relevant illustration formed the base of conceptualizing the idea into a visual graphic.

The conceptualization included an open space that would allow the visitors to admire the architecture of the building without vegetal obstruction. Considering the 20th-century image of the landmark and the Bánffy's possible affinity for plants, a couple of Baroque look-alike pots with roses were chosen to define the vertical lines in the composition at a smaller scale from that of the historic building.

An exotic accent was established with the central piece of an Agave sp. (century plant), and variety was shown with a simple mosaic made of Senecio cineraria (dusty miller) and Petunia sp. It formed a natural passing from vertical lines to horizontal ones, which are not that easily perceived by the human eye unless viewed at the correct angle. This minimal intervention presents a great opportunity for continuous development in the historical landscape field and completing the final level of restoration, uniting the castle and garden in the 21st century.
Conclusion

The past cannot be changed, but the present is an opportunity for a 19th-century garden rehabilitation to stand as a testimony of Hungarian culture and society into the future with positive implications for Transylvania. This study highlights the natural evolution of world heritage and provides an impression of Romanian historical landscape. By understanding Sâncrai Castle’s settlement from an analytical point of view and comparing it with the domain from Bonțida, a simple landscape rehabilitation proposal was developed.

The connection between the building and the garden has a history of its own, adapting and transforming into different styles. Overall, specialists in the 21st century still have much to learn from the forgotten monuments. Only acknowledging the true spirit of a landmark, can it be restored to its former glory. A first step has been made for the Bánffy Castle; the same should be done for the landmark garden closely related to the castle, and from which could emerge a unique work of art. Landscape architecture is designed to be contemplated and protected in time.
References


DIDACTIC PARAMETER OF LANGUAGE LITERACY IN THE BULGARIAN SECONDARY SCHOOL

Tanya Borisova

Abstract: This article summarizes the main conclusions about the state of reading literacy of students in the same class in a Bulgarian school and the correspondence between the international criteria for establishing reading literacy of the students. A study, based on the longitudinal method, outlining the didactic parameters of reading literacy in the Bulgarian school was conducted. Emphasis is placed on the needed changes regarding overcoming the problems in the education in reading literacy of Bulgarian students, its limits and variety in its improvement; the correlations which exist between the results of the national external assessment (NEA) of the students in the subject of Bulgarian language and literature of the fourth, seventh and twelfth grade.

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Keywords: Reading literacy, external State assessment, education in Bulgarian language and literature, level of reading literacy and language competency

Introduction

The use of the longitudinal method to establish reading literacy levels of students of the 4th, 7th, 9th and 12th grades, of the same class (enrolled in first grade in 2004) in the Burgas district, enabled the analysis of the reading literacy of the same class in the 4th, 7th, 9th and 12th grade with national and international means and traces the dynamics of the reading literacy of the students in all stages and grades of secondary school. The comparative analysis of the results obtained through the Bulgarian and international methods of research of the reading literacy shows reading literacy levels as a summary of the requirements of the new Bulgarian normative documents for studying Bulgarian language and the international standards for reading literacy;

The didactic parameters of reading literacy in the Bulgarian school outline the following trends:

Purpose, object, subject and aim of the study

The proposed dissertation work fulfilled the purpose and the tasks set in its concept and thus the following conclusions can be made:

1. The didactic parameters of the reading literacy, related to its formulation by UNESCO (UNESCO, 2006) read in the context of the state educational requirements for Bulgarian language and literature education in secondary school and compared to the PISA criteria should be basic in reading literacy education - from initial literacy education to reading comprehension and finding, retrieving and interpreting information from the text on the basis of established correspondences between the didactic parameters of the reading literacy in the Bulgarian secondary school and the international systems of work for raising the levels of its understanding.

2. The external evaluation in the fourth grade and the thorough analysis of its results in the Burgas district showed that the correct answers rates from 2007 to 2013 are still going downwards. In 2007 (with the first introduction of the fourth-graders test), the percentage of true answers was 81.01%. The percentage in 2008 (the year of the evaluation) it was already 80.50%. In 2013 it was only 68%. Without further calculation, it can be said that the decline is significant, even on the basis of the overall results of the test, which is solved by the students. The difference of more than 13% can lead in several directions: - the achievements of the students have significantly dropped, i.e. their knowledge in Bulgarian language and literature marked a serious decline. In just six years something difficult to explain has happened in their education in Bulgarian language and literature The comparison of the 4th grade test of the 2007/2008 school year with the PISA criteria found the following: the text for dictation and reading is the same but is without subject; it is missing a title and it should be entitled by the students; only five of all 15 questions are to find and retrieve information from the text. They are standardized, i.e. the students choose a response from 3 possible options that are given to them. Moreover, the PISA criteria and their presence in the test lead to the conclusion that the state test for external evaluation can hardly be related to the global dimensions of reading literacy. The reference to the requirement for

1 Trakia University, Faculty of Education, Stara Zagora, Bulgaria, borisova.t@abv.bg
reading and writing education go hand in hand (as two branches of literacy) and this immediately reveals that more than 17% of the students did not master the so-called elementary initial literacy after the 4th grade.

2.1. According to the sex of the students, girls showed higher results. Their average score for girls is 17.29 points and for boys is 16.86 points. The difference is less than half a point. At the same time, 28.1% of the girls have reached the maximum test score, while the percentage of the boys is 17% according to data received from mean square deviation, there is significant difference.

2.2. More serious is the problem with the results obtained according to the students' mother tongue. The study shows that students whose mother tongue is Bulgarian have the highest score in the test and the dictation (average score 17.7 points). Students from Turkish ethnicity, who are predominant in the Burgas district in Ruen, Aytos, Pomorie, Malko Tarnovo, make more mistakes in observing the grammatical rules of the language and their score drops to 15.05 points. Statistically significant is the difference in the ball of the Roma ethnicity students - an average of 13.74 points. In the Burgas district they are predominant in the Kamen and Sungurlare regions. A difference of nearly 5 points in 20 max points of the students with Bulgarian as their mother tongue is enough to conclude that the Roma pupils show a significant lag in the covering of the state educational minimum standards still at the external evaluation in fourth grade. It is only emphasized on this part of the competences that are set out in the SER, for the purpose of applying knowledge rather than improving skills.

3. The external assessment of the same pupils in the seventh grade, consisting of two modules (with the first, compulsory for all students), which measured the pupils' achievements according to SER and the educational minimum, contains the following information for measuring the reading literacy of seventh grade students: 18% of the points provide information on student literacy; 18,46% - bring information about students' achievements when editing text; the remaining 63.54% measure students' knowledge of grammar and literary comment only elementary literature forms. According to the PISA criteria, these percentages clearly show what and how is reading literacy being assessed according to the educational minimum. In this way of assessment, it turns out that only 51.23% of the seventh-grade students in the Burgas district have dealt with the tasks of the first module.

4. When compared to the average success rate of the same students from the external evaluation in 4th grade - 80.5% measured according to the average statistical dimensions of the Ministry of Education and Science (State educational standard). Referring to MES statements that these two tests - after the fourth and seventh grade measure how much and how many students have covered the SER in Bulgarian language and literature subject, without looking for a high level of difficulty, then the success of the same students marks a decrease of 29.97% for only three years.

5. The results of the study of the reading literacy of the seventh grade students show that the successful solving of the specific tasks within the depicted problem areas should be interpreted as a consequence of the change of the profile of the Bulgarian language teaching as the first language in the secondary school – from grammatically oriented towards communicative oriented Bulgarian language education; and not only to be talked about communication, but to make sense of it as a communication with a text, i.e. acquiring reading literacy and such skills that help the individual's social realization.

6. The study conducted and tested how and in what direction the reading literacy of the students of the same class in the fourth, seventh and ninth grade is moving. If in the fourth grade 81.1% of the students in the Burgas region are successful, according to the SER, in the same test in seventh grade 51% of them have managed to cope with the educational minimum. Somewhere between the fifth and the seventh grade, nearly 30% of the students "self-isolated" themselves from reading, and most of them have dropped out of school. The tendency for girls to do a little better than boys keeps up. These figures are very similar to the national statistics, because the Burgas region has always been somewhere in the middle with its achievements. In this case, this data should have been noticed by the MES long ago. But the results are reported year by year, and it has not occurred to them that they can already see the competencies of whole classes. And the competencies are decreasing. This is confirmed by the PISA criteria in a sample of 204 students from a grade, divided into different types of schools in the Burgas region. Still another 10%, of the students are dropping beyond the critical level of reading literacy. So, from the fourth to the ninth grade, the succeeding students are reduced by half. This tendency is preserved till the twelfth grade and is confirmed by the results of the grade shown in the June 2016
session of the Bulgarian matriculation exam in Bulgarian language and literature subject: - a large number of poor grades that were predicted from the study of reading literacy in the ninth grade; the lack of reading skills directly influences the acquisition of knowledge, so the students have limited themselves to working only on issues bearing 1 point for a correct answer (da Costa et al., 2013).

7. Research shows that the decreasing reading literacy in Bulgarian schools is a fact. Therefore, more correlations need to be sought to suggest to researchers and experts where they should direct their efforts if they want to get out of the enchanted circle. State schools most clearly indicate the tendencies in the achievement of the graduating students. They are the most, and in them the success gives an idea of the real level of literacy. In the Burgas region - 4, 33 / 4, 08, in the country 4,54 / 4,27. In these schools more than 89% of 12th graders study. Most of the graduating students who have not worked on the creation of an interpretive text study at state schools. Most students also study there, also have not received higher scores from the range of 3,49 to 4,00. This is Grade Point Average of the students from the municipality schools compared with the same value achieved in the State and the private schools in Bulgaria. As a conclusion to their reading literacy, it can be argued that the differences are in contrast between profiled and un-profiled classes in the same school.

8. The decline in the dynamics of reading literacy is categorical and confirmed by the study.

Results
To overcome it, it is necessary:
- To take into consideration the level of the reading literacy of the students in the secondary school and to compare it with the requirements of the state educational standards for educational content (syllabus) through independent assessment methodology - threshold values, illustrative material (Bench mark), etc. It is especially important to integrate the skills that are a subject of evaluation in the international research;
- To understand why reading and reading skills are given such great attention in international studies of achievements in education. And if today our education system encourages the best students to acquire reading literacy, why do they continue their studies abroad and are realized in the societies there, while the labour market in Bulgaria remains with those that are below the critical values of the reading literacy;
- To respond to the broad public needs with reliable information on how our educated system prepares students for the Bulgarian public reality. The PISA's results can be the basis for public dialogue and political will, and for collaborating in defining and implementing educational goals with innovative methods that reflect the understanding of the skills necessary for the lives of mature people. The recognition of the literacy as understanding, use and comprehension for writing texts to achieve goals and meet the needs of deepening knowledge is essential for PISA. They see the literacy as a development of the intellectual potential of the person for his active participation in public life. Reading seeks to extract information, to interpret texts and to broaden their common understanding as well as to reflect on the text and to evaluate its content, form and characteristics (OECD, 2010).
- To process the educational context of a unified Europe the SER for learning content on the BLL in secondary school. These new standards should be applied in the practice of learning, as well as in the evaluation and measurement of students' achievements in Bulgarian language as the first and the national language in Bulgaria. A step in the right direction is the introduced external evaluation, but it waits for its improvements in the direction of validity and reliability (Mullis et al., 2004).
- To pay special attention to the thresholds for assessment of the BLL training between grades 4 and 5 as well as between 7 and 12 grade. There is also a need to define the BLL (mandatory, optional and facultative) levels of training, and why not to provide a specific discipline to develop the pupils' reading skills and reading literacy skills. Moreover, such experience exists in many European countries.

Conclusions
Among the key issues awaiting their decision are the following:
1. Establishing a link between the results of international researches in order to improve the Bulgarian language and literature education and the whole cultural and educational area, in order to build reading literacy among the students.

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2. Again, the problem of what to assess the external sight of the system is highlighted - the educational minimum or the achievements and weaknesses of the students in their reading literacy.

3. Where will the system of assessing students' achievements in Bulgarian language and literature go - to some Bulgarian idea or to the global system measuring a set of skills, including reading and writing, perception in their social context. (Rayner, K., & Reichle, E.D., 2010)

4. The published PISA reading literacy thresholds, tailored, compared and implemented through the normative documents for studying Bulgarian language and literature under the new School and Preschool Education Act, can be used as a basis for discussions on whether the FUNCTIONAL EDUCATION of Bulgarian students should be as a KEY COMPETENCY in the Bulgarian school (Lundberg & Hoien, 1991).

5. The study of "reading literacy" also raises the question of how students should be trained in it to be validly assessed and prepared for social realization. Qualitative assessment, such as structuring evaluation standards, selecting an educational evaluation philosophy, and identifying key objectives, leads to the reconsideration of curricula in the Bulgarian language and literature and their focus on developing students' reading literacy.

References


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Abstract: Raising the environmental awareness of architectural students becomes increasingly important given today’s global environmental challenges. As a prominent player in urban development, an architect needs to be concerned with the alternative ways for achieving environmental sustainability. Subsequently, environmental issues constitute an important part of the curriculum in architectural education. The scope of this study covers an elective course in an architectural graduate program of Turkey with the main aim of making fresh architects aware of their vital role in environmental objectives. In this course, the students are asked to visit and examine the vernacular architecture at a rural Turkey settlement. In this assignment, the students use a series of architectural as well as social science research methods. They present their findings visually and offer their proposals as a conclusion. Their proposals involve ways, not only, to achieve sustainability for this rural settlement but, also, to adapt the traditional design methods and materials examined within the course into contemporary design techniques. Given the acquisitions of the graduate students, this paper concludes with a recommendation for improving architectural course content by integrating applied learning.

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Keywords: education, architecture, sustainability, environmental awareness

Introduction

Professor Viktor Papanek, an international design expert recognized by United Nations Educational, Scientific and Cultural Organization (UNESCO) and design teacher of several renowned design schools of the world, defined ecologically responsible and socially responsive design as revolutionary and radical (Papanek, 1985). His ideas included consuming less, using things longer, and recycling materials (Papanek, 1985). When considered in the context of architectural design, it is about ecologically responsible and socially responsive architectural design offering a sustainable lifestyle and future. It is clear that buildings of the future need to provide suitable environmental conditions for dwellers. At the same time, building design should create a lighter impact on the wider environment. Being conscious of such vital importance of architectural education, the authors have emphasized the need for ecologically responsible architectural design in their undergraduate and graduate courses. One of the related graduate courses held at Uludag University, Architectural Program of Institute of Science and Technology, will be presented in the context of this study.

Literature Review

Environmental Education in Architectural Programs

As ecological awareness has grown globally in recent years, the role of architectural education in Turkey has gained increasing importance, with the construction industry recognized as one of the most answerable sectors in the fight against the current climate crisis. According to the International Energy Outlook of 2016 (IEO, 2016), 20.1% of the total energy delivered worldwide is consumed by the building sector. This truth places the need to introduce sustainable architectural design to new generations of architects at the apex of their agenda for many years. The descriptives qualifying desirable architecture, namely, ‘sustainable,’ ‘ecological,’ ‘green,’ and ‘environmental,’ appear more often in related media. The architectural programs now prefer to enhance their curriculums with theoretical and practical courses that include sustainable design. Furthermore, this preference has become a ‘must have’ for accreditation and qualification boards in many countries.

Altonome (2009) indicates that there is a great need to discuss environmental issues such as climatic design, choice of materials, construction techniques, resource efficiency, and similar options throughout the architectural teaching because current curriculums of the programs are insufficient in integrating sustainability issues methodically.

In fact, the roots of architecture, or otherwise, the traditional ways of building, should be the main guide for sustainable architecture.

1 Uludağ University, Bursa, Turkey, arzcuhcan@gmail.com
2 Uludağ University, Bursa, Turkey, renginb@hotmail.com
Analyzing examples of vernacular architecture is a particularly fruitful approach for developing a guidance tool.

Vernacular Architecture as a Tool for Environmental Awareness

Defining ‘ vernacular architecture’ and clarifying its importance for improving environmental consciousness needs priority consideration. Oliver (1997) defined vernacular architecture as the most widely used term to denote indigenous, tribal, folk, peasant, and traditional construction. He points out the distinctions that can be made between formal architect-designed and vernacular architecture, and between these and what can be termed as popular architecture. He is a renowned researcher who works for recognition and understanding of the meaning and importance of vernacular architectural traditions, worldwide. Oliver (2006, p. 267) argues that vernacular architecture will be necessary for the future to “ensure sustainability in both cultural and economic terms beyond the short term.” Another eminent researcher, Rapoport (1969), defined and described the vernacular design as a part of a typology that comprises primitive, vernacular, and high-style settings, with modern architecture a special case of the latter. In one of his studies, he described vernacular design as both a process and a product with the resulting environment having certain characteristics. Concentrating on the process, he argued that the main point is not that it is created directly by the users without architects but rather that the vernacular design is achieved through applying shared rules. Asquith and Vellinga (2006) indicated that contemporary studies about vernacular architecture mainly focus on the applicability of lessons learned from traditional building styles for that applied in the twenty-first century. The emphasis is mostly on vernacular traditions having much to contribute to contemporary practice through offering economic and culturally sustainable solutions for global housing problems. The common aim is to foster an architectural perspective that integrates vernacular and modern knowledge, to create “a truly sustainable future built environment” (Asquith & Vellinga, 2006, p). Recognizing the importance of vernacular architecture and in sharing the ideas of Yannis (2005), who considered sound theoretical background to be supported by empirical knowledge and evidence-based learning, the authors realized the value of vernacular in both undergraduate and graduate courses.

Methods

This study uses proceedings from a graduate course held at Uludag University for the Architectural Program of the Institute of Science and Technology. A Graduate Course: Sustainability and Materials in ArchitectureThe course’s main aim is to determine the sustainability of an architectural design and its implementation including the role of building materials in this sustainability. In achieving this aim, it is envisaged that fresh architects will have a greater awareness of their vital role in environmental objectives. The proposed learning outcomes are 1) an understanding of the relationship of sustainability and architectural design and 2) knowledge of the characteristics of building materials and the roles these play in architectural design. The concept of sustainability is considered in three main components: ecologic, economic, and socio-cultural. The students were invited to visit a vernacular village, Tongurlar, located in Bilecik City, in the northwest of Turkey (Figure 1), to analyze and identify the reasons for its unique architectural characteristics. Few families live in this village today since most have immigrated to urban centers because of lack of income sources in the village. Furthermore, poor economic conditions have resulted in unhealthy living environments, and the traditional buildings are now degraded to near inexistence. Agriculture and cattle breeding are the main sources of income for the villagers, but because of the insufficient policies of the government, it has become difficult to earn a living in the area. For revitalizing the village, there was little doubt that socio-cultural and physical sustainability of Tongurlar village should be achieved. Having this aim, the academicians with varying professions, such as architects, textile artists, sculptures, and painters, in different universities of Turkey, developed a research project supported by the universities’ foundations. They organized summer workshops together with their students. The architecture students from varying universities attended these workshops and together restored the primary school building and one house in the village. Today, these buildings comprise the hub for workshops organized at varying times over the year.
Results and Discussion

In the scope of their research, graduate students of the Uludag University Architecture Program combined a series of architectural approaches with social science research methods. They presented their findings using visual applications and offered their proposals as conclusions. They prepared analysis charts for the vernacular houses in the village, including physical and material properties, and calculated the energy efficiency of the houses (Figure 2).

At the end of the term, the graduate students developed a set of strategies for sustainability of all aspects of this vernacular site. These proposed strategies were as follows:

- Organize events similar to the summer workshops of the universities in the village to vitalize the everyday life of the villagers; arrange these to include festivals, bazaars, and themed education activities.
- Teach the villagers the value of their lifestyle and living environments for a sustainable future. This awareness could be developed through students spending more time with the villagers and experiencing their lifestyle, while explaining the adaptability of their everyday practices and ways of building for modern living.
Investigate ways of using vernacular building materials and techniques in the maintenance of the traditional houses and consider both the local people and practitioners.

**Conclusion**

This experimental study, undertaken in a traditional village of south-western Anatolia, aimed to increase awareness in student architects of the basic vernacular ways of living and building that are the basis of sustainable architecture. The students recognized that to understand the basic principles of sustainability, a designer needs practical experience in the vernacular ways of living and the traditional modes of architecture. Furthermore, it was accepted that by analyzing the traditional building materials and techniques one can propose new sustainable materials and technology for composing contemporary spaces for modern living.

The outcomes of this practical study undertaken by the graduate students of the architectural master program indicate that this type of applied learning has many advantages in architectural education. The necessity for this type of learning specifies the importance of architecture being a multidimensional and applied discipline. These conclusions indicate the merit of applied learning, integrated with theoretical coursework, in providing a more innovative and up-to-date architectural education system.

**References**


LEGAL ADJUSTMENT OF ILLEGAL EMPLOYMENT OF CHILDREN IN SLOVAK REPUBLIC

Peter Čonka

Abstract: Illegal employment of children deserves our specific attention because the healthy development of children is one of the most important factors of an advanced society. The aim of this contribution is to provide a preview of a theme, especially in a branch of the Criminal law. The contribution deals with the definition of child labor and analyses the legal adjustment of illegal employment of children included in Criminal Code of the Slovak Republic while also pointing out international sources of this legal adjustment. The Criminal code of the Slovak Republic, the Convention on the Rights of the Child, and other relevant literature and documents about child labor are the main sources of this survey. We can consider this legal adjustment as suitable, but it is important to focus on its adherence. An important benefit of this particular analogy is a general overview on the theme of illegal child labour by analysis of relevant legal adjustment.

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Keywords: children, labor, employment, illegal, convention.

Introduction

Child labor is an issue that needs to be handled very carefully because incorrect procedure might cause huge damage to the children’s development. Illegal employment of children might cause damage to their moral development, physical health, and it also has significant impact on truancy. Premature termination of education and truancy make it harder to find a stable job with good salary. According to the World Report on child labour (2015) some 168 million children remain trapped in child labour while at the same time there are 75 million young persons aged 15 to 24 years of age who are unemployed and many more who must settle for jobs that fail to offer a fair income, security in the workplace, social protection or other basic decent work attributes.

Child labor is typical for developing countries, but we need to focus on this issue also in Europe, because development of this unwanted phenomenon might be very dangerous. We need to take control over truancy and premature termination of education to prevent illegal child labor, because children which are not under control and which are not educated are more susceptible to be abused.

It is very positive that in the most of the European countries there is protection of children secured by Criminal law. This fact might discourage potential perpetrators and also serves as expression of the highest importance of resolving this issue.

Contribution Legal adjustment of illegal employment of children in the Slovak Republic presents legal adjustment of this issue expressed in the Criminal code with focus on international conventions as sources of this legal adjustment. The contribution also pays attention to the definition of key concepts and also focuses on connection between child labor and truancy.

Illegal employment of children

Society pays extraordinary attention to protection of children by its system of laws, and this is expressed by the fact that children are protected not only by the norms of civil law, but also by the norms of criminal law. Criminal law protects only the most important values of society so we can conclude that life, health and healthy development of children belong to the top of human interest.

Employment of children is a very specific theme which is regulated by strict rules. These rules can be found in Labour law and also in Criminal law.

The Criminal law of Slovak republic provides protection of children by the Criminal code (number 300/2005), which includes following legal adjustment in § 211:

1) Any person who, even by negligence, exposes a person under eighteen years of age to the risk of debauchery by
a) enticing such person to leading lewd or immoral life,
b) enabling such person to lead lewd or immoral life,
c) enabling such person to perform actions which are considered as criminal offenses under this Act or,

d) preventing such person from compulsory school attendance, shall be liable to a term of imprisonment of up to two years.

(2) The same sentence as referred in paragraph 1 shall be imposed on the offender, who as a contrary to a generally binding legal regulation, employs a child under fifteen years of age, and thus prevents him from compulsory school attendance.

We can conclude that the cited paragraph of the Criminal Code contains two different facts. The paragraph number one contains general protection of children to prevent the risk of their debauchery. Objective of paragraph number two is to protect the healthy physical and mental development of children younger than fifteen years of age. This provision implements the Convention on the Rights of the Child which has been approved on 20-th of November. The Convention on the Rights of the Child describes a child as every human being below the age of eighteen years, unless under the law applicable to the child, maturity is attained earlier. State Parties shall secure life and development of children at the most possible level. According to article 19 of the Convention, state Parties shall take all appropriate legislative, administrative, social and educational measures to protect the child from all forms of physical or mental violence, injury or abuse, neglect or negligent treatment, maltreatment or exploitation, including sexual abuse, while in the care of parent(s), legal guardian(s) or any other person who has the care over the child.

According to article 27 of the Convention, state Parties recognize the right of every child to a standard of living adequate for the child's physical, mental, spiritual, moral and social development. According to article 31 of the Convention, state Parties recognize the right of the child to rest and leisure, to engage in play and recreational activities appropriate to the age of the child and to participate freely in cultural life and the arts. State Parties shall respect and promote the right of the child to participate fully in cultural and artistic life and shall encourage the provision of appropriate and equal opportunities for cultural, artistic, recreational and leisure activity. From the mentioned article, it is possible to conclude that its objective is the protection of children against illegal employment, because it guarantees the right to rest, leisure time, and versatile development.

Article 32 of the Convention explicitly protects children against illegal employment and against truancy. According to this article, state Parties recognize the right of the child to be protected from economic exploitation and from performing any work that is likely to be hazardous or to interfere with the child's education, or to be harmful to the child's health or physical, mental, spiritual, moral or social development.

State Parties shall take legislative, administrative, social and educational measures to ensure the implementation of the present article. State Parties shall in particular:

(a) establish the minimum age or minimum ages for admission to employment;

(b) determine the appropriate regulation of hours and conditions of employment;

(c) enact the appropriate penalties or other sanctions to ensure the effective enforcement with respect to the present article.

Article 36 of this Convention also refers that state Parties shall protect the child against all other forms of exploitation prejudicial to any aspects of the child's welfare.

The capability of citizens to rights and obligations in labour relations and capacity to acquire these rights and take on such obligations by one's own legal actions (labour-law capacity) comes to existence, if the Labour code do not enact different ways, by reaching 15 years of age, but the employer is not allowed to arrange a day to start work before a citizen has completed a compulsory education. The mentioned legal adjustment contributes to the protection of children against illegal employment and especially against truancy.

It is very important to protect children from early termination of education or truancy, because according to the World report on child labor (2015) it is more difficult for early school leavers to secure stable jobs, also it takes more time to do so than better-educated youth. The World report on child labor (2015) points out that these results run counter to the common perception that better-
educated school-leavers with more specialized skill sets have relatively greater difficulty in gaining an initial foothold in the labor market.

Criminal offense - Corrupting morals of youth is committed by its subject when by contrary to the law (Labour code) employs child younger than fifteen years of age and thus prevents him from a compulsory school attendance.

The consequence of this kind of employing is that the child does not attend a school; however the law requires that the child is prevented from fulfilling this obligation. Lichá Valicová (2014) points out that when we are talking about preventing school attendance, if a person is prevented from attending a school physically or by persuading, both cases pose the potential danger and threat. The criminal offense of corrupting morals of youth is committed only if a perpetrator acts willfully. This means that a perpetrator has his own specific intent and he knows that if he will employ a child who is less than fifteen years of age, than this child can be prevented from attending a school. It is required by law that the perpetrator has knowledge about the age of the child. Criminal liability cannot arise without fulfillment of these particular elements.

It is very important to recognize the first signs of truancy by parents of truants, but sometimes even parents support their children in this behavior, because they expect money from their children’s work or they think this also helps the children. Reid (2003) writes that this is a totally false and a misguided belief. Regular attendance at school matters and is critically important for a child’s schooling and social and academic development. As Blanco Allais and Hageman (2008) say in countries where child labor is a common phenomenon many children are excluded on a permanent basis from the education system (i.e., high levels of child labor translate into large numbers of out-of-school children). This, of course, puts a downward pressure on overall school attendance rates.

According to a survey made by the International Labour Organization on child labor and education, there is an inverse correlation between the number of working hours and the capacity of children to attend school.

Illegal employment of children is dangerous for their moral development, because this employment has no rules regulated by law and children can sometimes do work which is not suitable for them. According to United Nations’ definition of child labour, it means work that is prohibited for children of certain age groups. It is work performed by children who are under the minimum age legally specified for that kind of work, or work which because of its detrimental nature or conditions, is considered unacceptable for children and is prohibited.

However according to the International Labour Office (Making progress against child labor) children worldwide are usually illegally employed in the field of agriculture, industry or household chores. It is possible to suppose that children in Europe do similar work. Muižnieks (2013) says that many of the children working across Europe have extremely hazardous occupations in agriculture, construction, small factories, or on the street. This has been reported for example in Albania, Bulgaria, Georgia, Moldova, Montenegro, Romania, Serbia, Turkey and Ukraine.

According to the International Labour Office, agriculture is by far the most prevalent sector, representing 59% of all those of child labor and over 98 million children as a final number. Child labor in agriculture consists primarily of work on smallholder family farms, although it also extends to activities such as livestock production, fishing and aquaculture.

According to International Labour Office 54 million children around the world can be found in the services sector and 12 million in industry. These numbers are very alarming, because work in industry can be dangerous for children’s organisms and it also causes truancy. The International Labour Office also declares children who are working in the services sector primarily work in hotels, restaurants, street selling, car repair shops etc.

According to a survey made by the International Labour Organization – Child labor and education: Evidence from the surveys, boys and girls often do different jobs, where girls are usually overrepresented in non-economic activities such as work in the “own household.” As Blanco Allais and Hageman (2008) say they also often bear the double burden of work outside and inside the house, with little time left for schooling.
It is possible that the situation about child labor is much better in Europe than in Africa or Asia, but for many European countries there are no available data, so it would be proper to make a survey about child labor in the states of the European Union in order to get updated statistics. Authorities should focus on prevention by greater inspection in this field to protect the correct development of children and to prevent truancy, which is related to the illegal employment of children.

**Conclusion**

It is possible to conclude that the protection of children needs to be secured by international conventions in order to point out the high importance of this issue by state parties. However, inclinations of these norms to the Criminal code of the state have the greatest importance, because it makes these norms directly enforceable. Legal adjustment of this issue in the Criminal code of the Slovak Republic can be considered as an advancement to the international standards, because it implements the Convention on the Rights of the Child which has been approved on November 20. The legal frame provided by the Convention is sufficient, but we need to focus on its adherence and enforcement.

We need to gain updated statistics of illegal child labor all around the European Union to work with relevant data and to be able to adopt suitable action. It is also very important to prevent truancy, because this phenomenon helps illegal child labor to develop. Truants are often out of control and this can lead to the development of drug abuse or gambling addictions which then forces them to look for particular source of income. One of the possible ways to gain money is to make truancy more intensive and get a job. These jobs are usually not well-paid so these young truants are actually abused. We can suppose that this kind of child labor which is motivated by the need for money is present also in Europe.

**References**


IDENTIFICATION OF CULTURAL DIFFERENCES IN MANAGEMENT IN MULTINATIONAL COMPANIES BASED IN SLOVAKIA

Elena Delgadová,¹ Monika Gullerová²

Abstract: In 2004, Slovakia became a full-fledged member of the European Union. Since then, Slovakia has been one of the attractive investment locations for multinational companies in the region of Central Europe for its skilled and educated labor force. Managers who want to succeed in running multinational companies in culturally diverse settings must have the intercultural competence, i.e. the capability of thinking and acting in interculturally appropriate ways. The lack of intercultural competence skills in managers may result not only in miscommunication but can also be detrimental to the financial and economic success of organizations. The purpose of the paper was to identify cultural differences in management in German, Korean and French multinational companies operating in Slovakia. In the paper, the methods of questionnaire, literature research, analysis, synthesis were utilized. 160 respondents participated in the research on establishing cultural differences in management based on Hofstede’s model of cultural dimensions.

JEL Classification Numbers: M3, Z00; DOI: http://dx.doi.org/10.12955/cbup.v5.987

UDC Classification: 3.39

Keywords: culture, intercultural competence, management, multinational companies, cultural environment, cultural dimensions

Introduction

In May 2004, Slovakia became a member of the European Union. Some EU countries applied transitional periods before fully opening their labor markets to citizens of the new Member State, while others opened up their labor markets immediately. Recently, Slovakia has become one of the attractive investment locations for multinational corporations, especially automobile manufacturing companies, for its highly skilled and qualified labor force. Multinational corporations, operating across borders in diverse cultural settings, need to be run by managers, having among others, an intercultural competence.

Culture and Models of Culture

The first modern scientific definition of ethnological and anthropological concept of culture was formulated by the English anthropologist Edward Burnett Tylor in 1871. Tylor looked at culture from the point of view of evolutionism, i.e. the theoretical approach that attempts to objectively depict and explain processes of cultural changes in the long-run, viewed as a configuration of learned behaviors and results of behavior whose component elements are shared by the members of a particular society. This new theory of culture was distinct from the previously recognized individualistic and restrictive concepts of culture. American anthropologists Kroeber and Kluckhohn (1952) compiled a list of 164 definitions of culture and put forward the following definition “Culture consists of patterns, explicit and implicit, of and for behaviour acquired and transmitted by symbols, constituting the distinctive achievements of human groups, including their embodiments in artefacts; the essential core of culture consists of traditional (i.e. historically derived and selected) ideas and especially their attached values; culture systems may, on the one hand, be considered as products of action, and on the other as conditioning elements of further action”. Zorkócióvá (2007) maintains that culture should never be viewed as good or bad, there are only distinct cultures: distinct in shared values or hierarchy of needs. Needs of diverse cultures can encompass different defining characteristics. Culture of society reflects the interaction of attitudes, traditions, beliefs and other values that are recognized by the members of a culture. A set of values, not individual items, can be viewed as culture. A set of values are the principles respected by and adapted to members of a group. The theory by Zorkócióvá, however, is opposed by those who use the example of cannibalism in some societies to say that clear boundaries between good and evil cultures should be distinguished.

The conclusions of the World Conference on Cultural Policies (MONDIACULT, 1982) say: “…culture should be regarded as the set of distinctive spiritual and material features of society or a social group and that it encompasses, in addition to art and literature, lifestyles, ways of living together, value systems, traditions and beliefs…” According to this point of view, culture refers to a

¹ Faculty of Social and Economic Relations, A. Dubček University in Trenčín, elena.delgadova@tnuni.sk
² Faculty of Social and Economic Relations, A. Dubček University in Trenčín, monika.gullerova@tnuni.sk
system of values, social norms and rules, which are typical for society and which are passed from generation to generation through cultural elements, such as language, symbols, history, ceremonies, rituals, values, norms, etc. Values that underpin the social and cultural system of society are learned in the process of socialization. The scientific model of "the structure of culture" draws attention to the relations and ties between the essential subsystems of culture: the system of education, science, art, mythology, morality, politics, and religion. Sociologists argue that culture is an integral part, property, and attribute of society. Culture arises from society and society evolves thanks to culture, and the collapse of society means the end of culture. Culture refers to everything shared by all members of a group and passed on from older to younger generations. It is the central element in interpersonal relations, guiding people’s behavior and interaction. Culture is our self-expression, composed of values, beliefs, attitudes, norms, and assumptions which make it unique and distinct from other cultures. Actually, each culture refers to the ways we classify or denote objective reality and view the world, which is reflected in our thinking, feeling and doing. Moreover, culture relates to the way humans sense, perceive and organize everything that surrounds them and which is apparent in the way they communicate. They are the patterns of meaning that are passed on from generation to generation through symbols, communication schemes or models. Thus, culture is understood as a way of being, thinking, feeling and acting that humans have acquired in a particular social and linguistic environment. Thus, intercultural competence is seen as the “ability to communicate effectively and appropriately in intercultural situations” (Deardorff, 2006). It goes without saying that “individuals capable of effective cross-cultural communication can limit potential misunderstandings, minimize social barriers, and reduce ethnocentrism” (Lauring, 2011). In order to identify differences across cultures, several models of culture have been developed. Kluckhohn and Strodtbeck (1961) proposed a model of culture that was based on value orientations. They argued that cultures can be distinguished by the way they address five common human concerns, such as man-nature relationship (attitudes towards the need or responsibility to control nature or live in harmony with nature), time sense (attitudes towards past, present and future), human nature (attitudes towards the basic nature of people), human activity (being, becoming or learning mode of activity) and social relations (hierarchical, collateral or individual form of organization). Trompenaars and Hampden-Turner (1998) regarded culture as “a dynamic process of solving human problems/dilemmas in the areas of human relationships, time, nature.” He developed the onion model of culture as he believed that the levels of culture can be compared to the layers of an onion. There are a number of interpretations of this model but the simplest one consists of three or five layers. The outer, explicit or visible layers, represent cultural artifacts and symbols such as flags, architecture, hairstyles, jewelry or traditional clothing and all the material things that the culture has ever made. The next layer is represented by language, common rituals, customs and traditions. This could include how people greet each other, how they eat meals, get married or practice their religion. Next layers, noticeable but more implicit or invisible ones, represent norms, rules, values, beliefs and attitudes that are much harder to recognize, get to know and understand. In the centre of the onion, there is the most implicit, most invisible layer of the culture that hides the underlying values, cultural assumptions and the worldview of the culture which influence all of the other layers. Trompenaars and Hampden-Turner (1998) classified cultures along a mix of patterns related to behaviour and values, and developed a cultural model composed of seven dimensions/dilemmas: universalism versus particularism, individualism versus communitarianism, achievement versus ascription, neutral versus emotional, specific versus diffuse, sequential versus synchronous time, internal direction versus outer direction. The Dutch cultural researcher, Geert Hofstede (Lustig and Koester, 2009) identified the following five dimensions of culture: Individualism/collectivism – describing the strength of the relation between an individual and other individuals in the society. In cultures that are high in individualism, people tend to think and act as individuals rather than as members of a group. In cultures that are high in collectivism, people think of themselves mainly as group members. Power distance concerns the way the culture deals with unequal distribution of power and defines the amount of inequality that is normal. In countries with large power distances, the culture defines it as normal to maintain large differences in power. In countries with small power distances, people try to eliminate inequalities. Uncertainty avoidance describes how cultures handle the fact that the future is unpredictable. High uncertainty avoidance refers to a strong cultural preference for structured situations. In countries with high uncertainty avoidance, people tend to rely heavily on religion, law, and technology to give them a degree of security and clear rules about
how to behave. In countries with low uncertainty avoidance, people seem to take each day as it comes. Masculinity/femininity is the emphasis a culture places on practices or qualities that have traditionally been considered masculine or feminine. A masculine culture is a culture that values achievement, money making, assertiveness, and competition. A feminine culture is one that places a high value on relationships, service, care for the week, and preserving the environment. Long-term/short-term orientation suggests whether the focus of cultural values is the future (long-term) or the past and present (short term). Cultures with a long-term orientation value saving and persistence, which tend to pay off in the future. The dimension related to indulgence versus restraint juxtaposes hedonism with self-discipline. Thus, high-indulgence cultures encourage pleasure, enjoyment, consumption and spending, whereas high-restraint cultures encourage the control of such hedonistic gratifications, and the pleasures and enjoyment that go hand in hand with leisure-time activities. Hall (1996) distinguishes high-context and low-context cultures. High-context cultures place more emphasis on the context than the words even though words play a decisive role and less legal documents are used in such cultures. Low-context cultures that messages rather by words than non-verbal means. Verbal messages are clear and direct. Hall (1996) also categorized cultures according to their attitude towards time. Thus, cultures were divided into strongly monochronic, slightly monochronic and polychronic ones. Monochronic cultures do one thing at a time, they like to concentrate on the job at hand, respect privacy, and adhere to plans and deadlines. Polychronic cultures like to do multiple things simultaneously, tend to change plans often and easily, and their main concern are people, mainly those closely related to them. In addition to the above models of culture, there have also been other scholars researching cultural models and cultural differences. The main purpose of the paper was to identify cultural differences in management in a German, Korean and French multinational companies operating in Slovakia. In addition, the research intended to identify the values of corporate culture in multinationals and to find what style of management is used by middle managers and what management style is preferred by Slovak employees. In the paper, the methods of questionnaire, literature research, analysis, synthesis were utilized. 160 respondents participated in the research on establishing cultural differences in management based on Hofstede’s model of cultural dimensions. Due to the recommended extent of the paper, two dimensions of culture were examined, such as power distance, and femininity vs masculinity.

Regarding the style of management, it was found that managers in the German multinational used democratic style of management (78%), managers in the French multinational used authoritative style and, similarly, managers in the Korean multinational use authoritative style of management (80%) – compare Table 1.

<table>
<thead>
<tr>
<th>Table 1: Style of management</th>
<th>Authoritative</th>
<th>Democratic</th>
<th>Laissez-faire</th>
</tr>
</thead>
<tbody>
<tr>
<td>German multinational</td>
<td></td>
<td>78%</td>
<td></td>
</tr>
<tr>
<td>French multinational</td>
<td>75%</td>
<td></td>
<td></td>
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<tr>
<td>Korean multinational</td>
<td>80%</td>
<td></td>
<td></td>
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</tbody>
</table>

Source: Authors

Table 2 lists the preferred styles of management by respondents – employees of the German, French and Korean multinationals based in Slovakia. As shown, employees in all multinationals surveyed prefer democratic or participative style of management, mainly due to the shared-decision making process and employee recognition by managers.

<table>
<thead>
<tr>
<th>Table 2: Preferred style of management</th>
<th>Authoritative</th>
<th>Democratic</th>
<th>Laissez-faire</th>
</tr>
</thead>
<tbody>
<tr>
<td>German multinational</td>
<td>78%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>French multinational</td>
<td>95%</td>
<td></td>
<td></td>
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<tr>
<td>Korean multinational</td>
<td>75%</td>
<td></td>
<td></td>
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</tbody>
</table>

Source: Authors
The following question was to find the power distance in multinational corporations. Hofstede’s power distance indexes for the three countries are the following PDI Germany – 35, PDI France – 68, PDI Korea – 60. The lowest level of power distance was found in the German company where employees are not afraid to express their opinions and disagreements to their managers or supervisors. On the contrary, more obedient and passive employee attitude was found in the French and Korean companies. The responses by respondents found in other questionnaire items also revealed that employees working in the French and Korean companies do not question decisions by their managers, expect to be told what to do and do not participate in decision-making.

The responses by respondents found in other questionnaire items also revealed that employees working in the French and Korean companies do not question decisions by their managers, expect to be told what to do and do not participate in decision-making.

<table>
<thead>
<tr>
<th>Country</th>
<th>Always</th>
<th>Sometimes</th>
<th>Every once in a while</th>
<th>Rarely</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>German multinational</td>
<td>80%</td>
<td>10%</td>
<td>9%</td>
<td>1%</td>
<td></td>
</tr>
<tr>
<td>French multinational</td>
<td>11%</td>
<td>73%</td>
<td>9%</td>
<td>7%</td>
<td></td>
</tr>
<tr>
<td>Korean multinational</td>
<td></td>
<td></td>
<td>6%</td>
<td>85%</td>
<td>9%</td>
</tr>
</tbody>
</table>

The following question was to identify whether the companies under research display feminine or masculine traits. Hofstede’s masculinity vs femininity indexes for the three countries are the following Germany – 66, France – 43, Korea – 39. The research findings indicate that, given the manufacturing nature of companies, management positions are filled by men.

Competition among employees was found to be encouraged in the German company. In addition, employees in the German company were expected to come up with their own ideas whereas Korean and French companies valued harmonious relationships among employees.

**Conclusion**

The purpose of the paper was to examine cultural differences in management in three multinational corporations operating in Slovakia. The research attempted to identify the values of corporate culture in a German, French and Korean multinational and to find what style of management is used by managers / preferred by Slovak employees. The findings show that German middle managers mostly use democratic management style whereas authoritative style is common in Korean and French companies. Authoritative style of management can imply fast decision-making process, and high demands placed on employees. Democratic or participative style of management is, however, preferred by employees working in the French and Korean companies. It can be inferred that employees value collaborative decision-making process and recognition by managers. With respect to the power-distance, the lowest level of power distance was found in the German company where employees are not afraid to express their opinions and disagreements to their managers or supervisors. On the contrary, more obedient and passive employee attitude was found in the French and Korean companies. High power distance in French and Korean companies indicate hierarchical structure in management, big salary range from top to bottom and employees expecting their superiors to tell them what to do. The responses by respondents found in other questionnaire items also revealed that employees working in the French and Korean companies do not question decisions by their managers, expect to be told what to do and do not participate in decision-making. Thus, the outcomes of the research on cultural differences in management in multinational companies are clearly attributable to dimensions of culture developed by cultural theorists.

**References**


THE POWER OF PROJECT BASED LEARNING: EXPERIENTIAL EDUCATION TO DEVELOP CRITICAL THINKING SKILLS FOR UNIVERSITY STUDENTS

Nicholas Dimmitt

Abstract: Can a project based learning (PBL) pedagogy improve critical thinking skills in first-year university students? This was the research question that drove this action research investigation. The purpose of this study was to find the best practice pedagogy to improve critical thinking skills for college students. A literature review examined the themes of PBL best practices, millennial student learning styles, and critical thinking pedagogy. Methodology included a student survey to better understand the needs for university level, critical thinking skills. The potential effectiveness of a PBL approach to improve the critical thinking needs and challenges of these students was analyzed. The results indicate that a PBL method can provide students with effective techniques for improving self-reliant, critical thinking skills. The paper concludes with recommendations for best PBL practices and strategies for developing independent, critical thinking abilities which are essential for students to be successful in their academic endeavors.

UDC Classification: 378; DOI: http://dx.doi.org/10.12955/cbup.v5.988

Keywords: Project based learning, critical thinking skills, university students

Introduction

First-year university students need critical thinking skills more than ever in the current college environment. This is particularly true for freshmen engineering students in the United Arab Emirates. This paper investigates student needs for developing critical thinking skills in first-year students at the Petroleum Institute; a university and research center in Abu Dhabi, UAE, and suggests pedagogical approaches to support student needs in this area. Specifically examining how constructivist learning approaches and understanding preferred learning styles of millennial learners can support students to be more successful in their university studies and future careers.

The Research Context

The Petroleum Institute’s intention is to be a world-class university providing outstanding educational opportunities in engineering and applied sciences to prepare students for engineering careers and to support research in the energy industry. The Institute’s mission is to develop students as professionals in their fields of expertise in the UAE and worldwide.

In the freshmen year, students take core courses that need to be completed by everyone regardless of a student’s major. One of core courses is communication and this research study was conducted with freshmen students in the first and second semesters of the communication course.

Student Needs in Developing Critical Thinking Skills

In today’s multi-media, digital overload of information, where access is everywhere and content is available instantaneously and in overwhelming amounts, it is more important than ever that educators continue to develop strategies to help new university students handle the challenges of processing and thinking critically (Connor-Greene & Greene, 2002; Halpern, 2009).

Millennial Freshmen University Students

Millennial generation students, also known as Net Generation and Gen Y (Bracy et al., 2010) have been identified as those born between 1982 & about 2003 (Nicoletti & Merriman, 2007). These students are Digital Natives, who “are native speakers of the digital language of computers, video games and the internet” (Prensky, 2010), they have always been around computers, keyboards, and digital devices. In 2013 a survey in the USA showed that 84% of 14-23-year-olds use laptops and smart phones regularly (McCoy, 2013). Research shows that this generation of students is more oriented towards multi-tasking, autonomous information gathering, and with shorter attention spans (Nicholas, 2008; Worley, 2011). This has challenges and consequences for curriculum delivery and classroom interaction.

Literature Review

Three areas of previous research are particularly useful to inform this study; (1) Critical Thinking Pedagogy, (2) Learning Styles of Millennials Students, and (3) Teaching Implications. In this section,

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1 College of Arts and Science, The Petroleum Institute University, Abu Dhabi, UAE, ndimmitt@pi.ac.ae
we will discuss key aspects of these three issues.

Critical Thinking Pedagogy

Although the term critical thinking is discussed widely and used constantly in pedagogical approaches today, it is not a new concept. Centuries ago, Socrates used a method of probing questions focused on examining ideas believed to be true but had dubious logical value. Much later, the name ‘critical thinking’ was introduced as a method for discerning the truthfulness of the information. Paul & Elder (2006) further defined critical thinking by adding in the concepts of problem-solving and metacognition. Progressively, these critical thinking concepts continued to develop to include assessing and analyzing various points of view and challenging the beliefs and theories supporting those perceptions (Brookfield, 2005; Ennis, 1985).

Of the many definitions of critical thinking that have been suggested over the years - most have similar fundamental concepts, such as the definition by Halpern (1999) below;

“Critical thinking refers to the use of cognitive skills or strategies that increase the probability of a desirable outcome. Critical thinking is purposeful, reasoned, and goal-oriented. It is the kind of thinking involved in solving problems, formulating inferences, calculating likelihoods, and making decisions. Critical thinkers use these skills appropriately, without prompting, and usually with conscious intent, in a variety of settings. When we think critically, we are evaluating the outcomes of our thought processes – how good a decision is or how well a problem is solved.”

Critical thinking skills in university study are essential because they allow students “to deal effectively with social, scientific, and practical problems” (Shakirova, 2007).

Learning Styles of Millennial Students

The digital society in which millennial students have grown up has had an impact on their preferences and skills in reference to education. Prensky (2007) claims “… students are clamoring for these [new] technologies to be used as part of their education, in part because they are things that the students have already mastered and use in their daily lives, and in part because they realize just how useful they can be”.

As the students in this study are in the millennial generation, it is important to understand and teach with their learning styles and preferences. According to Sweeney (2006):

“the millennial student prefers to learn under the following conditions;

- In a collaborative learning environment. They exhibit a preference for teamwork incorporating cooperative learning and constructivist principles.
- In a challenging environment that has as its purpose a ‘life plan’ that is goal orientated and directed toward their future plans.
- In a flexible, personalized and customized program.
- In an environment that makes learning interesting. Fun and humor are important additions to instructional components without compromising learning and classroom management.
- In a structured environment. They prefer structured activity in the learning process.
- In an environment that uses technology to enable them to be more productive and connected.
- In an environment in which individuals are respected and all members of the group are supported.
- In an environment that is goal and achievement orientated.”

Another challenge of the digital culture in which millennial learners find themselves is the variety of literacies they need to master (Gurr, 2015):

Literacies in the 21st Century

- Computer Literacy
- Information Literacy
- Technological Literacy
- Social Network Literacy
Media Literacy
Visual Literacy
Aural Literacy

Central to this concept of literacies is the significance of critical thinking as the key variable to mastering these skills. Larmar & Lodge (2014) put forward that millennial learners need support and development of metacognitive skills (critical thinking) to be successful in university study. They have developed an approach for doing this, that provides students with “opportunities to develop a deeper understanding of their own learning, [where] students are able to engage in university curriculum in a way that integrates positive study skills and supportive learning strategies that provide scaffolded support.”

A major characteristic of the millennial generation is their understanding of and fluency in using technology. This is not always the case with instructors in higher education. Prensky (2010) not only labelled students of the millennial generation ‘Digital Natives’ but also referred to the often less fluent educators as ‘Digital Immigrants’ - suggesting they were foreigners in the technological territory of the Net Generation. He believed the gap between the immigrants and the natives to be “the biggest single problem facing education today.” Researchers recommend that due to this disparity teachers need to modify and enhance their pedagogical approaches and classroom activities to address the needs and interests of this different type of learner (Prensky, 2010; Frand, 2000). A key recommendation which motivates this study.

Wade (1995) suggests the following “eight skills that students need to become critical thinkers:
(a) ask questions and be willing to wonder,
(b) define problems clearly,
(c) examine evidence,
(d) analyse assumptions and biases,
(e) avoid emotional reasoning,
(f) avoid oversimplification,
(g) consider alternative interpretations, and
(h) tolerate uncertainty”

From this literature review I applied many of these concepts to enhance the pedagogical approach to the course curriculum to address the students’ challenges and requirements for the improvement of their critical thinking abilities in their freshman year academic needs.

Methodology

Needs Analysis

For a number of years now, my colleagues and I have conducted surveys, interviews and observational studies on the Petroleum Institute freshmen students in the communication courses, to identify what needs and challenges they have during their first year of college. The data clearly demonstrates that our students belong to the profile of the millennial student and possess similar learning styles and preferences as mentioned above.

Action Research Curriculum Applications

After analyzing this data, teaching techniques and learning approaches were modified to focus on the specific critical thinking needs of these students. I have additionally added teaching and learning strategies discussed in this study to test out what works best with these students.

Evaluation

Student surveys, observational analysis and exit interviews all were used to assess the increase in critical thinking skills of the students.

Results

I would now like to describe how the action research applications suggested in this study have informed practice with my students. I have tried to adopt a cognitive apprenticeship model in my classroom, that is, learning by observing and providing an ‘expert’ model (Svinicki, 1999).
Constructivist approaches to learning include a theory of experiential cognitive apprenticeship. This kind of apprenticeship is a procedure by which a master of a skill teaches that proficiency to an apprentice. Experiential cognitive apprenticeships “are designed, among other things, to bring tacit processes into the open, where students can observe, enact, and practice them with help from the teacher” (Collins et al, 1989). This approach is complemented by Bandura’s (1997) theory of modelling, which states that “in order for modelling to be successful, the learner must be attentive, must have access to and retain the information presented, must be motivated to learn, and must be able to accurately reproduce the desired skill.” For example, when asking students to go online or go to the library to find an academic journal article as part of a literature review or source analysis assignment, I first demonstrate how I go online and walk them thru the steps of using a database to find appropriate scholarly journals that can be obtained through the university library or downloaded online. I show them how to determine the factors that will help them decide if the article is credible and reliable, which they then go out and search and evaluate for themselves.

Teaching Suggestions
Other lessons learned from this action research study resulted in teaching applications to increase critical thinking skills and appeal to millennial learners.

- Modelling Critical Thinking Skills

The article search illustration above is a good example of how we can teach by doing. Another way I model critical thinking skills in the classroom is by showing a video of a group wrestling with a contentious problem and then have the students discuss ways to analyze and evaluate solutions presented in the video and in their own discussions. I offer ideas and model critical thinking of my own in the discussion without dominating the interaction.

- Questioning Techniques

Socratic dialog is an excellent method for generating critical thought processes. “The art of Socratic questioning is important for the critical thinker . . . What the word ‘Socratic’ adds is ‘systematicity,’ depth, and a keen interest in assessing the truth or plausibility of things” (Paul & Elder, 2006). I ask questions designed to elicit examination and critique of issues and facts. I dig deep to ask questions that students need to struggle with and become aware of new possibilities and solutions.

- Changing the Technology

Using a variety of media and mixing technology appeals to millennial learners. Even with their zeal for all things digital, these students prefer a moderate amount of IT in the classroom. In fact, according to Oblinger et al. (2005), “the actual use of technology is not as important as the activity the technology allows students to do.”

Therefore, I have increased the variety of technology and media that I use in class (i.e., shorter PowerPoint presentations, streaming video examples, including social media samples where appropriate, conducting on-line team research data searches, podcasts, excerpts from TED talks). Also, assignments for student teams to create multi-media examples of topics covered in class. This addresses the millennials’ preference for variety and diversity in IT delivery forms and keeps them from losing interest with a single (or similar types of) classroom activity.

- Classroom Environment

As these students like to be in an environment that makes learning interesting (Sweeney, 2006), I do my best to keep the classroom atmosphere as relaxed and enjoyable as possible. Humour and fun without compromising learning and classroom management (as Sweeney suggests) is a goal to strive for, and I find this often increases participation and interest in class discussions (and often makes the classroom interaction a joy for the professor).

Conclusion
This action research study was not about changing or reinventing the curriculum but about enhancing and customizing the pedagogical delivery and classroom activities to best suit the needs of the study’s student population. Student exit surveys and interviews show that these enhancements provided our millennial generation students with constructive and practical tools and techniques for learning independent, critical thinking skills which they need to be successful in their university experience and beyond.
Developing critical thinking abilities, to be able to explore and evaluate all kinds of information is an essential skill for first-year university students (Connor-Greene & Greene, 2002; Ellis, 2009). By addressing the way millennials best learn and by adopting best practice techniques, teachers can offer their students the tools to be able to solve problems, make the best decisions and identify solutions in their educational experience and future professional careers.

Acknowledgments

I would like to thank my faculty colleagues of the PI Communication Department, College of Arts and Sciences, who have assisted in conducting course evaluations and assessments which were used in the data collection of this study.

References


A SURVEY INTO THE SATISFACTION OF NURSING STUDENTS WITH THEIR PRACTICAL TRAINING

Snezhana Dragusheva,1 Biyanka Tornyova,2 Maria Semerdjieva,3 Silviya Novakova4

Abstract: The training nursing students in the Republic of Bulgaria confirms with the contemporary European requirements. The training is theoretical and practical, with the practical training accounting for at least 50% of the total number of hours in the specialty. The practical training includes clinical practice and pre-graduation traineeship, which complies with the Ordinance on the Unified state requirements regarding the training of nurses. The clinical practice and the pre-graduation traineeship involve a total duration of 2740 hours for students majoring in Nursing (Ordinance on the Unified state requirements). The level of satisfaction of these nursing students is an important indicator of the quality of the practical training. The study involved a sociological method of direct group survey involving an original set of questions with one developed specifically for this survey and others adapted from the questionnaire on job satisfaction of the Institute of Psychology at the Bulgarian Academy of Sciences. This questionnaire on satisfaction comprises 36 statements with three subscales: 1) work organization or organization of the practical training; 2) social-psychological conditions; and 3) material. The approach uses a Likert-type scale from 1 to 4 (1 = “no”, 2 = “to a certain extent”, 3 = “very much”, and 4 = “extremely”) to score responses. The opinion of 280 fourth-year nursing students from three universities: the Medical University of Plovdiv, Trakia University of Stara Zagora, and ‘Prof. Dr. Asen Zlatarov’ University of Burgas, is surveyed. The analysis of the results from the conducted empirical survey shows that in their professional activity the surveyed students are primarily motivated by love and care for people (78.8%) followed by the desire to perform an activity that is beneficial to society (63.3%). Then follows the respect on behalf of patients, the team, and society as a whole (52.5%) and subsequently, the emotional attractiveness of the work reflected in the desire to do work that brings pleasure and joy (job satisfaction; 42.4%). The level of student satisfaction with their practical training depends on the organizational-educational, social-psychological, and material and technical conditions of the hospital environment. The analysis of the survey data confirms the significant role of practical training for the professional qualification of these nursing students. However, certain negative trends are also identified. These trends are connected with the satisfaction of the students concerning the procedures they have the opportunity to perform, their relationships with their mentors and medical teams, and that at times they are required to perform inappropriate activities. This calls for increased control on behalf of the tutors.

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Keywords: nurses, satisfaction, practical training.

Introduction

The mission of the university level of medical education is to provide students with professional training that not only satisfies the social needs and those of the labor market but also meets student expectations concerning their professional careers and personal development. This mission is the main aim of education and training of nursing students: to prepare specialists who have mastered knowledge and skills, personal qualities, and professional competencies, necessary for providing quality health care.

The training of nursing students in the Republic of Bulgaria conforms with the contemporary European requirements. It is conducted at universities and colleges accredited under the Higher Education Act of Bulgaria. After the accession of Bulgaria to the European Union, significant changes have taken place in the training of nurses. In accordance with the unified state requirements, the required number of academic hours of education and training for nurses is 4600, and the duration of the program is four years (eight semesters) full-time (Ordinance on the Unified state requirements for completing higher education in Nursing and Midwifery and earning a Bachelor’s degree, 2010). The training is theoretical and practical, with practical training accounting for at least 50% of the total hours for the academic major.

The practical training includes clinical practice and pre-graduation traineeship, which complies with the ordinance under the unified state requirements regarding the training of nurses. The clinical practice and the pre-graduation traineeship are with a total duration of 2740 hours for students majoring in Nursing.

1 Nursing Care Department, Medical University, Plovdiv, Bulgaria, sdragusheva68@gmail.com
2 Health Care Management Department, Medical University, Plovdiv, Bulgaria, btornyova@abv.bg
3 Health Care Management Department, Medical University, Plovdiv, Bulgaria, msemerdjeva@abv.bg
4 ‘St. George’ University Hospital, Plovdiv, Bulgaria, novakova66@yahoo.com
Students do practical clinical training from the first semester through to the sixth, and the duration of this training is at least 1140 academic hours.

Pre-graduation traineeships are taken in the seventh and eighth semesters, and their duration involves at least 1600 hours. Thus, young specialists are provided with the opportunity to master the needed professional skills and competencies in a real-life hospital environment. Pre-graduation traineeships provide students with a practical basis of specialized knowledge in various areas of nursing (Ordinance on the Unified state requirements for completing higher education in Nursing and Midwifery and earning a Bachelor’s degree, 2010).

The practical training is conducted at hospitals and outpatient centers, social centers, and institutions approved and accredited to train students, and staffed by highly qualified professionals. Students work under the supervision of a tutor, mentor, or both. According to Andonova (2013, p. 22): “For mentoring to be efficient, it should be based on constructive partnership so that each trainee could be encouraged and assisted to realize their full potential.”

It is during their practical training that the theoretical knowledge, mastered by students, is transformed into skills and competencies, values, and respective qualities, which are expressed in their conduct. The involvement of future registered nurses in various types of activities and manipulations during their training in providing high-quality health care to patients facilitates the development of professional awareness and moral values and forms skills and abilities that demonstrate their developed qualities and competencies. On the other hand, this allows students to become aware that they belong to a social group of nurses and they adapt to the job more easily.

The level of satisfaction of nursing students is an important indicator of their assessment regarding the quality of the practical training. The expression of satisfaction is a subjective way of assessing the training environment. This involves the conditions of work in the respective hospitals and clinics, the organization of the practical training, and the interrelationships in the medical team. Student satisfaction can also be regarded as an expression of personal well-being and not only as satisfaction with the conditions in which they perform the medical activities (Petkova, 2003, p. 192).

The aim of this study is to survey and analyze the satisfaction of nursing students regarding the way in which their practical training is organized and conducted, as a factor in forming their professional competencies.

**Data and Methodology**

The survey was conducted in two consecutive academic years, 2014–2015 and 2015–2016. The respondents were 283 nursing students who were voluntary participants from three universities: Medical University of Plovdiv, Trakia University of Stara Zagora, and ‘Prof. Dr. Asen Zlatarov’ University of Burgas.

The respondents had completed the full course of training, and at the time of the survey were in their pre-graduation traineeship, which was considered a prerequisite for obtaining objective responses for the assessment of practical training.

The structure of the research tools corresponded to the overall concept of the study. A sociological method of direct group survey was used to collect the initial statistical information. A survey card was developed for the study. This survey card included an original set of questions developed for this survey with some questions adapted from a questionnaire on job satisfaction from the Institute of Psychology at the Bulgarian Academy of Sciences. The questionnaire of this current study comprised 36 statements in total, with three subscales: 1) work organization or organization of the practical training, 2) social-psychological conditions, and 3) material. A Likert-type scale from one to four (1 = “no,” 2 = “to a certain extent,” 3 = “very much,” and 4 = “extremely”) was used to score the responses.

Pearson correlations were used to identify relationships in the data. The empirical data was statistically analyzed using the software package for statistical analysis in the field of social sciences (SPSS).

**Results and Discussion**

The analysis of the results showed that most of the respondents (81.6%) were in the 20–25 year age range. Of the respondents, 95.4% were females and only 4.6% were males. The nursing profession has traditionally been dominated by females, although in the past few years there has been a trend towards an increase in the number of males opting for this profession in Bulgaria.
The significance of motivation in the medical profession is directly connected with the quality of the care provided and the level of job satisfaction. The motivation for a professional career stems from internal personal reasons, mostly conscious ones that ensure students strive after gaining knowledge and mastering skills and working habits necessary for the job.

The analysis of the results from the conducted empirical survey showed that in their professional activity, the surveyed students are primarily motivated by love and care for people (78.8%); the desire to perform an activity that is beneficial to society (63.3%); the respect on behalf of patients and the team and society as a whole (52.5%); the emotional attractiveness of the work reflected in the desire to do work that brings pleasure and joy (job satisfaction; 42.4%), with the sum total of the results exceeding 100%, since respondents could give more than one answer.

The level of student satisfaction with their practical training depends on the organizational-educational, social-psychological, and the material and technical conditions in the hospital environment. The ranking of the motives in this study shows that the respondents were strongly driven by humane reasons in choosing their career.

The analysis of the results according to the first subscale regarding the organization of the practical training clearly shows that students highly appreciated the need for high-level knowledge (X_{av} = 3.24) and they were satisfied to a great extent (r = 0.69). In the education of nursing students, theoretical training serves as a basis for acquiring practical skills and competencies. The results show that 76.6% of the surveyed students considered their theoretical training sufficient for the subsequent practical training, 10.5% were not satisfied with the training, and 12.9% were undecided. Students were aware that the knowledge they had mastered was a solid foundation for acquiring practical skills.

The satisfaction of the surveyed students with the quality of tutorials, clinical practice, and pre-graduation traineeship is a significant factor for the professional development of future registered nurses. The results from the distribution of their answers to the components of this question according to the four-level scale are presented as mean values (Table 1).

<table>
<thead>
<tr>
<th>Satisfaction with the quality of practical training</th>
<th>X_{av}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tutorials</td>
<td>3.62</td>
</tr>
<tr>
<td>Clinical Practical Training</td>
<td>3.42</td>
</tr>
<tr>
<td>Pre-graduation Traineeship</td>
<td>3.12</td>
</tr>
</tbody>
</table>

Source: Author

The respondents expressed the highest level of satisfaction with the quality of the tutorials followed by practical clinical training and then the pre-graduation traineeship. The difference between the perceived quality of the tutorials (X_{av} = 3.62) and that of the pre-graduation traineeship (X_{av} = 3.12), at p =0.00, was statistically significant. Therefore, students had the greatest satisfaction with the quality of the tutorials and were less satisfied with the quality of the clinical practical training and the pre-graduation traineeship.

During their tutorials (practical exercises) students acquire practical skills and master their nursing obligations to a high standard. First, they practice respective manipulations on medical simulation mannequins in special rooms, and then on patients in their clinical practice. It is the practical applicability of the knowledge and skills they acquire during their tutorials that possibly account for the satisfaction of the students from the type of training they receive.

The lower level of satisfaction of the students with their clinical practical training is most probably associated with their anxiety and uncertainty when applying the acquired skills in an actual hospital setting. It might be because some rules are ignored in the course of performing nursing activities, some patients refusing to allow students to perform the prescribed procedures and manipulations, a high number of students in the training, or the shortage of personal protective equipment and other consumables in the university hospitals and clinics. These reasons predetermine the second and third position of practical training forms in the opinion of the students. According to the students (X_{av} =
2.19), their practical training poses a threat to their health (Figure 1), being held in an actual hospital setting. In hospitals, students confront suffering and death and the experience of patients and their families, and this possibly places additional pressure on them. The greater the threat to their health seemingly corresponds to a lower level of satisfaction with their training (r = 0.48).

The level of student satisfaction regarding the statement “I will choose a better-paid job” was relatively high (Figure 1). Their training appears to play a significant role in contributing to the successful professional career and prospects of a better-paid job of those surveyed (X̄av = 2.66). This rationale results in an increased level of satisfaction with the practical training because it is seen that they acquire useful practical skills that endow them with higher competitiveness and employability (r = 0.74).

One of the most important activities of practical training is the mastering of procedures and manipulations to that of the highest level, where the manipulations become automatic. This requires numerous drills and performing certain manipulations many times though creates the impression of monotony for the students (X̄av = 1.91; Figure 1). There is a moderately expressed dependence between student satisfaction and the monotony of the performed activities (r = 0.56). In this regard, tutors and mentors could involve students in various types of activities on a daily basis during their
practical and pre-graduation traineeship.

The survey showed that the majority of students were satisfied with the number of manipulations as a set requirement in the different sectors (81.5%), while 8.0% stated “no”, and 10.5% answered “cannot decide”. Notably, only 72.7% of the trainees coped with the required manipulations, while approximately 27.3% could not. The reasons they quoted varied from the lack of patients on whom to perform certain manipulations or activities, an unwillingness on behalf of the medical staff to include them in administering manipulations, to fear and uncertainty on behalf of the students. This result is somewhat alarming and calls for optimizing the organization of work of students and mentors in the respective units.

The results show that 72.8% of the respondents felt most confident when administering intramuscular injections and over half, 59%, felt the same when administering intravenous infusions (students were allowed to provide more than one answer). The lower percentage of students feeling confident when performing intravenous manipulations – 41%, and infusions (55.1%) is a signal to tutors that as early as during their tutorials, students should be encouraged and motivated to overcome their fear from these manipulations (Table 2).

Table 2: Confidence in performing manipulations

<table>
<thead>
<tr>
<th>Manipulation</th>
<th>N</th>
<th>%</th>
<th>μ</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subcutaneous</td>
<td>174</td>
<td>61.5 ± 2.89</td>
<td>2.86</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Intramuscular</td>
<td>206</td>
<td>72.8 ± 2.69</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intravenous</td>
<td>167</td>
<td>59.0 ± 2.92</td>
<td>0.93</td>
<td>&gt; 0.05</td>
</tr>
<tr>
<td>Infusion</td>
<td>156</td>
<td>55.1 ± 3.0</td>
<td>0.93</td>
<td>&gt; 0.05</td>
</tr>
</tbody>
</table>

In the clinical training in the actual hospital environment, the future registered nurses expressed keen interest to master the functional activities and are models of professional conduct and decision-making. In the training of nurses, the main focus is on the patients and their families. The respondents stated they had the opportunity to make decisions independently (Xav = 3.00; Figure 2), which they found satisfying to a great extent (r = 0.74).

The analysis in regard to the second subscale investigated the satisfaction of the students with the material and technical conditions (facilities) in the university hospitals and clinics where they performed their practical training.

During their practical training on clinical matters and their pre-graduation traineeship, in particular, students develop and master professional skills and competencies needed for their future independent work. The opinion of the respondents on the level of their satisfaction with the opportunities and working conditions provided by hospitals and clinics for their practical training can be classified as follows: 48.16% of the surveyed students were fully satisfied, 41.84% were partially satisfied, 7.35% were unable to decide, and 3.14% were dissatisfied. Notably, the level of dissatisfaction was especially low, yet, almost half of the respondents were “partially satisfied” and demonstrated a critical attitude. This may be due to the lengthy duration of the pre-graduation traineeship, held in certain medical establishments that lack the dynamics of medical practice, contrary to what students would prefer, as well as students not being allowed to practice for longer at hospitals and clinics of their choice.

Approximately 11% of the surveyed students were unable to decide or were dissatisfied with the working conditions at the university hospitals and clinics where they performed their practical training. Probably the difficulties encountered in the performance of their nursing tasks in a real-life hospital environment are connected with organizational problems relating to medical supplies and consumables, and that most university hospitals are outdated and not well maintained, resulting in poorer living conditions for the patients in some units. This situation, along with organizing work,
possibly constitute the main reasons for the lower level of student satisfaction with the facilities where they perform their practical training ($X_{n} = 2.62$; Figure 2). There is a clearly expressed dependence between good working conditions and a high level of student satisfaction with their practical training ($r = 0.80$).

In the analysis of the third subscale, student satisfaction with the social and psychological conditions was investigated. The social and psychological environment finds its expression in interpersonal relationships. A supportive educational environment is characterized by a positive and creative atmosphere of trust and partnership among the participants in the process of training, and among the students themselves; support motivation, and active involvement of the students in the process of practical training.

The job of the nurse is likely to be an emotionally tinged. The encounters with human pain, suffering, and problems underpin this profession and coincide with the shortage of funds for their profession. Possibly, the future nurses, facing human suffering on a daily basis cannot but feel a certain disappointment with their choice of a career. At the end of their training, however, they also discover the other side of their profession. They appreciate patients’ gratitude for their work and care, the process of recuperation and recovery, and the satisfaction with their valuable work and hence influence the statement that practical training “is of great importance for my improvement as a professional” ($X_{n} = 3.26$; Figure 2). There is a significant correlation, that is, the better students become in their profession, the higher is their level of their satisfaction with practical training ($r = 0.62$).

Figure 2: Satisfaction with the social and psychological conditions

<table>
<thead>
<tr>
<th>Characteristics of the pre-diploma practice</th>
<th>and the compliance with the socio-psychological conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Improving myself in the profession</td>
<td>3. Requires great responsibility from me</td>
</tr>
<tr>
<td>5. Creates the self-confidence of a specialist</td>
<td>2.83</td>
</tr>
<tr>
<td>7. The atmosphere in my working group is good</td>
<td>2.80</td>
</tr>
<tr>
<td>9. The work is tense</td>
<td>8. Allows me to show my worth</td>
</tr>
<tr>
<td>15. It will help me orientate for my future career</td>
<td>11. It will help me orientate for my future career</td>
</tr>
<tr>
<td>18. Gives opportunities for communication</td>
<td>21. Develops my abilities</td>
</tr>
<tr>
<td>22. Everything is interesting to me in my job</td>
<td>35. My colleagues use others when I need it</td>
</tr>
</tbody>
</table>

Source: Authors

The results of the survey show that 69.0% of the respondents were exceptionally satisfied with the atmosphere in their team or working group ($r = 0.85$). This was directly connected with the opportunity for students to practice ($r = 0.74$) and develop their skills and abilities ($r = 0.72$).
Pearson correlations were strongly expressed. The better the psychological atmosphere in a group of students of the medical team, the higher the level of satisfaction of the respondents. In the process of their practical training, students master the skill to communicate with patients and their families, as well as with the medical team; they adopt models of professional conduct. Hence, the members of the medical teams are of great importance as role models.

The mentor plays a key role in the practical training of nurses. The majority of the surveyed students, 81.5%, were satisfied with the assistance they received from their mentors. It is the mentors who exercise direct control and supervision of the activities of the nursing students in the respective unit. According to most students, their mentor acknowledges their achievements (Xav = 3.24) in coping well with the assigned tasks and consider their opinion (Xcp = 3.00). The analysis of the results showed significant correlations, r = 0.63 and r = 0.85, respectively, in these areas. The friendlier and more supportive is the attitude of the mentor, the more satisfied are the students. The answers to the other question concerning their satisfaction with the assistance they received from the medical staff were similar. Some surveyed students (25%) were dissatisfied with the attitude of the medical staff in the university, hospitals, and clinics. They attributed this attitude to the lack of time and unwillingness of mentors to communicate and provide students with independent activities. The attitude of the staff in the university hospitals and clinics affected the level of student satisfaction. Improving the connection between tutors and their colleagues in the university hospitals and clinics along with resolving the need for control in the practical training may help overcome negative trends in communication.

Conclusion
The conducted survey established the organizational, educational, technical, and social-psychological conditions for optimizing practical training in the context of student satisfaction. The analysis of the collected data confirmed the significant role of practical training for the professional development of students majoring in Nursing. Certain negative trends were also identified, mostly connected with student satisfaction with the manipulations they access, their relationships with mentors and medical staff, and that sometimes students have to perform unusual activities. All these trends call for greater control on behalf of tutors.

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THE IMPACT OF GLOBALIZATION FOR NEED OF SOCIAL PEDAGOGUES IN SCHOOLS

Pavol Durana,¹ Darina Chlebikova²

Abstract: The aim of this paper is to highlight the changes that have occurred in society due to globalization. There has been a change in the social environment, economic security of family and social security of pupils. The result is the change of behavior and socialization in school, leading to undesirable practices in primary schools, such as bullying, truancy, drugs, rebellion, violence, emotional abuse and so forth. Social pedagogues are the experts in schools that can help in these areas and can help to harmonize the school environment. The questionnaire survey made in 18 primary schools in Žilina tries to find out the existence of social pedagogues and their activities in primary schools.

JEL Classification Numbers: H75, I21, J14; DOI: http://dx.doi.org/10.12955/cbup.v5.990

Keywords: social pedagogy, social pedagogue, behavioral failures, globalization, hypothesis.

Introduction
It is not possible to exactly determine when the development of social pedagogy began. However, it is demonstrable that it has evolved with the development of socio-pedagogical ideas and ideas that education has to take into account and implement social interests. Education was established and developed, and its development was influenced and determined by society.

Theoretical background
Social pedagogy is one of the theoretical disciplines whose role is to assist. The growth of social problems connected with globalization highlights the need to deal with them, in theory as well as on the basis of empiricism, and prepare solutions for practice. Gogolova (2016), Ponisciakova (2015) and Sukalova & Ceniga (2016) discuss possible and potential impacts and problems linked to the globalization.

The term “social pedagogy” started to be used in Germany around 1850. The author of this concept is considered to be a German teacher A. Disterweg, whose definition is not known. Here are just some famous authors who have dealt with this issue.

Natrop considered the leading role and duties of social pedagogy as providing education to everyone according to the measure of its ability, all sections of the nation (Bakosova, 2008).

Ryszard Wroczynski discussed that social pedagogy contains in addition to the complex problems of education in the society, two separate sections of educational theory and practice as well. These sections are: the pedagogy of social care and after-school education with cultural and educational work among adults (Hroncova & Emmerova, 2004).

Kraus Mollenhauer regarded social pedagogy as a theory of help to socialization problems which aim is to change individual, and raise extending cognitive skills, emotional skills, psychomotor skills and also eliminate the reasons which give rise to or which cause conflict (Bakosova 2008).

Bakosova (2008) asserts that social pedagogy is part of the science of man and belongs to the complex of pedagogical sciences. It is a scientific discipline which aim is transforming the people in the system of comprehensive care, provides services for children, young people and adults in different types of environments, through finding optimum forms of assistance and compensating for weaknesses.

Polackova (1999) discourses social pedagogy is an interdisciplinary science. It integrates and develops the knowledge of human sciences and society in educational, preventive and re-educational action.

Kraus & Polackova (2001) understand social pedagogy in the broader sense. This discipline focuses not only on the problems of the pathological character, marginal groups, and vulnerable sections of the population in their development and potentially deviant acting, but above all the whole population in terms of creating harmony between the needs of individuals and society to shape the optimal way of life in a given society.

Balaz (1991) focused on defining the subject of social pedagogy and relationship to other sciences and so on. Social pedagogy is understood as the science of social aspects of education. Gogolova et al.

¹ University of Žilina, The Faculty of Operation and Economics, pavol.durana@fpedas.uniza.sk
² University of Žilina, The Faculty of Operation and Economics, darina.chlebikova@fpedas.uniza.sk
(2015) adds that it examines the educational aspects of the socialization process and contributes to the formation and development of personality in the educational process in the family, at school and in their free time, also in leisure and work activities.

Social pedagogy and its methods and principles are implemented by social educators in practice (Schwedler & Stofkova, 2011). The definition of a social teacher is not easy. Create a fixed, universal model of social educator is not easy or straightforward. Shots of his work are very broad and sometimes it seems that it is approaching to the teaching profession, ever the educator or psychologist, but what is important, social pedagogy never replace these professions.

Wroczyński, one of the first to write about the social educator. Social educators are targeting their interest in the issue of the role of the environment in the process of purposeful educational activities and environmental education organization, therefore the planned release of stimuli and influences in the environment that act in the same direction as an educational activity (Hroncova & Emmerova 2004).

Klima characterize the social pedagogue as dedicated professionals equipped theoretically, practically and conceptually for deliberate action on individuals and social groups in particular where the way of the life and life experience of these individuals or social groups is characterized by a destructive or uncreative way of satisfying the needs and creating one’s own identity (Hroncova & Emmerova 2004). Kraus (2000) defines social pedagogue as an expert who is theoretically, practically and conceptually equipped to educational activity where it contributes to the formation of healthy lifestyles of individual and groups.

Bakosova (2008) defines social educator as a professional, whose general competence is to help and support children, young people, adults, parents, socializing and finding ways to improve the quality of life through education, training, prevention and counseling.

Abroad social activity at school has a long tradition. In the USA, the concept of a social worker at the school was introduced 100 years ago. Positive experiences were transferred to Europe. The profession of social pedagogy ranks between assisting and the development of recommended OECD in transition countries in 1994 for a sharp increase in socially undesirable and socio-pathological phenomena (Hroncova, 2009).

**Definition of social in Slovak Republic**

The legislative definition of the status of the social educator in schools occurred in 2008 in the Law no. 245/2008 on education and training, where §130, paragraph (3) letter e) ranks the social educator among the components of educational counseling and prevention. Law no. 317/2009 teaching staff and specialists and change and addition to certain laws, § 24, making the social educator in the system of educational counseling and prevention as a professional employee of schools, school, special education and counseling centers.

**Social pedagogue at school**

Sukalova et al. (2015) show that the importance of social pedagogues in schools is increasing with the growing problems of students. The origins of problems can be in the family or in the environment in which the child grew up as well as in the integration of pupil into the school environment. Given the specific approach of social educators that they have to use to solving these problems of pupils, it is not possible to transfer the competencies of social educators to the teachers.

Polackova (1999) sees the possibility of applying of the social educator at schools in the following areas:

- social education (extracurricular activities, support for social learning with an emphasis on the formation of pro-social personality characteristics),
- social counseling,
- multicultural education.

Learning disabilities are a modern phenomenon, Ponisciakova & Gogolova (2015) think that affect the lives of not only individual students, but also entire families. It seems as that learning disorders are constantly increasing, respectively, of students with learning disabilities. This is due to the fact that today a lot of time is devoted to diagnose children if their school results are bad. Bencsik et al., (2016)
remind us that children are usually placed in schools with normal teaching and is needed to adapt not only the teaching process but also the environment (climate) in classes to other pupils learned to accept their classmates with special needs and problems, therefore, those who they are. On the other hand, it is somehow disturbing element for the other children who have to adapt to these children or to such an environment. Withstand this situation in schools is on the shoulders of the teachers. To have in the classroom, at school, students with learning disabilities means to cope with the situations outside of the classroom as well, in leisure activities, communication with parents, other school staff and the solution of these problems are social educators.

**Results and discussion**

The social educator expertly helps pupils with learning disabilities. What is the experience from practice and what are their activities in primary schools? Authors and Chlebikova (2016) found out by using a questionnaire survey in the fourth largest city in Slovakia in Žilina which had a population of 83578 in 2016. There are 18 primary schools in the city, the number of students attending primary school in 2015/2016 was 6735.

The aim was to determine the number of social teachers in primary schools in this city, to analyze their job description and specify how they help or can help students with learning disabilities.

Hypotheses, we set ourselves:

**H1**: The main problem of employment of the social educator in primary schools in the Žilina is financial reason of schools.

**H2**: More than 50% of primary schools in Žilina have a social educator.

**H3**: In every primary school in Žilina there is diagnosed at least 1 pupil with a learning disability.

**Figure 1: Primary schools in Žilina according to the number of pupils**

From 18 primary schools in Žilina, there was only 1 school social pedagogue and it was in a church primary school. The social pedagogue operates at this school mainly in:

- the educational process,
- leisure activities,
- in social counseling.

The total pupils with learning disabilities in schools in Žilina were 347, which is a little over 5%.
Figure 2: The structure of the primary schools according to the founder

The structure of the primary schools according to the founder

- State primary schools: 88%
- Church primary schools: 12%

Source: Authors

Figure 3: Primary schools in Žilina with social pedagogues

Primary schools in Žilina with social pedagogues

- Primary school without social pedagogues: 17
- Primary school with social pedagogues: 1

Source: Authors

Figure 4: The reasons of no social pedagogues in primary schools in Žilina

The reasons of no social pedagogues in primary schools in Žilina

- Financial reasons: 41%
- They do not need them: 41%
- They do not know the job: 6%
- Nature of the job: 12%

Source: Authors
Collecting data on primary schools was a good experience because it showed the true image of knowledge about social pedagogues. Very often at the first mention there was a misunderstanding and earlier resonated special education teacher as a social pedagogue. After refinement, the reactions were varied: from “I do not know what a social pedagogue should do at school” to “we do not have money to pay a social pedagogue” or “we do not need a social pedagogue.”

**Testing of hypotheses**

**H1**: The main problem of employment of social educator in primary schools in the Žilina is financial reasons of the schools.

Test of hypothesis H1: To verify the hypothesis, we used a chi-square test whether it is the choice of uniform distribution. 17 schools have no social educator, in seven schools there is problem of financial nature, 7 schools do not know the job description of social pedagogue and 3 schools were other reasons. Based on the research, the assumption has not confirmed that the main problem of employment of social educator in primary schools in Žilina is the financial reason of the schools.

**Table 1: Testing of hypothesis H1**

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<tr>
<td><strong>H0</strong></td>
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<td><strong>H1</strong></td>
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<td><strong>The test statistics</strong></td>
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<td><strong>Critical field</strong></td>
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<td><strong>Result of the test</strong></td>
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**H2**: More than 50% of primary schools in Žilina has social educator.

Test of hypothesis H2: From 18 primary schools in Žilina have only 1 school social pedagogue (Primary school of Romualda Zaymusa). It means that only 5.56% of primary schools in Žilina have a
social pedagogue. The hypothesis that more than 50% of primary schools in Žilina has social educator has not been confirmed, therefore, it can be rejected. We could use only this test because he was a research of the whole file.

H3: In every primary school in Žilina is diagnosed at least 1 pupil with a learning disability. Test the hypothesis H3: Based on the survey on primary schools in Žilina we know that at every school in Žilina is at least one student with a learning disability (the least were 4 pupils in the Primary school Javorku, the most were then 36 students at Primary school Karpatská). We can accept H3 because the hypothesis was not disproven.

Conclusion
Social pedagogy and its issue come to the forefront in our country in recent years by the growing social problems of the families of the students, by the growing differences in social status in society, and by the growing problems in schools, such as drugs, bullying, physical and psychological abuse and so forth. Justification of social pedagogues in primary schools is more than necessary. The results of the survey conducted in primary schools in Žilina are unsatisfactory and we see them as a challenge towards to universities bringing up social educators as well as primary and secondary schools, where their help is justified, and the ministry of education should clearly define by the law the work of social educators, not just refer to them as the support staff in schools.

Acknowledgment
This paper is an output of VEGA 1/0244/16 Personnel marketing as a new approach of the ensuring and maintaining the skilled workforce in Slovak companies, which authors gratefully acknowledge.

References
INNOVATION OF THE STUDY COURSE USING PEARSON HIGHER EDUCATION TOOLS

Kateřina Dvoroková,1 Lumír Kulhánek2

Abstract: In the Czech Republic, there is historically a wealth of experience with eLearning. In recent years, however, new platforms were developed that have escaped the attention of the academic sphere. The purpose of this article is to evaluate experience with the platform of Pearson Company within the innovation of the course Monetary Theory and Policy at the Faculty of Economics, Technical University of Ostrava. In the Czech Republic, the history of eLearning has been dating since the year 2000. Among the best-known eLearning projects within universities belonged the project "Virtual University" or the online training system WebCT. The most widely used eLearning tools in the Czech Republic today are LMS Moodle, Articulate, Adobe Captivate, eDoceo, etc. Surprisingly eLearning platforms built within the renowned book publisher – e.g., Pearson or Oxford, are less known in the Czech Republic. In this article, we will, therefore, discuss the possibilities that Pearson platform for eLearning offers for universities, and we will conclude with our further experience with its practical use.

JEL Classification Numbers: A23, E52; DOI: http://dx.doi.org/10.12955/cbup.v5.991

Keywords: higher education, LMS Moodle, online courses, test generator.

Introduction

The IEA's international study center TIMSS (the Trends in International Mathematics and Science Study) conducts international comparative assessments of student achievement in mathematics and science. Libich, J. (2014) highlighted their international survey which reveals that the Czech students in comparison with foreign spend fewer hours with experiments, discussions or presentations of their project, however, much more time to listen to the teacher's monologue. The teaching should not be limited to transmitting information, especially in today's era of modern technology where any information is available within seconds. The teacher should be mainly moderator who asks questions and seeks discussion of students in the right direction. Rose & Goll (1992) demonstrated that after 48 hours on average, students remember only ten percent of what they read, twenty percent of what they hear and 30 percent what they saw. This finding is in contrast to 70 percent of what they discuss with others, 80 percent of what they use in life, and 95 percent of what they tried to teach someone else. Certainly, there are many factors behind that teaching methods are little effective. Worth noticing is the fact that with the development of technology during the teacher's monologue students take their mobile phones, tablets, laptops. Students naturally redirect their attention from the monologue full of what they can learn on the internet easily to something more interesting at that moment. Is there any possibility to link modern technology in teaching with the learning process to make it more efficient, funnier and more attractive for students?

Theoretical Discussion about new Methods of Learning

Nowadays, in various fields and different industries, we can find the technological development. It facilitates work; make it easier and more efficient, in many instances. The evolution of computer technology supported such development. Nowadays practically, we cannot find a field in which computer technology or components thereof is not used. Technical development is also very familiar with the area of education and training, in which advanced tutorials and technical equipment that facilitates the work of the teacher on its interpretation is applied. Thanks to modern technology, it is possible to engage students in interactive teaching, which may be not only with the spoken word but on cooperation between teacher and student as well. Claims for educational methods increase, which, in turn, not only facilitates teachers' work, but also provides students with an opportunity to learn how to work with new technologies and thus acquire work experience for the future.

The most popular term for alternative ways of teaching using new methods is an eLearning. It is a concept that indicates the method of learning using interactive environment, electronic materials that run through modern computer technology using the worldwide web, which is not always needed. The forms of eLearning are very diverse. On the other hand, understanding the eLearning is quite simple. eLearning is a different kind of education, in which electronic information and communication technologies are used. Most often, it can be a desktop, tablet or mobile phones also connected to the

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1 Faculty of Economics, VŠB-Technical University of Ostrava. Czech Republic. katerina.dvorokova@vsb.cz
2 Faculty of Economics, VŠB – Technical University of Ostrava. Czech Republic. mojmire.kulhanek@vsb.cz
Internet. The student realizes training or testing of knowledge through eLearning software or online application directly on their devices, e.g. computers. The history of eLearning dates back to the early 19th century, in 1840 Sir Isaac Pitman laid its roots. Since then the first educational tools and software began to emerge. At the end of the 20th century, eLearning has been progressively implemented into schools. Singh, G., & Hardaker, G. (2014) draw attention to the potential and importance of learning technologies in higher education. They stressed among other things on the reduction of costs to students (McMillin et al., 2010) and the more flexible learning (Haughey, 2006). eLearning may have some disadvantages also. Rymanova et al. (2015) discussed the lack of social contact between a teacher and students; poor understanding of the content: no opportunity to express knowledge in oral form; requirements for computer and Internet access; requirements for strict self-discipline.

Moodle Software Package

The vast majority of Czech universities use LMS Moodle software package designed mainly to create supporting educational programs for distance learning. Moodle can be freely downloaded from the internet because its license is the GNU General Public License. This is useful for universities because not only they can save much money, but there is no need to pay extras for administration as well. As regards the content, various components added to the Moodle can facilitate work in this system. Currently, there is an interconnection between standard (full-time, face-to-face) teaching and eLearning. Students use Moodle to log on to the topics of seminar papers or to submit the correspondence tasks. On the other hand, teachers can post materials needed for discussion in lessons there.

Veletiansos and Navarrete (2012) conceded that LMS serves as static repositories of content, failing to provide the robust social experience found on platforms that have garnered societal interest and appeal, such as Facebook. Also, our practical experience led to the realization that LMS Moodle is an excellent tool in the classroom, but it became the repository of learning materials without broader use rather.

Innovation of the Subject Monetary Theory and Policy

The course Monetary Theory and Policy (MTP) focuses on the key areas of contemporary monetary economics and monetary policy. It presents and compares different theories of money demand and money supply, including their implications for various monetary policy strategies, explains the approaches to the influence of money and financial processes on price levels, inflation, product and other macroeconomic variables, including the creation expectations of economic agents. The course analyzes in detail the process of monetary policy, objectives, instruments and transmission mechanisms of monetary policy conducted by the central bank. It serves well as an overview of monetary policy in the Czech Republic and the world, with an emphasis on the trends of the nineties of the 20th century and necessary perspective adaptations.

The subject MTP is part of a master study program Economic Policy and Administration at the Faculty of Economics, Technical University of Ostrava. In the academic year, 2015/2016 it was decided to change the extent of teaching, which was increased by introducing seminars. Given the current trends in education, the innovation of the subject aims to promote modern teaching methods to lectures and seminars. Its objective is the update of present lectures to reflect the evolution of contemporary monetary theory and practice of monetary policy, and updating the content of special seminars after evaluating experience with the introduction of this form of teaching. According to the absence of electronic support for this study course, we will make the study materials for seminars as well. The innovation of the subject will enable students more in-depth understanding of the topics covered. Contents of the subjects, materials, and tools used in teaching will focus more on practicing set themes so that passing the course at the master’s level significantly increases the level of financial literacy in both professional and personal level of the graduates of the course. Benefits of course innovation are to support progressive forms and new methods of education. New materials enable a better understanding of the studied problem based on applied practicing of the subject matter.
Pearson Higher Education – possibilities and practical use of the study course

One of the world’s companies offering services in the field of education is Pearson PLC. Samuel Pearson founded the company in 1844. The company’s headquarters are placed in London (United Kingdom of Great Britain and Northern Ireland). Besides services in the field of education, the company offers services in strategic business information, international television production, and consumer publishing. Pearson as a learning company specializes in educational courseware and assessment, and a range of teaching and learning services powered by technology. With 35,000 employees across 70 countries, the company can rightly be considered as a transnational corporation.

One of the company’s slogans perfectly captures this fact:

“Whether it is through new digital learning products in the US, developing qualifications and Assessments in the UK, training school leaders in the Middle East, teaching English in China, or Educating professionals, we are helping people make progress in their lives through learning,” (Who We Are, 2017).

The company in the field of education for the higher education sector offers many products and services. These include Course development, Customisable resources, and technology, MyLab & Mastering, Online program management, Printed textbooks and eBooks, Learning Catalytics, Simulations, etc. Educators can browse by discipline the catalog on the website https://uk.pearson.com/higher-education-educators.html as well as choose the required scientific discipline.

Course Management with Textbook

Without the need to register Pearson offers for their own published books supporting resources. For the requirements of our subject, we select Economics, Money, and Banking, MTP. Through such exactly predefined task, each teacher can choose from the list of books published by the company, and for each of them he can use such tools, the company offers for the book. In the case of the subject MTP, we work with the book The Economics of Money, Banking and Financial Markets with MyEconLab, Global Edition, 11/E by Frederic S. Mishkin, Columbia University. On the website, http://catalogue.pearsoned.co.uk/educator/product/The-Economics-of-Money-Banking-and-Financial-Markets-with-MyEconLab-Global-Edition/9781292094304.page downloadable resources and other resources are available.

Downloadable instructor resources are as follows:

- Instructor’s Resource Manual;
- PowerPoint Presentation - contains lecture notes and all the textbook’s figures and tables;
- TestGen Computerized Test Bank - contains over 2,500 multiple-choice questions that are appropriate for use as a quiz or test questions. These forms provide us alternative methods to make up exams. The Pearson TestGen program offers us a computerized test generator that lets us construct tests by choosing questions from the Test Bank that was prepared specifically for this textbook. The Test Bank includes four types of questions: multiple choice, true/false, short answer, and essay.

Other resources are as follows:

- Companion Website including web chapters and appendices in PDF format.

In the book itself at the end of each chapter, End-of-Chapter Problems (Questions, Applied Problems, and Web Exercises) are placed. Some of these questions require students to look up current data. We use them mainly for homework assignments.

Course Management with MyEconLab

Within the innovation of the study course MTP, we use MyLab & Mastering at most. The tool consists of online homework, tutorial and assessment products such as Learning Catalytics; Adaptive Learning; Econ Experiments; Assign real-time data analysis exercises that use real-time data; Multimedia assets assist students’ learning. MyLab courses are available on mobile devices as well, and there is a possibility to integrate them into LMS. Those instruments can only be used to paying the license fee. Without having to pay, Pearson offers an option for instructors to register into the system and enroll in an existing course related to some of the Pearson’s published books.
MyLab & Mastering has adapted to the needs of the individual disciplines also. We can find support for anatomy and physiology, biology and microbiology, mathematics, etc. For economics, the platform MyEconLab serves. Unlike the service Learning Catalytics, it is possible to use this product partially without paying a license fee.

MyEconLab delivers online content and innovative learning tools to our classroom. To use the basic tools of MyEconLab, it was required to register first. After validation of the instructors by Pearson, we got access to existing courses. If the school had paid for the licenses, then each teacher can create his/her course with particular content. Since the Faculty of Economics does not offer such possibility, we took the approach without a license. In this case, we searched for the already existing course by Frederic S. Mishkin, formed to his book The Economics of Money, Banking, and Financial Markets Global Edition. (2017). Following the enrollment in the course instructor can use particular resources, which include supporting materials for lectures and seminars of all kinds. It is possible to customize the existing content and add our own as well. We can manage, create, and assign tests to students, choosing from the exercises in the Study Plan as well as from the Test Banks.

We considered Chapter Resources to be the most valuable. For each chapter in the book materials of different media types were created:

- Animation;
- Appendix;
- online Textbook;
- Reading - Pearson publishes an annual Readings book online, aimed to enhance the text. The Readings collection is unique in that it is updated over the life of current edition of the textbook. More than that, it includes summaries of the articles, provides suggestions for which textbook chapter(s) the reading might be assigned, and contains discussion questions that follow each reading to encourage students to think about how the reading relates to material in the text;
- Study Guide – includes Chapter Review to summarize the chapter, Helpful Hints to provide additional examples, Terms and Definitions to match key terms to their definitions, Problems and Short-Answer Questions, Critical Thinking to provide a single multi-step problem as an application of the major issue, Self-Test to provide true/false and multiple-choice questions, Solutions to provide solutions for all problems and questions;
- Video;
- web Chapter;
- web Links.

Students and MyEconLab

MyEconLab delivers students access to a variety of study and practice tools that put them in control of their learning. Students can use practice tests to check their understanding and identify areas in which they need to do further work. For each student, a personalized study plan is based on test results will show students where further study is required. Students can choose from many interactive exercises based on specific end-of-chapter questions and select from Readings in Money, Banking, and Financial Markets, regularly updated by Frederic S. Mishkin and James W. Eaton of Bridgewater College. Sample quizzes are also available to give students a chance to double-check their understanding and application of the main topics in each test chapter.

Learning Catalytics

In the context of products and services listed above, probably the most interesting of them seems to be Learning Catalytics. We believe that this instrument can grab the attention of students during classroom instruction and connect the latest technology while teaching at the same time. Learning Catalytics was founded by Gary King, Brian Lukoff, and Eric Mazur, of Harvard University. It is an advanced, cloud-based learning analytics and assessment response system that helps instructors evaluate student understanding in real-time. It is one of the most interesting tools to attract student’s attention known as "bring your own device" student engagement and classroom intelligence system. Thanks to it, the teacher can engage students in real time, using open-ended tasks to probe student understanding, see Figure 1. Students can use any smart web-enabled device they already have — laptop, smartphone, or tablet. The teacher creates open-ended questions that ask for a broad range of
responses. Question types include word clouds, graphing, short answer, matching, multiple choice, highlighting, image upload, etc.

Utilization of this tool is a chargeable service. The license price depends on the length of the period and the number of students with access to the system. Although we could find a use for it (for example, to solve arithmetic problems), this tool has not been used within the innovation of the study course MTP, therefore.

**Figure 1: Learning Catalytics™**


**Conclusion**

The innovation of MTP course was motivated by an effort to modernize teaching using current methods and tools in education. Presently, there are several platforms for eLearning available at the market learning tools. At Czech universities, the most used are probably LMS Moodle. Although it brings much innovation to modern education, its major disadvantage is that it places high time and technical demands on instructors. At present, the pressure on teachers to engage in research and publish professional publications is enormous. It remains, therefore, a lack of time to focus on the quality of teaching process. Thus, we consider beneficial to take advantage of opportunities that are offered by professional companies. Pearson PLC is such firm that has for years devoted to the field of education. During the course innovation, we have seen only a fraction of the tools that Pearson offers nevertheless we can say that all of them are handled professionally about the reflection of modern methods in teaching. Therefore, it is worth for Czech universities to consider professional service firms to be more applied in higher education.

**Acknowledgements**

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**References**


AN ANALYTICAL APPROACH OF SOURCES OF CONFLICT AMONG STUDENTS
Luiza Enachi-Vasluiianu,1 Flavia Mălureanu2

Abstract: In a broad sense, conflict is an interactive process displayed through incompatibility, disagreement or dissension among social entities such as individuals, groups, organizations, etc. In a society in a changing, based on competitiveness, conflict is an integral part of human relationships, as it is a natural component of everyday life. New perspectives on conflict agree that its presence is natural and inherent in the human activity. The educational context is, inevitably, a space of conflicts. According to the actors involved, there has been established the following typology of conflicts: (a) conflicts among students, (b) conflicts among students and teachers, (c) conflicts among teachers and parents, and (d) conflicts among teachers. This paper aims to study the sources of conflict between students at the gymnasium and high school levels to lay emphasis on the aspects that could generate situations of risk or even educational crisis. The starting point in the research was specific literature, the observations and the experiences in the classroom. The items identified were a competitive atmosphere, intolerance, deficient communication as a result of linguistic ambiguity, inappropriate expressions of emotions, aggressiveness, lack of skills in solving conflicts, abuse of teacher’s authority, etc. A questionnaire-based survey was developed, and the respondents were instructed to answer depending on how often they met the situations described by the indicators in the questionnaire. The results obtained were processed using the SPSS analysis. Further studies on conflicts between teachers and students/parents, teachers/peers can complete the research.

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Keywords: conflict, sources of conflict, school tensions, competitiveness

Introduction
Conflict in education has been under scrutiny in the recent years. Perceived as a significant feature of human development, conflict represents the quintessence and the premise of the personal and social change. Inherently, the school space is conflictual, with tensions in several aspects such as knowledge, social and political. Current studies of pedagogy have classified conflict in school according to various and multiple criteria. Our paper will limit the research to the analyses of some selected sources of conflict among students belonging to two different school levels, taking into consideration the specifics of the present Romanian educational context.

Literature review
Competition in education is a tough fight, most of the times, irrelevant, for a place in the top of the school hierarchy. Traditionally, teachers consider that competition is efficient as a source of increasing motivation for learning. However, this competitive system generates the marginalization of students with low intellectual skills, even if these students are skilled in other different fields, such as art, sports, etc. The competition becomes destructive only when it is exaggerated and becomes a goal. In this case, it cancels cooperation (Bocoș et al., 2008) and may generate conflicts and aggressive behaviors within the group (Neculau, 1996) as it creates rivalries, envy, selfishness, etc.

The type of relationship among the students of a classroom, as well as the quality of interpersonal communication, depending upon the attitudes of each of the agents involved (Abric, 2002). Intolerance is about hostility, negative judgment, superior attitude, negative feedback. Intolerance is present in all aspects of society, ethnic, racial, cultural, economic, educational. The inequalities within the groups, in which people are exposed to discrimination, marginalization as manifestations of intolerance can lead to conflicts or even exclusion (Nedelcu, 2007). As such, students must learn to accept one another, to develop tolerant attitudes and behaviors because they often get to conflicts as they are convinced that the others do not accept or like them (Olsen, Nielsen, 2009).

The way emotions are expressed significant for social interactions as it contributes to their maintenance or degradation and triggers the appearance of conflicts (Șâlăvăstru, 2004). Children’s inadequate expression of negative emotions (fury, fear, sadness) through physical or verbal aggression determines the appearance of similar behavior or isolation. Children who behave aggressively have difficulties in recognizing and understanding the emotions expressed by the others in a given situation, thus initiating conflicts. On the other hand, some children express their emotions through exaggerated

1 Faculty of Psychology and Educational Sciences, University of Bucharest, Romania, vasluiianu_luiz@ yahoo.com
2 Faculty of Psychology and Educational Sciences, University of Bucharest, Romania, flaviamalureanu@yahoo.com
manifestations such as outpouring laughter, ample, theatrical gestures or physical aggressiveness when they like somebody so as to draw attention to themselves, etc. As children grow up, their emotional expression is affected by cultural values, gender stereotypes, etc.

Ambiguity in communication is based on insufficient, untrue information, inadequate channels of communication or lack of open communication among colleagues (Bocos et al., 2008). Alongside these, research demonstrated that ambiguity in communication is also triggered by linguistic elements such as polysemy, intensifiers of negation, modality, indefiniteness, anaphora, modifiers, gradability, figures of speech (Malureanu, Enachi-Vasluianu, 2015). Children have a tendency to make extensive use of such linguistic elements and, sometimes, their inappropriate or erroneous use may lead to misunderstandings which develop into conflicts.

Children aged 11-18 lack abilities to solve conflicts. They may know some of the strategies described in the specialized literature, compromise, retreat of one of the conflictual sides, consensus, negotiation, mediation (Păun, 1999), but they do not possess the necessary experience, tact or will to put them into practice, especially in the case of gymnasium children. As a matter of fact, with gymnasium children, the use of hierarchic authority (teacher, parent, elder brothers) leads to conflict attenuation or even elimination. With high school students, there is a tendency to avoid outside involvement and try to solve different conflicts by themselves.

Reboul (1971) states authority indicates the supremacy of the one that practices it, so it establishes a vertical relationship. The authoritative teacher can impose certain decisions that may be contrary to students’ desires, may favor some students in others’ detriment, may discriminate students with low results through criticism, may evaluate students in negative terms, may humiliate publically. Some students may easily assume these behaviors to obtain supremacy in front of their colleagues, which may determine significant interpersonal tensions. The relationships between the groups led authoritatively evolve from great interpersonal tensions, manifestations of irritability and hostility towards team colleagues to the collective aggressiveness of more subjects against one of them who becomes an “escape goat” (Sălăvăstru, 2004).

Specialists in social psychology state that aggressiveness is the tendency to answer hostilely to unpleasant interactions. Aggressive children can orientate their aggressiveness on a colleague by hitting, insulting, mocking him or indirectly by speaking ill behind his back or laying traps for him (Eibl-Eibesfeldt, 1995). On the other hand, the students included in our study talked about another form of aggressiveness, stubbornness identified as passive aggressiveness, defined as refusal to do what is necessary or what is requested. The two ways of aggressiveness, active and passive, create pressure, a tension which may eventually lead to conflicts.

**Methodology of Research**

**Objectives**

The research objectives are a) to identify the sources of conflict among students at gymnasium and high school levels in order to lay emphasis on the aspects that could generate situations of risk or even educational crisis, b) to realize descriptive analyses of the selected elements to determine a hierarchy of two school levels, gymnasium and high school.

**Participants**

The sample used for research was made of 100 students from Vrancea County, Romania, split evenly in number: 50 from gymnasium students (ages 11-14) and 50 high schools (ages 14-18). The students volunteered to take part in the research.

**Research instrument**

The main method used in our research was the questionnaire-based investigation. The questionnaire was built based on specific literature and focus-group discussions with students from the two school levels. This method allowed the identification of a series of sources of conflict among students transposed into the following items: competitive atmosphere, intolerance, deficient communication as a result of linguistic ambiguity, inappropriate expressions of emotions, aggressiveness, lack of skills in solving conflicts, abuse of teacher’s authority that can generate into envy.
The respondents chose one of the following variants of a five-step scale: (1) to a very low extent, (2) to a low extent, (3) to an average extent, (4) to a large extent, (5) to a very large extent. These steps are showing the relevance of each item as a source of conflict.

Results and Discussion

For the descriptive analyses, we used SPSS software, the t-test for the independent samples.

Table 1: Means and standard deviation of sources of conflict among students

<table>
<thead>
<tr>
<th>Items of sources of conflict among students</th>
<th>Gymnasium Mean (std. dev.)</th>
<th>High school Mean (std. dev.)</th>
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</thead>
<tbody>
<tr>
<td>1. competitive atmosphere</td>
<td>4.70 (0.644)</td>
<td>4.10 (0.931)</td>
</tr>
<tr>
<td>2. intolerance</td>
<td>4.18 (0.839)</td>
<td>4.22 (1.178)</td>
</tr>
<tr>
<td>3. deficient communication</td>
<td>3.52 (1.446)</td>
<td>4.32 (0.891)</td>
</tr>
<tr>
<td>4. inappropriate expressions of emotions</td>
<td>4.38 (0.780)</td>
<td>4.60 (0.571)</td>
</tr>
<tr>
<td>5. aggressiveness</td>
<td>4.36 (0.663)</td>
<td>4.30 (0.735)</td>
</tr>
<tr>
<td>6. lack of skills in solving conflicts</td>
<td>4.20 (0.881)</td>
<td>4.44 (0.705)</td>
</tr>
<tr>
<td>7. abuse of teacher’s authority</td>
<td>3.76 (0.824)</td>
<td>3.72 (1.106)</td>
</tr>
</tbody>
</table>

Source: Authors

The means in Table 1 were used to realize a hierarchy of sources of conflict among students for the two school levels. Thus, the indicator ranked one was considered the source with major impact in triggering conflicts, whereas the indicator ranked seven was less appreciated as a source of conflict among students.

Table 2: Description of hierarchy of sources of conflict among students

<table>
<thead>
<tr>
<th>Rank</th>
<th>Gymnasium</th>
<th>High school</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>competitive atmosphere</td>
<td>inappropriate expressions of emotions</td>
</tr>
<tr>
<td>2.</td>
<td>inappropriate expressions of emotions</td>
<td>lack of skills in solving conflicts</td>
</tr>
<tr>
<td>3.</td>
<td>aggressiveness</td>
<td>deficient communication</td>
</tr>
<tr>
<td>4.</td>
<td>lack of skills in solving conflicts</td>
<td>aggressiveness</td>
</tr>
<tr>
<td>5.</td>
<td>intolerance</td>
<td>intolerance</td>
</tr>
<tr>
<td>6.</td>
<td>abuse of teacher’s authority</td>
<td>competitive atmosphere</td>
</tr>
<tr>
<td>7.</td>
<td>deficient communication</td>
<td>abuse of teacher’s authority</td>
</tr>
</tbody>
</table>

Source: Authors

According to the hierarchy resulted from the investigation, competitive atmosphere (m = 4.70) registered the highest means for gymnasium students, while inappropriate use of emotions (m = 4.60) rated highest for high school students. Placing competitive atmosphere as the main source of conflict for gymnasium students is explained on the one hand, through the importance of the final grade for all four gymnasium years, as it represents a certain percentage of high school entrance grades. On the other hand, students declared in focus-group discussions that the competitive atmosphere is supported by teachers who encourage this form of educational progress. As for the inappropriate use of emotions with high school students, the age of adolescence is characterized through emotional exaltation which may lead to the amplification, the exaggeration of emotional-expressive behaviors (Crețu, 2005). Deficient communication (m = 3.52) for gymnasium students and abuse of teacher’s authority (m = 3.72) for high school students registered the lowest means.

Gymnasium responses registered means above 4 for five items: competitive atmosphere (m = 4.70), inappropriate expressions of emotions (m = 4.38), aggressiveness (m = 4.36), lack of skills in solving conflicts (m = 4.20), intolerance (m = 4.18). High school responses registered means above 4 for six items: inappropriate expressions of emotions (m = 4.60), lack of skills in solving conflicts (m = 4.44),...
deficient communication as a result of linguistic ambiguity (m = 4.32), aggressiveness (m = 4.30), intolerance (m = 4.22), competitive atmosphere (m = 4.10). These means show that students in both school levels consider these items as sources with major impact in triggering conflicts. Even the lowest means are above 3.5, which demonstrate the importance students pay to these items as significant sources of conflict among students.

The T test was used for the independent groups to determine the differences of the opinions regarding the sources of conflict among students. The significance level was set to 0.05. Starting from the significant differences from a statistical point of view among students’ appreciations, we could state the relevance of the sources of conflict. Thus, the analysis of the appreciations of the students from the gymnasium and high school brought to significant light differences for two items (deficient communication and competitive atmosphere, p<0.05). The divergence of opinions regarding the two elements is reflected on the hierarchy in Table 2. Thus, deficient communication ranked 7 (m=3.52) at gymnasium level and 3 (m=4.32) at high school level. The comparative analysis of the two means shows higher appreciation with high school responses. This demonstrates that deficient communication has a greater relevance as a source of conflict for high school students. The second item which registered statistically significant differences is a competitive atmosphere. According to Table 2, it ranked 1 (m = 4.70) at gymnasium level and 6 (m = 4.10) at high school level. The higher mean is registered with the gymnasium responses. Statistically insignificant differences were registered for five items, indicating convergence of opinions of the students from the two school levels.

Conclusion

Although conflicts are not desired in the educational communication, they exist. Specific literature underlines that a solved conflict may be seen as a source of learning, as previous experience for others to come and thus the participants will know how to react to diminish the impact of the phenomenon or even solve it. The existence of conflicts helps to discover personal values and beliefs, contributes to developing proper conflict management skills.

Our study demonstrated that students pay attention to conflict as an important issue in education by giving high scores to the sources identified in the research. We also appreciated their involvement in focus-groups discussions as they provided examples or drew attention upon different conflictual situations. The selection of the sources of conflict for this research was made according to the specifics of the present Romanian educational context. Although they were analyzed individually, the sources of conflict can act separately or in combinations determined by the situation in case. Mention must be made that there is a much richer range of sources of conflict that generate particular aspects, strategies of preventing and solving, which could be dwelled upon in further studies.

References

STUDENTS’ PERCEPTIONS OF EXTRA-CURRICULAR ACTIVITIES IN FOREIGN LANGUAGES AS VALUE FOR THEIR PROFESSIONAL COMPETENCIES DEVELOPMENT AND FUTURE EMPLOYABILITY

Elena Gavrilova, Kira Trostina

Abstract: The rationale behind this research is based on the claim that the students actively involved in university-geared extra-curricular activities (ECAs) in foreign languages gain higher employability than their uninvolved peers. With the recruitment market toughening and the universities’ budgets tightening, the role of ECAs in increasing a student’s profile needs revisiting. This paper examines the correlation between participation in free-of-charge and fee-paying ECAs in foreign languages and greater opportunities for better employment. In recognizing the value of extra-curricular input in their future, student’s views of themselves are reshaped. This outcome results in an increase in the number of student-led versus teacher-initiated activities, thus developing students’ autonomy, critical thinking, and cognitive skills. This article reports on the review and findings of the benefits of ECAs in a Russian economic university. The survey shows that employer-focused ECAs in foreign languages unfailingly provide university graduates with an added edge. The paper concludes with a proposal that inexperienced job-hunters have more confidence to seek better employment when armed with a portfolio of achievements in ECAs and non-degree courses.

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Keywords: extra-curricular activities, foreign languages, non-degree education, economic education, employability

Introduction
Possessing a single diploma in tertiary education is no longer adequate for seeking jobs since the global recruitment market now requires graduates to diversify in their job search. Narrowing the pathways to work paradoxically necessitates a great deal of versatility from those searching for their first career opportunity. Prospective employers are longing to see potential applicants’ flexible approach and seek adaptable staff that does not fear new challenges and change. Recruiters worldwide are, to a less extent, convinced of an applicant’s ability to work effectively, judging solely by his or her diploma, and demand ‘ready for work’ graduates with clear evidence of specific job competencies. The contemporary knowledge-driven economy is witnessing a downturn in the number of employers offering induction courses or training programs for novice graduates and a secure career ladder. Fry (2009) claims that there are increasingly more qualified people available for most jobs than has been in recent memory and adds that what has changed is the level of competition and the need, more than ever, to set the applicant apart from all other contenders. Moreover, IT-powered modern society has completely reshaped the job application process. Job seekers now forward their curriculum vitae (CV) through email or complete applications on-line for screening by special corporate filters that automatically reject those that fail to conform to basic specifications and requirements.

A major commitment of modern universities is to equip their graduates, not only with standardized academic qualifications but also with an array of ‘extra-curricular skills’ to allow them to stand out in the crowd and boost their employability. It is a topmost concern for a business that students leave university with a wide range of employable skill sets (BIS, 2010, p. 8).

Employability, in contrast to employment, is a term increasingly used, especially in describing students and graduates. According to Fancourt and James (2005, p. 5), “employment refers to having a job, while employability, or being employable, refers to the qualities needed to maintain employment and progress in the workplace.” As interpreted by Hillage and Pollard (1998), employability is the capability of gaining initial employment, maintaining jobs, and obtaining employment where required. Some universities are especially active in promoting their extra-curricular component and additional educational services and narrow the definition of employability to that applicable specifically to their graduates. For example, the University of St Mark & St John, in their Marjon Employability Strategy 2013–2015, declared that their Marjon Plus program would act as a vehicle for acknowledging extra-curricular achievements. The University spells out employability as the set of accomplishments, understandings, and personal attributes that make their “graduates more likely to gain employment and

1 Plekhanov Russian University of Economics, Russia, helena0517@mail.ru
2 Plekhanov Russian University of Economics, Russia, kiratrostina@mail.ru
be successful in their chosen occupations” as stated by Kalei (2016, p. 1).

During the development stage, researchers had difficulty defining extra-curricular activities (ECA). For some time, different names for ECA co-existed, e.g., after-school activities, co-curricular activities, out-of-school activities, and extra-classroom activities causing some confusion in terminology worldwide. Today the complications are so many and varied that, in the authors’ view, it remains difficult to provide an unequivocal definition of ECAs. Generally, ECAs are attributed to those activities that are not the components of the academic curriculum but are an integral part of the education environment, comprising sports, singing, music, debate, dance, drama, and social services. Co-curricular activities (CCAs) are defined in The International Dictionary of Education as follows:

Activities sponsored or recognized by a school or college which are not part of the academic curriculum but are acknowledged to be an essential part of the life of an educational institution, such as sports, school bands, student newspaper etc. They may also be classed as ‘extracurricular’ i.e. activities carried on outside of the regular course of study; activities outside the usual duties of a job, as extra class activities. (Page, Terry, Thomas, & Marshall, 1977)

However, although all authors accept that ECAs take place outside of curriculum hours, there is no unanimity as to whether these activities include activities practiced within a university setting exclusively or whether they should include those conducted externally as well. Including the latter expands the definition of ECAs to an exorbitant range of activities, from all types of sports and youth associations to non-degree (L2) courses.

This paper summarizes the experiences from more than 20 years of voluntary ECAs, which have been university-focused and professionally-focused, and of the supplementary educational service in foreign languages at the Plekhanov Russian University of Economics (PRUE). It also presents the manner in which these programs not only support students’ linguistic competence but also enhance their employment opportunities.

**Literature Review**

The first studies summarizing extra-curricular experiences in colleges and universities appeared as early as the 1920s. These recognized the value of ECAs and administering, guiding, and promoting the ECAs, and thus demonstrated that such activities could and, often worthily, contribute towards achieving educational aims and goals. Some educators were inclined to set the same values for curriculum and extra-curricular programs (Koos, 1926). An early philosophy behind ECAs was that they should “grow out of curricular activities and return to curricular activities to enrich them” (Millard, 1930, p. 12, cited in Broh, 2002, p. 71).

Recent researchers in ECAs diverge to embrace a whole array of topics and outcomes. Stuart, Raht, and Smith (2011) attempted to re-vision the teacher-learner roles through ECAs. Chan (2010) suggested that the locus of control and ECAs influence the learning approaches of full-time and part-time sub-degree finance students and concludes that the deep approach is positively associated with academic achievement. Holloway (2002) studied ECAs and student motivation in educational leadership, while Clegg, Stevenson, and Willott (2010, p. 1) place considerable focus on the “blurring of boundaries in conceptions of the curricular and extra-curricular” in regards to the United Kingdom (UK) higher education.

Many researchers highlight the correlation between ECAs and academic achievement. Seow and Pan (2014) prepared a literature review on how participating in ECAs affected the academic performance of accounting students and offered three major theoretical frameworks, zero-sum, developmental, and threshold, in explaining such. Wilner (2005) studied the role of ECAs in helping students choose an appropriate career path and a support network to thrive. Yorke and Knight (2006) stated that ‘employability’ is a more complex construct than that of ‘core’ or ‘key’ skills, suggesting that employability becomes part of the curriculum. According to Yorke and Knight (2006, p. 2), “employability can be enhanced through personal development planning, but success will depend upon the extent to which students see a ‘pay-off’ for the effort that they put in.” When the students know that ECAs are included in their profile, their participation becomes more fervent. Thompson, Clark, Walker, and Whyatt (2013) admitted that although an excessively active ECA engagement can
be detrimental to academic study where it is framed in structured institutional schemes, it would enable students to increase their employability.

In Russia, research in university ECAs in foreign languages, as well as their effect on graduates’ employability, is in its infancy, and corresponding publications are infrequent. Though many colleges and universities persistently organize a supplementary educational service and a variety of forms of ECAs in foreign languages, the information about these is fragmented with no serious attempts to systematize and publicize evident to date. Publications of Russian researchers’ studies in ECAs in foreign languages relating to universities are second to none. However, these studies only highlight individual aspects of ECAs in foreign languages (Kuimova & Gaberling, 2014; Pashkova & Solodovnikova, 2013) and no studies connect ECAs with employability.

**Data and Methodology**

This study was a desk research that included theoretical literature and empirical studies on the topic of ECAs and employability. The literature included scientific periodicals, companies’ and universities’ websites, publications on employment, application forms, recruiters’ blogs and posts from world’s largest professional networks. This approach aimed to elicit information on ECAs in foreign languages that would be advisable to include in university graduates’ CVs in response to likely questions during job interviews. This information would reflect their experience gained from ECAs in foreign languages, and account for the contribution of ECAs in successful job-hunting. The field research component involved collecting first-hand information from a series of interviews with human resources (HR) managers from different companies, lecturers from PRUE’s Human Resources Management Department, administrative staff of PRUE’s foreign languages non-degree courses, foreign language teachers from PRUE, and bachelor and master’s undergraduates and alumni.

Interviews with the companies’ HR practitioners and PRUE’s HR for teaching staff with the knowledge and expertise in this area of research focused on the evaluation of ECAs achievements for the employment decisions. There were two questions asked: 1) Is there any benefit of ECAs in foreign languages for a graduate in the initial job-hunting? 2) If yes, then which ECAs are especially valuable for the work in the economic sector?

Interviews and panel discussions with 28 foreign language teachers provided details of their experiences in organizing various L2 teacher-gaered ECAs at PRUE and conducting non-degree courses. This activity elicited ideas for further development and improvement. To be more objective and to monitor the dynamics of the students’ lifecycle in ECAs, the study used data collected from only those teachers who had worked at the Chair of Foreign Languages for more than four years.

Statistical data about students’ participation in non-degree courses of foreign languages were collected from the administration of the courses, at the chairs of Foreign Languages, to analyze the breakdown of students’ interests in fee-paying foreign language activities at PRUE during 2014–2016.

One-to-one interviews and communication with the undergraduates using on-line social and professional networks provided the means of collecting feedback of their positive and negative reflections from participating in ECAs in foreign languages. One-to-one interviews with former graduates working in multinational companies sought to collect their perceptions on the relevance of these activities for their current job practices and experiences.

**Results and Discussion**

**Language Training in an Employability Context**

Established in 1907, PRUE currently has over 17 000 enrolled students in bachelor, specialist, and master’s degrees and supports over 100 educational programs. The university holds a practical approach towards students’ instruction, thus, highlighting the entrepreneurial traditions as an essential social value. Many PRUE graduates with a decent command of L2 seek employment where the office operates in the English language. The feedback collected from our alumni indicated that among the main objectives of English language studies there should be more emphasis on training students in cross-cultural issues as well as immediacy and clarity of communication.

Undergraduates directly linked their future employability with their English language advancement, thus voicing exaggerated expectations of the curricular L2 courses. Having to act within the rigid syllabus boundaries and being well aware of the inherent limitations of both obligatory and elective L2
courses, teachers in PRUE were increasingly encouraging their students to engage in both teacher-directed and self-initiated ECAs. Additionally, to compensate for the lack of traditional classroom language practice, the enrollment for foreign language non-degree courses was promoted.

Teacher-led activities in foreign languages were on an ad hoc voluntary basis, but students were aware that participation in these could help them outscore their more academically gifted peers, raise their rating, and accessorize their CVs for the future. Achievements in most activities were documented by way of certificates, screenshots from the University website, photos of events, and publications, which provided students with credibility. Hence, by graduating, students can accumulate a diversified portfolio of extra-curricular achievements, demonstrate to prospective employers their language abilities, and strive for self-development and self-actualization in a recognized manner.

Most HR specialists who were questioned agreed that involvement in ECAs in foreign languages enhanced the former students’ employment chances. As Julia Kosareva, the Head of PRUE’s Career Development Centre wrote: “generally, the employers from economics graduates’ target companies prioritize three core requirements for the successful applicant, computer literacy, advanced knowledge of English, and team-working skills.” Inna Shirko, Director for Academic Activities Coordination, PRUE, contemplated that principally there are two sets of questions that can be tackled with the applicants’ recollections about their participation in ECAs in foreign languages: 1) What do you consider most important for the interviewer to know? and 2) Are you able to relate the story back to the job? Petr Karasev, Vice-Rector for Education and Methodology Work, PRUE, outlined that to prove the graduates were valuable candidates there were two recommended answers. One was to tell the interviewer a story about their awards, non-degree course enrollment, interests, or hobbies, and thus, relate their success to examples that reflected well on their character (e.g., their excellent people skills). The second was to share a personal story of being involved in or initiating some project in the ECAs.

The rise of the electronic job market in recent years has accentuated the wider implementation of electronic portfolios in the recruitment process. Unlike a paper-based portfolio, which is a collection of an applicant’s certificates and diplomas, an e-portfolio presents various electronic samples, such as videos, audios, as well as posts on the blogs or websites. Dudeney and Hockly (2007) believe that modern recruiters consider an e-portfolio to be a richer way of assessing a job-seeker, as it provides a much clearer idea of their achievements and personality than formal grades and test scores. E-portfolios are also becoming increasingly common in tertiary education because university graduates can include the most relevant information about themselves and highlight their interests and needs, streamlining their e-portfolios in line with the aims of their career objectives.

University-Geared Employer-Focused ECAs in Foreign Languages

Being focused on the academic outcomes rather than their personal development, students did not always recognize the employability enhancement that their participation in ECAs could bring to them. Thus, the mission of the chair of Foreign Languages was to expose PRUE students to a better understanding of the value of ECAs. The framework of teacher-directed professionally-focused ECAs in foreign languages has been evolving in PRUE for at least 20 years. Now the chair of foreign languages has a well-established system of extra-curricular activities and additional educational service embracing bachelor, master’s, and post-graduate students of all ages with different linguistic abilities. Apart from foreign language non-degree courses, organized by the chairs of foreign languages, and taking international certificate exams, which are fee-paying, all other activities are free of charge, while none are obligatory.

A traditional Week of Foreign Languages (WFL) held in November each year, which lasts up to three weeks, is the initial go-ahead impetus for involving first-year students into ECAs. The WFL’s program includes such activities as drama contests when participants perform chosen episodes from books of their home reading lists, a newspaper contest to try themselves in writing articles in English, and various English-speaking countries’ quizzes. All events are photographed and displayed on the faculties’ pages on the PRUE website. More experienced second-year students participate in additional professionally-focused events within the WFL, which may include roundtables, workshops, and individual business presentations. The awards, ranging from certificates to two-week courses in a language school in Great Britain, encourage a plethora of students to participate eagerly. As far as
participation data were concerned, 93% of first-year full-time students typically join the events of WFL. However, this number generally decreases to approximately two-thirds of the total in the second year. This decrease occurs for two reasons: 1) students become less interested in General English activities, and 2) some students start working part-time and have less extra-curricular time.

A permanent and functional Functioning on a permanent basis a student-led English club organizes such activities as roundtables, watching and discussing movies, celebrating dates and holidays, playing language games, and questing into English speaking countries’ culture. The English Club involves 9% of the first- and second-year students. Such ECAs provide an excellent opportunity to practice the language in informal situations within a circle of friends and partners and show students how to work together in teams. Thus, students learn to communicate and broaden their social network.

Numerous interdisciplinary and inter-university presentation and case-study contests attract a broad participation of undergraduates. Both individual and group presentation contests aim to improve student’s public-speaking skills, help overcome the fear of the stage, and advance their computer skills; benchmark the best practices; provide knowledge transfer from senior to junior students; and offer impetus for passive listeners from the audience to try themselves next year. For example, some ambitious students participate in presentation contests for 2–3 years running until they finally win. In fact, these presentation and case-study contests are viewed by potential employers as the showroom of the brightest PRUE students. In these, students’ predominant choice of topics is mostly career-focused, as they anticipate the links on the event’s websites about their participation will enhance their e-portfolios.

Selection for the case-study and presentation contests usually follows a multi-stage procedure. The process restricts the number of second- and third-year students participating in the contests, with only one representative or group allowed per department. This selection results in approximately 15–20 contestants in the interdepartmental final, with every department holding semi-finals to define the representative who will compete on the final contest day.

Another form of ECAs in foreign languages involves guest lectures in English by world-famous scientists and economists. In the case when even the biggest auditorium fails to accommodate the expected number of attendees, as was during the presentation by marketing guru, Philip Kotler, in 2014, these lectures are broadcast through in-house cable television, Plekhanov-TV, for viewing in halls and lecture rooms. During such ECAs, students gradually progress from passive listening to active involvement in organizational support and from seizing unique opportunities to communicate personally with the world’s leading specialists.

International and interdisciplinary research conferences crown the hierarchy of ECAs in foreign languages. These conferences include the International Research Conference Synergy of Accounting, Analysis, and Audit and the Youth Science Week that are annually organized by the chair of Foreign Languages in conjunction with subject-matter departments. Both Russian and foreign undergraduates present interim and final results of their research at the conferences, which have become a platform for regular scientific exchange for interaction of students of economics with scientists, prospective employers, university teaching staff and students from other universities and countries, and other representatives from various academic and non-academic institutions. Most conferences are joint projects of several universities, and therefore, the undergraduates have an opportunity to expand their professional network. Finally, a selection of submitted articles is published in the inter-university research conference proceedings or the internal, domestic, or international periodicals, e.g., the Proceedings of Scientific Conference International Plekhanov’s Readings, or International Conference on Teaching Humanities at Economic University. Such events mostly involve senior bachelor, master’s, and post-graduate students, since the writing stage of the graduation paper is approaching and the students are willing to demonstrate their academic potential.

Notably, the only fee-paying ECA, the non-degree courses of foreign languages, annually attracts 3.0-3.5% of the total number of full-time students, i.e., 250–300 students each year. The breakdown of student interests and enrollments in the non-degree courses of foreign languages at the University in 2014–2016 were as follows: 50% of these student groups were enrolled to study English as a foreign language, and 44% of these were learning English to prepare for an international examination. The international examination certificate would provide them with a competitive edge as well as the
opportunity for selection in overseas student exchange programs. The interest in such overseas studies has increased participation in ECAs organized and promoted by the foreign languages chair. The number of students taking international examinations varies from 107 to 121 according to 2012–2016 data. Another 50% of the students were studying non-English foreign languages. Those studying Spanish comprised a quarter of these, though no ECAs in this language were available for the students. The remaining 25% accounted for students learning a foreign language to diversify their potential employment portfolio. The range of available foreign languages in additional educational programs has resulted in response to student demands. For instance, the launch of Chinese, Swedish, and Italian language studying groups was due to a student-initiated activity resulting from their search for potential employment.

The advantages of active participation in university-geared and student-led ECAs in foreign languages are various, and student perceptions show such advantages have a significant input in overall personal development. The participants of ECAs emphasized that participating in the ECA increases their enthusiasm for both foreign language studies and economic disciplines, as well as enhancing their study and broadening their future professional horizons. As most ECAs have undefined outcomes, students were invited to contribute to thought-provoking and open-ended discussions to develop their critical-thinking and rhetorical abilities. The ECAs in a foreign language undoubtedly improve academic achievements by way of providing expanded language practice and access to more authentic materials. Thus, they foster linguistic competencies and facilitate a practical approach within the course. Such participation would add to the individual scholar rating as extra activities are non-obligatory, and, in no way, degrade the student’s academic record. Rather, such activities would benefit the involved student’s worth in comparison with peers who are uninvolved. Involvement in ECAs teaches students character-building lessons for their future study habits and other aspects of their lives. By participating and persevering in these activities, the students noticed that they gained a sense of self-confidence and self-respect. Students of average abilities often struggle with their self-esteem, and ECAs can help them find where they can stand out, thus giving their self-regard a boost. Closely connected with building character is the development of solid networking and team-building skills. Students involved in ECAs accentuated that they had extra practice on how to act appropriately in different social situations. This, in turn, would affect their overall well-being. Participation in various group projects teaches them how to compromise and work in a group. Knowledge is gained, not only from reading textbooks and listening to lectures, as students obtained an incredible amount of supplementary information and experience from their peers through ECAs. Students involved in ECAs underscored that they acquire better time management skills and learn to prioritize their commitments.

Students learn about long-term pledges because when they join a club or attempt to study another foreign language, they expose themselves to that activity for a long period, thus developing a great sense of responsibility. The supplementary e-portfolios of the ECAs display a range of skills but are not reflected in a test score. As stated by Lunenburg (2010, p. 3): An important objective of the total learning process” and being the amalgamation of knowledge, ECAs are “integrative in nature because they tie together many areas of knowledge and experience. They don’t provide abstract and isolated pieces of learning, but rather synthesize many aspects of real-life situations.” Both students and teaching staff benefit from cross-fertilization of ideas and close working relationships that they develop. As minimal bureaucracy was attached to these projects, a democratic approach rather than an authoritarian style of formal instruction exists. Most activities are undertaken in affiliation with the students’ societies.

Most relevant, the documented extra-curricular achievements in foreign languages provide a prodigious testimony when applying for further studies (master’s or post-graduate) and employment. Joining such programs and attempting to gain employment in one’s own country, let alone abroad, requires a successful candidate to demonstrate abilities beyond the mainstream curriculum. University authorities and HR managers expect students to have completed more than purely theoretical work. The ECAs in which students participate reveal a great deal about them and thus would carry weight for their admission to committees by recruiters.

Conclusion
Graduates armed with a portfolio of ECA rewards presented with greater confidence in regards to gaining worthwhile employment. Achievements in ECAs in foreign languages added value to resumes
and revealed fundamental skills that employers expect in a professional environment. The ECAs in foreign languages develop employable skills, such as communication, organization, and teamwork. In line with requirements of recruiters for boosting a graduate’s employability, the portfolio of undergraduate achievements diversified by the active participation in ECAs in foreign languages in universities is positively associated with success and proves the ambitions to hit the career ladder. The certificates and other forms of the documentary proof show the prospective employer that applicants, rather than graduating from ‘exam factories’, can also demonstrate proficiency in a foreign language and, furthermore, have developed such traits as perseverance, self-motivation, self-control, and resilience. Understanding the value of the extra-curricular input for their future reshapes students’ views about them. At the onset, in most ECAs that are teacher-led there is a marked shift towards increasing the number of student-led activities. Students are invited to submit their own proposals for supplementary education service, e.g., by requesting to introduce another foreign language to the non-degree study offer and ECAs in foreign languages. Student proposals can also involve themes for research conferences. Where the value of the proposal is established after discussion in the student’s group and with the chair staff, language teachers do their utmost to enable the most successful applicants to jump-start their ideas.

A properly organized and administered ECA in foreign languages not only brings increasingly more scores to future graduates but it also in many cases helps graduates out-perform their more academically advanced peers in employability. Further, it raises a university’s profile among other tertiary educational establishments and business schools, both nationally and internationally. Thus, it increases the university’s competitiveness. As well, ECAs in foreign languages foster cross-institutional student interaction, generate a sustainable medium for knowledge transfer, and enhance the credibility of the students’ work. Perkin, Ahearn, and Lamb (2012, p. 2) considered one approach was to “offer employers the opportunity to learn about the students’ activities, meet the students and engage with the institutions”. The participation and attendance rates prove that students perceive ECAs in foreign languages as generating high value for their professional competencies development and future employability, notably shifting to more career-biased ECAs as the graduation is approaching.

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USE OF ANTIOPRESSIVE APPROACH IN CZECH SOCIAL WORK WITH HOMELESS PEOPLE

Kateřina Glumbíková,1 Alice Gojová,2 Soňa Vávrová3

Abstract: The article deals with the use of an anti-oppressive approach in Czech social work focused on homeless people. The theoretical part, among others, looks into the intersectionality of oppression with homeless people. This contribution also presents partial results from two research studies focused on the reflection of oppression by homeless people. The results show that oppression is perceived as pervasive and interconnected by homeless people. Intrinsically, it forms a barrier in the process of their reintegration into permanent housing forms and a barrier to their access to health services. The necessity of applying the anti-oppressive approach in Czech social work can be clearly deduced from the obtained outcomes. Specifically, its individual instruments such as the production of counter-narratives to oppressive metanarratives, advocacy, critical reflection, and agency.

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Keywords: homelessness, intersectionality of oppression, antioppressive social work

Introduction
In the presented study, we first reflect upon three levels determining the applied approaches of Czech social work with homeless people. The expectations of society that social work will primarily be tool of control of clients and individualization of their problems form the first level (Sirovátka & Winkler, 2010). Legislative changes, related to the fact that on March 8, 2017 the Czech Government approved a draft law on social housing and a housing allowance (Government of the Czech Republic, 2017), represent the second level. Other forthcoming legislative changes are the changes in the Social Services Act No. 108/2006 Coll., that will impose a new obligation to provide social and therapeutic service in shelters for homeless people. The third level consists of a persistent negative view of homeless people by the society. In the context of the third level, the fact that the society shares the view that homeless people are weak, lazy, handicapped and prone to psychological and social problems can be pointed out (Swick, 2005). Given the above mentioned facts, in our article we aim to present research-based arguments for the wider use of an anti-oppressive approach in Czech social work with homeless people because in this approach we see an improvement and the uplifting of social work with the target group.

Theoretical basis
Within the theoretical foundations, we proceed from the fact that identity of each individual is constructed socially (through relationships and interactions with the social environment) (Výrost & Slaměník, 2011), both in their interpersonal form (formed by social affiliation, membership of a particular category of people ...) and in their personal form (self-identification, self-image ...). Harré & van Langenhove (2010), who describe the existence of collectively developed "personal constructs" in which each individual is classified, speak about the mechanism of identity construction through sociality. Personal constructs are also described by Becker (1997) in his theory of "identity of outsiders" or Tajfel (1981) in his conception of in-group and out-group. Under the above mentioned situation, (forced) identification occurs, which can be explained by Cooley's theory of "mirror self," which affects the formation of the human "I" through mirroring of others' opinions of ourselves (O'Brien, 2011). In accordance with the above mentioned oppression can be understood as the exercising of power or authority of the majority group on the basis of socially and culturally constructed differences. The result is the birth of social inequality. Oppression is therefore structural in nature (Graham & Schiele, 2010) and an individual identity is produced through it.

Lots of socially constructed forms of oppression are the basis for creation of an individual identity. An example might be the creation of "subjectivity" of single mothers in a shelter constructed mutually by reinforcing vectors of sex (gender and the situation of maternity and single parent status), race (possibly affiliation with the Roma ethnic group), class membership (the situation of homelessness and resulting socio-economic situation) and other axes of social differences or dimensions of life situations.

1 Faculty of Social Studies, University of Ostrava, katerina.glumbikova@osu.cz
2 Faculty of Social Studies, University of Ostrava, alice.gojova@osu.cz
3 Faculty of Social Studies, University of Ostrava, sona.vavrova@osu.cz
(Nash, 2008). Another example might be the creation of "subjectivity" of men in shelters when their subjectivity can be formed again by class membership and race, but also by other axes such as their possible experience with the use of drugs or alcohol; or long-term poor health as a result of staying on the street. Their life situation and lived experience cannot be understood through experience with only one form of oppression, for their understanding, the interaction of all experience with oppression is important; their intersectionality. The anti-oppressive approach in social work, whose overarching principle is critical social work, is focused on intersectionality (interconnection/intersection) of various forms of oppression (Graham & Schiele, 2010). Intersectionality becomes not only a point of interest but also an analytical tool aiming at the crossing and multidimensional power relationships for anti-oppressive social work (Grillo, 2013). In fact, any form of oppression is not and cannot be considered less important in anti-oppressive social work (Graham & Schiele, 2010). The anti-oppressive approach is frequently used in foreign practice with homeless people (Gerson, 2007), while in Czech social work only a minimum of contributions dealing with this approach can be found.

**Research methodology**

The data presented were partial outcomes of two research studies. Our aim was to determine how homeless people reflect oppression in their replies. (1) The first research study was aimed at analyzing the perception of barriers and accelerators of the reintegration process of homeless mothers with experience of staying in a shelter into permanent forms of housing. (2) The second research study focused on understanding the health by the residents of shelters and their perception of access to health services⁴. Both research studies were carried out using qualitative research strategies and techniques of data collection from half-structured interviews with homeless people.

(1) The first research study was a participatory study by its nature. It was carried out with the direct collaboration of two homeless mothers changing stays in shelters that participated in all phases of the research study, from the construction of the half-structured interview, through the collection of data to their analysis. The informants were selected using stratified sampling through the institution of shelters in Ostrava. In total, 33 interviews were carried out with three groups of informants, mothers changing stays in shelters (18), mothers leaving shelters (8) and mothers reintegrated into permanent housing for at least 18 months (5). The data obtained from individual interviews were also validated in this research study using six focus groups (2) The second research study, focused on the perception of health by the residents of shelters. It was attended by 18 informants, including 8 women and 10 men from shelters from several regions of the Czech Republic (the Moravian and Zlín region and the City of Prague). The informants were selected using stratified sampling with the help of the institution of the shelter (according to individual target groups from shelters: men, women, mothers with children). The data from both research studies were recorded with the consent of participants, processed (transcribed) and subsequently analysed using the constructivist approach to the grounded theory, which assumes the existence of multiple possible realities and the construction of a new reality in the process of interaction of the researcher’s reality and the reality of the participants of the research (Charmaz, 2006). Within the realization of both studies we followed the ethical principles for research involving humans (American Psychological Association, 2010).

**Research results and their interpretation⁵**

Ad (1/first research study) Interviewed homeless mothers described their living situation/experience through multiple forms of oppression. Among the most common labels that the informants referred to, were "homeless", "bad mother", "unable to take care" (in this case, for themselves and the baby), "sneak thief", "scum", "gypsy", "the one who needs to live in shelter", "black sheep of the family". In their narratives, the informants regard the oppression, which is characteristic by its ubiquity, as a barrier to the process of reintegration into permanent forms of housing; they meet with it at school: "I seemed to me that our teacher had thought that when a child was from a shelter, he/she was just stupid

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⁴ It is the project called Health of Occupants of Shelters, that Ostrava University carries out for the Association of Shelters in the Czech Republic, r.a. within the project called Development of Services for Homeless People under the Roof. Project registration number is CZ.03.2.63/0.0/0.0/99_041/0.002.242th.

⁵ In the following text, we denote the authentic statements with letter abbreviations of the informant and the number of the paragraph where they can be found in the transcribed text, both in brackets, to anonymize them.
and would hurt other kids or I don’t know ..." (KP15); at the doctor: "Some doctors, I think, look at me in a bad way because I live in a shelter ... I told it to the nurse and they told each other, I think ... since then they have been looking at me in a weird way... they keep asking what and how I eat ... once even if I have enough food ... I feel like being questioned ... I really wouldn’t go there if I didn’t have to " (PV1); in a shop: "Well, when you go to a shop ... they take a look at you ... and then they follow you all the time, quietly and inconspicuously and check if you don’t shoplift ... they even follow the kids " (KPR30); at authorities: "And I guess that when you go to the authority, they don’t tell you everything purposely ... or they say it in the way that you don’t understand it, and then you don’t want to ask not to be a complete idiot..." (PV2); with flat owners: "I don’t give a damn ... well everyone sees just a gypsy ... even if I had the money, I wouldn’t get a flat ... Well, I’ve dealt with the fact that I spend the rest of my life in a shelter..." (KP7); in a shelter: "It seems to me that we’re like their (ed. authors: social workers at the shelter) subjects that we have to beg for everything ... it’s not possible to talk with them normally, I don’t trust them at all" (KP16). "When I speak with her (ed. authors: a social worker at the shelter), I feel like being incapable ..." (KP15). Within the relationship with social workers at the shelter, the informants describe the need for understanding their life situation: "She can’t even empathize with me, it was my daughter's birthday, I wanted to buy her a present, we have to hand in the money to them, you know, well, so I wanted to draw it out and she told me that she wouldn’t give the money to me, I had to save money, I tried to explain that I needed to buy a present for my daughter ... she didn’t give me anything " (KP1). "They can’t empathize at all, I think they can’t imagine the situation we are in ..." (KP3); the establishment of trust and informal sharing "The setting of the rules here is a crap ... I wonder if they can ever want this stuff from us ... instead of asking you how you are, they just want the bills for everything you’ve bought this month because you’re short of money, it’s not possible not to be short of money and you have asked them for lentils ..." (KP3); and to reduce the social distance in the sense of "us and them": "When we go to see them, they’re locked, we have to knock or ring, we can only be here in the bedroom when we want, the hours in common room are also set..." (KP19). In this context the informants reflected that a social worker is an employee of the shelter and certain work obligations and rules, that they must observe, derive from that fact: "I think that it is sometimes also hard for them ... they have to watch you here, take care and their boss probably assesses them by some tables, or not? ... they perceive that the relationship between us isn’t good, as well and they also don’t know what to do about it ... or the boss forces them to treat us in this way" (PV2). The informants also described the oppression against shelters as facilities for homeless people. "And I was afraid to go there because I had heard it was like a jail" (KP20). "People usually don’t know what a shelter is, they think that it is a punishment, not that it has to help us ... I myself didn’t know that there was something like that ... a lot of people probably don’t know until they begin to stay there ..." (PV2).

Ad (2/second research study) In the second research study, the intersectionality of oppression was perceived as a barrier of the access to medical care by the informants. This barrier was interpreted as very strong, sometimes stronger than the reduced availability of health care in the sense of the absence of its low-threshold in the form of its distance and charges for medical service and medicines. "Well, now we have to treat him, well, someone unshaven, dirty. I believe that they think like that, and I’m not surprised, because when a person is somewhere under the bridge or so, I understand the doctors that they ponder it like that. If they do, but they probably do," (KPM2). "I had an inflammation of testicles, I couldn’t walk. I had the money, so I went to the emergency on Saturday. The doctor even didn’t come out, only the nurse in the door, she asked what I wanted, I told her my problem. She said she would ask the doctor and she came back in 10 minutes and said that the doctor advised me to go to the surgery department " (KPM1). "I have a bad experience, such a strange behavior I don’t like it from them ... it seems to me that they think that you’re O.K. and swing the lead. Mainly at those emergencies... I've been in the hospital a few times, and such a strange behavior. It's not; it's not right" (KPM6). "You see it’s like... I don’t blame the doctors that they look at you in that way" (KPM8). This perceived oppression led the informants to not take advantage of health services, or to use them only in emergency cases, which does not provide the possibility of early intervention in case of health.

6 Shortcuts: KP 1 – 33 – communication partner and number (1 – 33), PV 1 – 2 – peer researcher and number (1 – 2).
7 Shortcuts: KP M 1 – 18 – male communication partner and number (1 – 18), KP 1 – 18 – female communication partner and number 1 – 18.
problems and it is costly. "I didn’t see the doctors until I ended up in the emergency room because of my stomach ... I didn’t see them because I knew exactly what they would think of me ... that I was a dirt and it’s my fault" (KP9). "To see the doctor only in the worst case, we prefer going to the emergency, we don’t have a doctor ... " (KP3). As KP3 describes, non-use of medical assistance is associated with emergency visits.

Conclusion

The results of the presented research studies clearly show that the life experience of homeless people is associated with the interaction of several forms of oppression that are perceived as pervasive. This shows that the intersectionality of oppression is a very important analytical tool through which we can understand the life experience of homeless people. According to the informants, the intersectionality of oppression is a barrier in the process of reintegration into permanent housing and a barrier to their access to health services. The status of "disadvantaged" / "disenabled" is attributed to homeless people on the basis of oppressive metanarrative, socially shared understanding. Therefore, anti-oppressive social work may be beneficial to the services with homeless people not only because it enables us to understand their life situation, but also because it allows us to change it. Actually, the aim of anti-oppressive social work is to replace oppressive and controlling relationships with new relations based on equality (Dominelli, 2010). Emphasis on differences, diversity and inclusion are getting into the centre of attention (Brown, 2012). The tool of anti-oppressive social work is the production of counter-narratives that are formed to oppressive metanarratives, and that may be the source of empowerment for oppressed groups and through them also for individuals (Baldwin, 2013). Another tool of anti-oppressive social work is Social Advocacy ("advocacy") within the meaning of defence of the rights of beneficiaries of social work, both in the broad sense, thus assertion of the rights of whole groups of disadvantaged to the public, and in the narrower sense as an assertion of the rights of specific people at different system levels (Dominelli, 2010). The right to housing for homeless people, the right to provide clear information at authorities or the right to be treated with dignity in health care facilities can be defended through this tool. In relation to the oppression perceived by social workers, the anti-oppressive approach can contribute to social work with the homeless people with its emphasis on critical reflection, which always asks where our knowledge comes from (Fook & Gardner, 2007). Healy (2000) states that even social workers can contribute to reproductive oppression, and therefore they should permanently reflect not only their presumptions while working with clients, but also their personal construction about the nature of the world (Fook & Gardner, 2007).

Based on the experience with participatory research approach, we can also point to the "action" ("agency"), which is another tool of anti-oppressive social work to achieve social change. The recipients of social work are seen as actors, as possible bearers of change that takes place through their individual and collective actions (Fook & Gardner, 2007).

References


THE CHALLENGES AND TRENDS IN HIGHER EDUCATION
Adriana Grenčíková,1 Jana Španková,2 Dagmar Petrušová3

Abstract: The aim of this paper is to study the developments and trends in higher education. The mission of universities is to develop harmonious personality, knowledge, wisdom, goodness, and creativity in a person and to contribute to the development of education, science, culture and health for the welfare of the whole society. It is necessary to pay attention to changing trends in the labor market in connection with the introduction of new technologies and the creation of new jobs as well as the changing requirements of employers in order to fulfill this mission. Despite falling unemployment, it is still necessary to pay significant attention to the preparation of the new workforce which enters the labor market and mainly to the education of a highly qualified workforce that is required by the labor market. The authors are dedicated to education itself as well as educational trends, they sought to underpin the theoretical background of education through statistical indicators. The authors used a time series analysis for the identification of trends and changes of the monitored parameters. They used a regression analysis for the prognosis of trends and have been using the index of correlation and determination for the choice of the most probable future development.

It is essential that the training of the workforce for the labor market and the education sector respond to the changes in a flexible manner. The conventional way of education will become substandard over several years, not only the content but also a technological transformation will be required.

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UDC Classification: 331.5
Keywords: education, higher education, labor market, graduate, employability, trends in education

Introduction
Globalization processes associated with the development of new communication technologies significantly impact the national labor markets and can result in an even greater problem with employment. In this context, the education system which prepares the workforce for the labor market is changing. The ability of the workforce to adapt to the changing labor market requirements becomes important. The basic structural features of the labor market of the EU countries, as well as the Slovak Republic is the aging population, high levels of long-term unemployment, high unemployment of people with low education, high youth unemployment, and large regional disparities (Fusch, 2016). Employment and productive work are one of the most important factors for economic and social development of society. Employment increases development of a society and the living standards of every citizen. That is the reason why the growth of employment is the most important goal in the majority of countries. A characteristic feature of most developed societies is their high degree of sensitivity to the level of employment. Many societies are based on the fact that the majority of their population that is able to work consists of employees who earn wages. This implies a dependency ratio on the stability of employment, which ensures a regular flow of income.

Employment represents the involvement of the population in the work process. It can be measured by the number of employed and the employment rate. Full employment reflects a level of employment, which corresponds to the natural rate of unemployment and the economy at the level of potential output. (Habánik, 2012). It is necessary to be aware of the preparation of the new workforce which enters into the labor market and in particular the preparation of a highly skilled workforce that is on demand. Such a workforce is prepared especially in higher education. The need for qualified labor force growth in the fourth scientific and technological revolution, particularly the workforce in specific industrial sectors, which are necessary for the growth of new sectors of production. However, unskilled labor or the workforce skills that can not find employment in new sectors are constantly appearing in the labor market. (Krajňáková&Vojtovič, 2012, p. 69). State intervention in the form of measures of active labor market policies but also in measures for more effective education systems helps facilitate the entry of young people into the labor market. The existence of targeted instruments

1 Faculty of Social and Economic Relations, Alexander Dubček University in Trencín, Slovak Republic, adriana.grencikova@tnuni.sk
2 Faculty of Social and Economic Relations, Alexander Dubček University in Trencín, Slovak Republic, jana.spankova@tnuni.sk
3 Faculty of Social and Economic Relations, Alexander Dubček University in Trencín, Slovak Republic, dagmar.petrusova@tnuni.sk
to support and provide help to young people can make a significant contribution to enhancing their competitiveness and integration into working life. Tools eliminating their main handicap, such as a lack of professional experience and practical experiences, generally are standard tools of the active labor market measures which are explicitly targeted towards young people. These schemes provide incorporation, training, and professional experience directly in the workplace by the employer in order to obtain professional competencies. Graduate practice, is for these purposes, in the active labor market measures of Slovakia. This practice gives the opportunity for graduates to acquire vocational skills and practical experience through work placements at the employers.

The issue of higher education is now rightly in the center of attention of experts and the general public due to the fact that many graduates leave Slovak universities every year and they do not have the required skills for the labor market needs. Education is a process that is difficult because of the changing conditions and rapid obsolescence of knowledge nowadays. Knowledge of the graduates can be obsolete already at the end of their study; therefore, the ability to learn and orientate one’s self in the search and acquisition of new knowledge is an important feature of graduates.

**Purpose and methods**

We used the following research methods:

- Quantitative methods, particularly mathematical - statistical methods (time series, relative values, indexes, regression and correlation analysis, the correlation coefficient and determination, prognostication etc.)
- Qualitative methods such as a secondary analysis of documents, laws, research materials, and other factually relevant domestic and foreign documents, etc.

The information sources from the Statistical Office of the Slovak Republic, Ministry of Labour, Social Affairs and Family, Ministry of Education, Science, Research and Sport of the Slovak Republic, Central Office of Labour, Social Affairs and Family have been used to analyze these. Internal materials of relevant institutions and organizations dealing with given issues and other available literature mentioned in the bibliography have been incorporated in the analysis.

Time series analysis for the identification of trends and changes in the examined indicators have also been employed.

Regression analysis for the prognosis of trends have been used and the most probable future development of this indicator and the index of correlation and determination have been chosen. Price index of determination could take values from 0 to 1, the more the value of the index approaches 1, the greater part of the total variability approaches zero, the smaller part of the total variability is explained by the model described by the model and vice versa, if the determination index

**Impacts on the market of higher education in the Slovak Republic**

The decline of a population significantly affects the whole European market of education. The capacity of universities is set to a greater number of students. This means that higher education is becoming more accessible to a greater number of individuals from the population each year. Therefore, training for future employment is extended significantly and the average age of the workforce which enters into the labor market in the European area is the highest in history. The following graph shows the situation of the development of the number of applicants for university study in the Slovak Republic.

Interest of students is focused mainly on social sciences and natural sciences in the Slovak Republic in recent years. In comparison with technical sciences, where interest of students is significantly lower for this type of study. This situation also impacted the labor market and the Most Desirable graduates become graduates with engineering degrees.

Due to the fact that boomers are falling, the employers are more often looking for graduates of technical fields, this results in an unharmonious labor market. Technical studies are generally considered to be very difficult; therefore, only the best students achieve success. The classic form of teaching and subjects that have not changed for at least two decades discourage potential candidates. Many of the subjects seem unnecessary. In Slovakia, there is no possibility for students to choose subjects that are considered more appropriate and that are prescribed as compulsory subjects in the group, from the range of prescribed credits. Flexible learning pathways and the use of more ICT in education will
change routines of higher education differently opposed to those being practiced now. (Jirasko, Hynek, 2016)

Technically and economically oriented faculties clearly dominate in comparison to individual faculties. Conversely, faculty focused on law, education, and agriculture are least in demand.

Despite the mentioned facts, university graduates create a negligible group in the overall unemployment rate in Slovakia. Other circumstances can lead them being registered as unemployed due to the lack of job opportunities. The following table presents an overview of unemployment in the Slovak Republic by educational attainment.

Table 1: Population structure by education

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<tbody>
<tr>
<td>Primary education</td>
<td>39.3</td>
<td>41.6</td>
<td>40.2</td>
<td>42.1</td>
<td>44.5</td>
<td>42.3</td>
<td>44.4</td>
<td>38.5</td>
</tr>
<tr>
<td>Secondary (vocational) education without GCE</td>
<td>18.1</td>
<td>25.1</td>
<td>32.6</td>
<td>32.9</td>
<td>29.8</td>
<td>33.2</td>
<td>16.4</td>
<td>13.7</td>
</tr>
<tr>
<td>Secondary specialized (vocational) education with GCE</td>
<td>8.4</td>
<td>15.1</td>
<td>19.6</td>
<td>12.2</td>
<td>9.7</td>
<td>12.5</td>
<td>11.6</td>
<td>11.1</td>
</tr>
<tr>
<td>Completed secondary general education</td>
<td>7.7</td>
<td>12.9</td>
<td>13.5</td>
<td>14.6</td>
<td>16</td>
<td>15.8</td>
<td>15.2</td>
<td>11.9</td>
</tr>
<tr>
<td>Completed secondary technical education</td>
<td>5.7</td>
<td>8.6</td>
<td>10.3</td>
<td>10.0</td>
<td>10.4</td>
<td>10.8</td>
<td>9.3</td>
<td>8.6</td>
</tr>
<tr>
<td>Higher vocational education</td>
<td>5.8</td>
<td>5.6</td>
<td>9.2</td>
<td>5.7</td>
<td>4.7</td>
<td>7.8</td>
<td>6.9</td>
<td>4.7</td>
</tr>
<tr>
<td>University education</td>
<td>3.5</td>
<td>4.2</td>
<td>6.5</td>
<td>5.8</td>
<td>6.9</td>
<td>7.2</td>
<td>6.4</td>
<td>6</td>
</tr>
<tr>
<td>No education</td>
<td>17.4</td>
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Source: ŠÚ SR, VZPS

* Vocational education is included in this number to 2013

The increasing trend of an economically active population (EAP) in the Slovak Republic and also the increasing trend in the share of university educated people from EAP during the period of 2008 to 2015 is being shown in Table 2. EAP growth index is 1,018 that represents an increase of 1.8%, and the university educated component of this population increased by 46.7%.

Table 2: The economically active population in the Slovak Republic and the share of university educated people in the years 2008 - 2015 (in thousands)

<table>
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<tbody>
<tr>
<td>EAP</td>
<td>2691.2</td>
<td>2690.0</td>
<td>2706.5</td>
<td>2680.0</td>
<td>2706.5</td>
<td>2715.3</td>
<td>2721.8</td>
<td>2738.3</td>
<td>1.018</td>
</tr>
<tr>
<td>University educated</td>
<td>401.4</td>
<td>425.0</td>
<td>476.7</td>
<td>488.4</td>
<td>500.2</td>
<td>528.8</td>
<td>562.5</td>
<td>589.0</td>
<td>1.467</td>
</tr>
<tr>
<td>Share in %</td>
<td>14.9</td>
<td>15.8</td>
<td>17.6</td>
<td>18.2</td>
<td>18.5</td>
<td>19.5</td>
<td>19.3</td>
<td>21.5</td>
<td></td>
</tr>
</tbody>
</table>

Source: ŠÚ SR, own processing

Following on the statistics above, the university educated component of economically active population of Slovakia has increased. It has been noticed that the highest share of population with university education on the EAP is in the Bratislava Region (share was 37.3% in the year, 2015), then in the Trenčín and Košice regions (share was 20.6% in the year, 2015). The lowest share was 5.9% in the Trnava Region in the year 2015 from the regional perspective.

It is expected that further development of the university educated component of the economically active population in Slovakia will continue until 2020 if we take into regard a linear model with the equation y = 25,819x − 51439, which has an index of reliability of 97.95% for this time period. Development prognosis are illustrated in Table 3.

Table 3: Prognosis of university educated component of economically active population in the Slovak Republic for the years 2016 - 2020 (in thousands)

<table>
<thead>
<tr>
<th>Year</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
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</thead>
<tbody>
<tr>
<td>University educated component of EAP</td>
<td>612.1</td>
<td>637.9</td>
<td>663.7</td>
<td>689.6</td>
<td>715.4</td>
</tr>
</tbody>
</table>

Source: own processing
In summary, given the analysis of the employed in Slovakia by education, the number and thus the share of university educated people have an increasing trend in the monitored period. This group makes up more than one fifth of workers in recent years. The share of university educated workers on the overall number of all workers in the Slovak Republic was approximately 22.8% in 2015. The Bratislava region is for the entire period higher than this value, which can be justified by the concentration of state and private enterprises, companies, organizations and councils, which require highly qualified workforce. Trnava and Nitra regions have long been below the national share of university educated workers on the overall number of all workers, which is likely related to the migration of the highly qualified workforce to the Bratislava Region; for instance, due to the closer proximity to and higher number of better career prospects, higher remuneration, etc.

The analysis about the proportion of the unemployed with university education in the Slovak Republic indicates an increasing trend as seen in Table 4. For example, it was only one person with a university education in twenty unemployed in 2008, but it was approximately one in ten in unemployed in 2015.

<table>
<thead>
<tr>
<th>Table 4: Development of unemployment in total and unemployed people with a university education in the Slovak Republic in the years 2008 - 2015 (in thousands)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2008</strong></td>
</tr>
<tr>
<td><strong>Together</strong></td>
</tr>
<tr>
<td><strong>University</strong></td>
</tr>
<tr>
<td><strong>Share in %</strong></td>
</tr>
</tbody>
</table>

Source: ŠÚ SR, own processing

The lowest share of unemployed with university education was found in Banská Bystrica, Trnava and Prešov regions throughout the period. This situation may be caused by the outflow of educated workforce to other regions and also shows that education has a positive impact on success in the labor market in these regions.

<table>
<thead>
<tr>
<th>Table 5: Development of EAP and unemployed people with a university education in the Slovak Republic in the years 2008 - 2015 (in thousands)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2008</strong></td>
</tr>
<tr>
<td><strong>EAP</strong></td>
</tr>
<tr>
<td><strong>Unemployed people with UNI</strong></td>
</tr>
<tr>
<td><strong>Share in %</strong></td>
</tr>
</tbody>
</table>

Source: ŠÚ SR, own processing

It is assumed that there is a correlation between the development of the university educated economically active population and the development of university students in the total number of unemployed. Based on the above further reduction of the share of highly qualified unemployed can be expected in the total number of EAP with university education. Index of correlation of these indicators is the highest in the quadratic model and has a value $r = 0.96$ (statistically very high interdependence of the examined parameters).

To summarise, the share of university educated people could fall below 2-3% till 2020, it is based on the quadratic model $y = - 0.0002x^2 + 0.2081x - 48,886$ with determination index 91.3% and the expected development of EAP with university education (Table 1). Of course, other factors that may affect future development have to be taken into account.

Availability of university education depends on the financial possibilities of families and students. Therefore, the choice of this type of education is particularly influenced by the possibility of studying in the region from which the student comes from, and it is usually associated with the lowest financial burden for the family. The graduates often remain at work in the regions in which they studied, and it is very important in the balancing of disparities in the labor market, which have been mentioned previously.
Figure 1 Quadratic model – dependence on share of university educated unemployed population in the economically active population with a university education in Slovakia in the years 2008 - 2015.

Conclusion
The Industry 4.0 Initiative, introduced in Germany, brings an entirely new model that will connect the production and non-production components of the organization (Lom, Pribyl, Svitk, 2016; Liu, Xu, 2017). This model will put very different requirements for existing employees in place. The creation of new jobs will be accepted with important changes. It will have a major impact on the required qualifications of the labor market in general; and will create a need to think about the social aspects of these impacts to (Pfeiffer, S. 2016). These impacts will not only lead to a new organizing work principle but will also require new skills and knowledge of employees and employers. Even in the 1980s, it was assumed that each vacancy would be replaced by a new one where the higher qualification and the higher salary would be required. However, at present, this looks different. Reproduction of work leads to another level. There is a small group of jobs that are highly specialized with a higher salary, bonuses and all others, and the vast majority of jobs with low intensity of qualification and lower salaries. On the other hand, it is necessary to take into account the low population growth in the EU. In this context, there is a need to change the training of the workforce for the labor market, and hence huge changes are waiting for the education sector. The conventional way of education will become unsatisfactory in a few years. University education will require huge changes in the content of the curriculum as well as technological changes. (Brigui-Chtioui, Caillou, 2016).

New communications technologies will have to be incorporated into the educational process inevitably (Begum, Aruna, Vetrivelan, 2016, Hutto, 2017). Growth in the use of mobile applications is expected and university teachers will work more as mentors of education, differently from what it is now. Requirements for their skills will inevitably change as well. As factories create smart places or smart factories, this trend will also affect higher education. The teacher will communicate more with students through the new communication technologies and applications than its traditional way, face to face. The considerable emphasis will be put on acquiring new knowledge and passing that new knowledge onto other students. It is important to realize how quickly the knowledge becomes outdated. This process will be more dynamic than it is nowadays, and it will affect all areas including scientific fields. It clearly shows that knowledge of ICT will become the foundation of skills for every individual within the society which also means that education in the humanities will require some level of technical knowledge. The question is raised around the student's role in the new model. Their task is to study in a traditional school. This basic task of a student may change significantly, and the process of gathering and sorting information and knowledge will put significant focus on creativity. A student will become more of a partner to their teacher. The students themselves will be the bearers of new creative ideas. A teacher will lead the students to the implementation and verification of knowledge especially in practice in the role of a coach. It will encourage greater integration between new knowledge of science and education and the transformation of knowledge (Ližbetinová, Hitka, 2016).
On the other hand, we must not forget the group of people who will need to be educated as communication experts [SMEs – Subject Matter Experts], whether as traditional or virtual ones. Communication will become the basis for Industry 4.0, but on the platform of elements that are at the same level, it means that even a person finds himself in an interaction with the machine, he becomes an equal partner. Specialists in social communication between people will be required as a result of these changes because this vision will have a negative impact on this sphere of communication. Today, the millennial generation uses a large number of communication applications. It has been seen that the deterioration in their communication with the surrounding world outside of virtual reality. University education will be much more important for society than it is today. These questions have to be addressed, and an action plan has to be produced in order to prepare for these changes. The government will have, as a founder of the educational process, an important role in this process. The measures adopted at the strategic level will affect the next generation of employees, their skill sets and abilities. For this reason, these measures must be very flexible. Measures will have to be changed more frequently than at present. On the other hand, measures will need to be reflected upon and must take into account the impact on the generation. Attention has to be paid to lifelong learning, in which universities should have a primary role in the education market.

References
HOW TO MEASURE THE SAFETY CULTURE OF ORGANIZATIONS

Martin Halaj¹

Abstract: Every organization has an interest in protecting its assets and increasing its profit. To preserve the integrity, organizations generally ensure their assets are safe. Today, especially in large organizations, asset security is a chief priority in decision-making. A factor affecting the level of an organization’s security is its safety culture. This factor is measured by the level by which the organization and its employees adopt and comply with security rules and principles. The status of a safety culture can have a positive or negative impact on the organization’s security, which directly affects its development. The aim of this article is to describe approaches for assessing the safety culture of different organizations. The study results can be used to compare several organizations, and it is possible to identify differences in the level of safety culture after applying innovative changes.

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Keywords: safety, safety culture, corporate culture

Introduction

A factor affecting an organization’s security is its safety culture. Organizations and their employees have specific values, traditions, attitudes, and approaches towards security issues. A summary of these characteristics represents the safety culture of organizations and individuals. Components of the safety culture of organizations are human, material, and intellectual resources. Each organization is interested in recognizing the level of its safety (including occupational safety and security of assets). While assessing the complex level of safety, it is necessary to determine the degree to which the safety culture has been implemented within the organization. Therefore, it is important to know the possibility of measuring safety culture, which may be different for each organization. Methods of measuring safety culture are specific and use different input data. Depending on the structure of organizations, methods of measuring safety culture differ and can intervene in various sectors of the organization. This article describes the possibilities of measuring safety culture in different organizations.

Literature Review

Since the existence of human civilization, influencing the safety of national or religious cultures prevails to achieve objectives or obtain domination. Today, this phenomenon persists with the ordinary person starting to realize its importance. In the past, as well as now, conflicts between different cultures ended with the loss of life. The impact of culture on safety is accompanied by power and violence to promote and impose certain values. On the other hand, there is a defense mechanism to protect values, norms, and attitudes (Hofreiter, 2015).

The term safety culture, which combines the concept of safety and culture, was introduced in 1986 by a group of workers of the International Atomic Energy Agency (IAEA) after an accident in a nuclear reactor at Chernobyl (Lardner, 2003). The investigative team that examined the accident stated that the main reason for the overheating reactor were shortcomings in the safety culture of the organization. Since this event, safety culture has become a focus in optimizing corporate culture so that employees are united in their behavior towards safety (Slováková, 2015). Instruction under the Assessment of Safety Culture in Organizations Team (ASCOT), IAEA-TECDOC-860, issued in 1996, suggests a set of key indicators to be taken into account for the different areas of an organization when evaluating its safety culture (Václav & Sivák, 2016).

Over time, the safety culture introduced in nuclear facilities was incorporated into other sectors of industry. Safety culture is not specifically intended for personnel at risk or dangerous objects but refers to individuals, groups, and society as a whole. Safety culture began to be used as a means of reducing or eliminating the impact of adverse events and factors for individuals, social groups, and states (Hofreiter, 2015).

The definitions of the safety culture are unique and differ among authors. Cieslarczyk (2011) considered a safety culture as a way of thinking about safety (what is safety, the possibility of

¹ Faculty of Security Engineering, University of Žilina, Slovakia, martin.halaj@fbi.uniza.sk
expressing safety), the perception of safety, and detection of safety values (how to achieve safety, which techniques and technologies can be used to achieve safety).

Pidgeon (1991) defines the safety culture as “the set of beliefs, norms, attitudes, roles, and social and technical practices that are concerned with minimizing the exposure of employees, managers, customers and members of the public to conditions considered dangerous or injurious” (cited in Guldenmund, 2010, p. 25).

However, a well cited definition from the United Kingdom Health and Safety Commission (HSC, 1993, p. 23) states that “the safety culture of an organization is the product of individual and group values, attitudes, perceptions, competencies, and patterns of behavior that determine the commitment to, and the style and proficiency of, and organization’s health and safety management”.

According to available sources, one can define safety culture as a set of values, traditions, characteristics, and attitudes of organizations and individuals in which the safety of the organizations has top priority and which adequate attention must be given in view of such importance (Kirschstein, 2013).

Safety culture is a part of the internal safety environment of an organization and reflects the perception and assurance of an organization’s safety. The safety issues are often subjective, due to a variety of persistent attitudes, opinions, and values of individual employees. Safety culture acquires many forms, and its existence or effectiveness is influenced by several factors, such as norms, values, symbols, conditions, conduction, and speech.

For an understanding of the safety culture, it is necessary to identify artifacts, values, and assumptions that are part of the safety culture. Artifacts are most easily traceable, but their interpretation is often challenging. The level of artifact acquires understanding after becoming aware of the values and assumptions (SAFETY CULTURE IN NUCLEAR EQUIPMENT: Instructions for use in enhancing safety culture, 2010).

<table>
<thead>
<tr>
<th>Elements</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Artefacts</strong></td>
<td></td>
</tr>
<tr>
<td>Subject</td>
<td>The adoption of a Security Policy</td>
</tr>
<tr>
<td>Language</td>
<td>No time-loss due to accidents</td>
</tr>
<tr>
<td>Ritual</td>
<td>Safety assessment</td>
</tr>
<tr>
<td>Behavior</td>
<td>Use of personal protective equipment</td>
</tr>
<tr>
<td><strong>Values</strong></td>
<td></td>
</tr>
<tr>
<td>Safety first</td>
<td></td>
</tr>
<tr>
<td>Intolerance of safety deficiencies</td>
<td></td>
</tr>
<tr>
<td>Learning from mistakes</td>
<td></td>
</tr>
<tr>
<td><strong>Assumptions</strong></td>
<td></td>
</tr>
<tr>
<td>The results of negligence are accidents</td>
<td></td>
</tr>
<tr>
<td>Some people are prone to accidents</td>
<td></td>
</tr>
<tr>
<td>In achieving its objectives, it is necessary to look at the risks</td>
<td></td>
</tr>
<tr>
<td>Safety is always possible to improve</td>
<td></td>
</tr>
<tr>
<td>Accidents can be avoided</td>
<td></td>
</tr>
<tr>
<td>Projection device is safe</td>
<td></td>
</tr>
</tbody>
</table>

Source: Author

Safety culture can be assessed at levels of the individual, the organization, or the state. Safety culture at the organizational level requires the acceptance of safety to achieve and ensure the safety of the organization. There is a particular emphasis on occupational safety and health, and protecting staff in their activities.

In creating the organization’s security policy, the managers are important, as are the professional competencies of employees, which are necessary for finding results in adverse events of each sector of the organization. The organization’s safety culture is based on the reception and identification of
employees with the organization’s security policy, as well as on safety behavior within the organization (Halaj, 2016).

Hofreiter (2015) states that the organization’s safety culture is influenced by:

- Adoption of security by senior management;
- Allocating sufficient resources to safety;
- Quality safety documentation and safety procedures;
- Strict observance of safety in all sectors of the organization;
- Safety training and educations;
- The readiness of the organization to deal with crisis adverse events assigned forces and means which are permanently accessible;
- Regular checks, obstruction, and continuously improving organization's safety.
- Safety culture affects safety management due to the existence of rules, laws, regulations, and standards in the field of security. The introduction and the presence of safety culture in an organization influences the management of the whole organization and behavior of senior management on issues of security and the adoption of security policy. Organization adopts security policy, which involves an important and basic document confirming an organization’s efforts to address security issues in all sectors of the organization. It contains a description of the organization’s protected interests as well as potential risks. A security policy can be processed comprehensively organization-wide or individually for each sector separately (Halaj, 2016).

Figure 1: Application of safety culture at the level of the organization

<table>
<thead>
<tr>
<th>Safety culture</th>
<th>Organization's security policy</th>
<th>Security policy of organization's sector</th>
</tr>
</thead>
</table>

Source: Author

Measuring Safety Culture

The measurement of the safety culture of an organization is focused on sustained and long-term improvement of safety and the safety culture within the organization. The outcome of a safety culture can be quantified by its status throughout the organization, and within the various sub-sectors that are part of the safety culture. Based on these measurements one can determine the current level of the organization, and then take appropriate safety strategies or adopt a security policy responsible for its needs.

Quantitative Measurement of an Organization’s Safety Culture

In addition to the quantitative measurement of a safety culture, collecting input data, mostly through questionnaires, is a vital phase of the process. The significance of this phase requires a large number of respondents to the questionnaires. Input data are analyzed to obtain the most objective understanding of the relationship between the organization and its safety culture. This data can be extended with information from an organization’s safety history concerning frequency of accidents, incidents, and other statistical indicators. Concerning the questionnaire, it is appropriate to involve senior management of each organization.

The main focus of quantitative measurements of safety culture should be on the following (Slováčková, 2015):

- Plans and objectives of organization’s safety;
- Organization and regulation of the safety;
- Management of the safety;
- Tools
  - Analysis of accidents and injuries;
  - Safety education;
Safety controlling;
The evaluation of the safety;
The percentage of implementation of the measures; and
other.

Obtained input data in each area are evaluated, and the result of analysis can be presented in a safety culture grid (Figure 2) and as a safety culture coefficient (Kirschstein, 2013).

A safety culture grid is a way of visualizing the measured results (Kirschstein & Werner-Keppner, 2014). It presents the strengths and weaknesses of the organization for each area of the safety culture (Slováčková, 2015). Subsequently, it is possible to measure the safety culture to the required level.

Safety culture coefficient unifies and summarizing the results for each area into one numerical expression that reflects the level of the safety culture in the organization. The safety culture coefficient can be used to compare two or more organizations for safety culture and allocate categories (weak, medium, or strong levels of safety culture) to the organizations.

**Figure 2: Safety culture grid**

Source: Kirschstein (2013)

Safety culture coefficient unifies and summarizing the results for each area into one numerical expression that reflects the level of the safety culture in the organization. The safety culture coefficient can be used to compare two or more organizations for safety culture and allocate categories (weak, medium, or strong levels of safety culture) to the organizations.

Qualitative Measurement of Organization’s Safety CultureIn cases where there is insufficient information to identify and determine the level of safety culture by quantitative means, qualitative methods can be used. In this approach, appropriate data can be collated through controlled interviews of staff based on structured questionnaires. According to Halaj (2016), data can be obtained from two levels of staff:

1. Senior management; and
2. Regular employees.

In both levels, questions addressed to the respondents should involve all areas of safety culture and include the main factors likely to affect the safety culture of the organization. Respective questions regarding the factors influencing the final level of safety culture are especially relevant in manufacturing, where the safety culture is of the highest importance. Responses and reactions of respondents can be recorded by field notes or audio recordings.

The aim of controlled interviews with management and regular employees is to obtain data about safety and safety culture implemented in the organization. Answers on particular issues related to the elements of safety culture may differ. A critical step involves an expert or group of experts responsible for analyzing the collected data. Their purpose is to identify the quality and appropriateness of responses and eliminate any that are flawed.

The final step in the qualitative approach is the verbal evaluation of the researched safety areas. This evaluation may have different scales, such as for observing safety: primary, important, secondary, or...
irrelevant; the reliability of technical equipment: excellent, very good, good, satisfactory, or poor; or compliance with laws, standards, and norms. Experts determine the level of safety culture in each organization from partial qualitative assessments, and determine the final level using a prepared scale (e.g., very weak, weak, not weak, not strong, strong, or very strong), which is the aim of qualitative measurement.

### Potential Problems of Measuring the Safety Culture

One of the most important steps in assessing the safety culture involves choosing the appropriate method. A factor influencing method selection is the type of organization. For example, in manufacturing, safety extends to sectors other than those found in non-manufacturing organizations. Selecting appropriate methods for measuring safety culture also relates to the size of the organization. Large organizations may have complex structures, and during the assessment, it is necessary to investigate all sectors. In these cases, due to time constraints, it is essential to use quantitative methods. It is also important to determine in advance how many respondents will need to participate in the assessment of safety culture using qualitative or quantitative methods.

The candor of respondents involved in the assessment is also crucial. Managers may often hide certain information in an attempt to appear the best in comparison with others. Regular employees may also hide information because they fear reprisal from their superiors if they respond to the detriment of the organization. Therefore, it is necessary to maintain the anonymity of participating respondents.

### Conclusion

Safety culture is one factor that can significantly affect the complex integrity level of organizations. It reflects an organization’s approach to safety and success of introducing in-house safety strategies. Hence, it is important to assess the level of safety culture in organizations. For this purpose, it is necessary to define the methods for assessing safety culture as well as choosing the appropriate method for a particular organization. This choice depends on the type, orientation, and size of the organization. Measuring safety culture involves either a qualitative or quantitative assessment of the level of safety culture. Organizations that are dissatisfied with the level of its safety culture can adopt new strategies. After this adoption, the level of safety culture within the organization may increase and thus enhance its safety status. However, where the organization intends to increase the level of safety, the elements involved should be included in the future assessment of its safety culture as these may influence the organization’s safety status along with the security of active and passive components and assets of the organization. Finally, it is recommended that future research examines the interconnection of the safety culture and security of assets in the organizations.

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MODIFICATION OF SCORING SCHEMES USING DECOMPOSITION PROCEDURES ON STATISTICAL DATA

Monika Hanáková,1 Aba Teleki,2 Boris Lacsný3

Abstract: This paper presents a method of modifying original scores to obtain independent random variables. It includes an analysis of the consequences of using such a method. The paper also describes the mathematical background of the method in detail and discusses the possible use of the method in identifying student or participant assessments that are over- or underrated. The method distinguishes performances of students and assesses their written solutions using a scoring scheme. In this study, it is used to analyze the competence of participants in the Physics Olympiad competition. Scoring schemes that are appropriately set by an author for a physics problem present the participant scores as independent random variables. The assessment solutions are analyzed using analytical tools (such as covariant matrix) for the dependence of random variables. The evaluators of the participants’ solutions were highly qualified professionals. Nevertheless, the study found statistical evidence of minor distortion in the evaluations, though this was found to only marginally affected the ranking of participants.

UDC Classification: 37.01/.02; DOI: http://dx.doi.org/10.12955/cbup.v5.s997

Keywords: Physics Olympiad, Assessment, Scoring, Independent Random Variables, Ranking

Introduction

Assessment of students plays an important role in physics education as it provides an essential feedback for all its participants, including instructors and students, as well as participants in various physics competitions. One of the most-often used assessment methods is evaluating written solutions of physics problems and tasks. According to Gaigher (2007), problem-solving is considered a reliable way to demonstrate conceptual understanding in physics for purposes of evaluation.

Physics Olympiad (PhO) is a worldwide competition where PhO participants solve physics problems, and their performance is evaluated according to their written solutions. Its history in Slovakia started in the school year 1958–59 and has been an important part of Slovakia’s education system since then. The main objectives of PhO in Slovakia, as defined by the Committee of PhO, are to develop the problem-solving and experimental skills of primary and secondary school students talented in physics, create competitive environments for them, and encourage them to study physics or a related science (Slovak Committee of Physics Olympiad, 2010).

An assessment of each PhO participant is crucial as it influences the participant’s results. Currently, the PhO participants are rated by points (maximum of 10 for a physics problem), which they achieve according to the scoring scheme proposed by the authors of the physics problems. Each physics problem is divided into tasks that are scored separately. For example, a score for the solution of the j-th task is defined as a random variable $X_j^i$ and scored as either ‘0’ for an incorrect or ‘1’ for the correct answer. In general case, $X_j^i \in [0,1]$ – for example, one can assign the value 0.5 to any partially correct solution which is not absolutely incorrect nor absolutely correct. This scaling is used rather than specific scores because of its universality. This paper describes the basics of a statistical method to quantify participant assessments using data and results of solutions provided by the participants of the competition, PhO.

Data and Methodology

The first step was to analyze a case using a proposed modification to the scoring of a single physics problem. That is, we analyzed the effect on scores and rankings of a particular PhO participant in regard to solving one specific physics problem. The modified overall scores gained for solving all four physics problems in each category were determined as the sum of modified scores gained for particular physics problems.

We defined scores of $X^i$ for solving the j-th task (upper index) from a set of ‘s’ tasks as random (column) vector variable, where the k-th element $X_k^j$ is a random variable for solving the j-th task by

1 Faculty of Natural Sciences, Constantine the Philosopher University in Nitra, Slovakia, monika.hanakova@ukf.sk
2 Faculty of Natural Sciences, Constantine the Philosopher University in Nitra, Slovakia, ateleki@ukf.sk
3 Faculty of Natural Sciences, Constantine the Philosopher University in Nitra, Slovakia, blacsny@ukf.sk
the $k$-th participant (lower index). We assumed that the random variables, $X^i_k$, were defined on the same probability space $(\Omega, A, P)$, where $\Omega$ denoted the set of all possible outcomes (containing all possible solutions of the task, including all incorrect, incomplete, and correct solutions). Therefore, it was accepted that $\Omega$ was the same for all tasks and all participants. A set of subsets (events) of $\Omega$ was defined as, $A$, i.e., an event was a particular solution of the task. The measure of probability, $P$, mapping any event into the interval $[0,1]$, i.e., $P(\mathcal{F}) \in [0,1]$ for any $\mathcal{F} \in A$. In practice, the participants were a limited ensemble with their solutions assessed by scores, where $X^i_k$ was $P(\mathcal{F}^i_k)$, where $\mathcal{F}^i_k$ was the event, $P(\mathcal{F}^i_k)$, representing the solution of $j$-th task by the $k$-th participant, and $P$ was the probability measure by the author of the scoring scheme and evaluators. The probability of the measure was distorted by inadequacies of the authors scoring scheme and by unsatisfactory decisions of evaluators. In the case of the PhO, this influence was relatively small due to the professionality of authors and evaluators. Mathematical statistical tools identified strong evidence of the limitations in the author’s scoring scheme, and in some cases, probable anomalies in the assessment of the evaluators (Hanáková, & Teleki, 2017).

The basic concept was that the random vector, $X^i$, as an independent variable provided objective scoring for the PhO participants with the same knowledge or skills. However, Pearson’s correlation coefficients (Evans, 1996; Markečová, Stehlíková, & Tírpačková, 2011; Spiegel, 1998) of random vectors $X^i$ showed that many were dependent variables. Following this, a covariant matrix, $\Sigma$, was created to analyze variables $X^i$ and $X^k$. This method was selected in place of the Pearson’s correlation coefficients to avoid nonlinear equations in the optimization procedure.

In the optimization procedure, the scoring scheme was modified to obtain independent random variables, $\xi^k$.

The modified random variables corresponded to the modified tasks. However, examining these modified tasks in their explicit forms was a highly complex problem and beyond the purpose of this article.

The covariance matrix, $\Sigma$, was defined by matrix elements as follows:

$$\text{cov}(X^i, X^k) = \Sigma^{jk}(X) = E[(X^i - \mu^i)(X^k - \mu^k)], \tag{1}$$

where,

$$E[X^i] \text{ denoted the expected value of } X^i, \text{ and}$$

$$\mu^i = E[X^i]. \tag{2}$$

We estimated $E[X^i]$ by the average of $\frac{1}{N}\sum_{i=1}^{N}X^i_i$ and therefore, the covariance matrix elements were estimated using Equation 3.

$$\Sigma^{jk} = \frac{1}{N} \sum_{i=1}^{N}X^i_jX^i_k - \frac{1}{N^2} \sum_{i=1}^{N}X^i_i \sum_{r=1}^{N}X^r_r, \tag{3}$$

where,

$N$ - number of assessed pupils and students.

The covariance matrix $\Sigma$, is a real and symmetric matrix, i.e., it is a Hermitian matrix (Horn and Johnson, 1985) and therefore $\Sigma$ is diagonalizable by an orthogonal transformation $A$, $(A)_{kj} = a_{kj}$ (Equation 4).

$$\Sigma_d = A\Sigma A^T \tag{4}$$

Covariant matrix diagonalized: $\Sigma^{kk}_d = D^k$, $\Sigma^{jk}_d = 0 \text{ for } j \neq k$.

The transformation, $A$, was not unique in the manner described below and defined the above mentioned new probability vectors, $\xi^k$ (Equation 5a).

$$\xi^k = \sum_{j=1}^{N}a_{kj}X^j \tag{5a}$$

The inverse transformation $B = A^{-1} = A^T$, $(B)_{jk} = b_{jk}$ was

$$X^j = \sum_{k=1}^{N}b_{jk}\xi^k \tag{5b}$$
where,
\[ b_{jk} = a_{kj}, \]
\[ \sum_{j=1}^{N} a_{jk}^2 = \sum_{j=1}^{N} a_{jk}a_{jk} = \sum_{j=1}^{N} a_{jk}a_{kl} = \delta_{jl}, \text{ and} \]
\[ \delta_{jl} = \text{Kronecker-delta (} \delta_{jl} = 1 \text{ and } \delta_{jl} = 0 \text{ for } j \neq l). \]

It was convenient to save a different notation for the matrix \( A \) and its inverse \( B \) and show, that
\[ \text{cov}(\xi_i^j, \xi_k^j) \equiv \Sigma^j_k(\xi) = \sum_{r=1}^{N} a_{kr} \text{cov}(X^r, X^r) = \sum_{r=1}^{N} a_{kr} \Sigma^r(X) = \Sigma^j_k. \]

The diagonalization procedure defined the new random vectors, \( \xi^j \), with a chance that they were statistically independent (\( \Sigma^j_k = 0 \) for all \( j \neq k \)). It was assumed that they were independent random vectors.

The transformation matrix \( A \) was obtained by the Schur decomposition procedure (Horn and Johnson, 1985), which solved the eigenvalue equation:
\[ (\mathbf{S} - \lambda_j \mathbf{I}) \mathbf{a}_j = 0, \quad j = 1, \ldots, s \]
where \( \mathbf{a}_j \) was a normalized eigenvector (\( \|\mathbf{a}_j\| = 1 \)) associated with eigenvalue \( \lambda_j \). The set of eigenvectors \( \mathbf{a}_j \) formed an orthonormal basis in the \( s \)-dimensional vector space. Multiplying Equation 9 by \( \mathbf{a}_k \) provided the matrix elements of the diagonal covariance matrix \( \Sigma_D \) (Equation 10).
\[ \mathbf{a}_k \cdot \Sigma \mathbf{a}_j - \lambda_j \delta_{kj} = 0, \quad \lambda_j = \Sigma^{j/j} \]

The following defined the transformation matrix \( A \):
\[ (A_{jk}) = a_{jk} = (\mathbf{a}_k)_j. \]

The normalized eigenvectors are given up to a multiplicative factor \( \epsilon_j \), (\( \|\epsilon_j\| = 1 \)). Also, the order of the eigenvectors is arbitrary.

In the first step, the eigenvector \( \mathbf{a}_{j_1} \) and the \( k_1 \)-th coordinate, \( a_{k_1j_1} \), is defined with the property:
\[ (\mathbf{a}_{j_1})_{k_1} = |a_{k_1j_1}| = \max_{j,k \in k_1} |a_{jk}| > 0, \text{where } j = \{1, 2, \ldots, s\}. \]

Where \( a_{k_1j_1} < 0 \), the transform \( \mathbf{a}_{j_1} \rightarrow -\mathbf{a}_{j_1} \) is achieved to obtain \( a_{k_1j_1} > 0 \).

In the second step, the new sets of indices were defined (Equation 13a).
\[ J_{2} = J \setminus \{j_1\} \quad \text{and} \quad K_{2} = J \setminus \{k_1\} \]

Also, the eigenvector, \( \mathbf{a}_{j_2} \), and the \( k_2 \)-th coordinate, \( a_{k_2j_2} \), were defined with the property:
\[ (\mathbf{a}_{j_2})_{k_2} = |a_{k_2j_2}| = \max_{j,k \in k_2} |a_{jk}| > 0. \]

Where \( a_{k_2j_2} < 0 \), the transform \( \mathbf{a}_{j_2} \rightarrow -\mathbf{a}_{j_2} \) was achieved to obtain \( a_{k_2j_2} > 0 \).

This procedure was repeated to obtain in the \( r \)-th (\( r > 3 \)) step for a new set of indices (Equation 14a).
\[ J_{r} = J_{r-1} \setminus \{j_{r-1}\} \quad \text{and} \quad K_{r} = K_{r-1} \setminus \{k_{r-1}\} \]

Also, the eigenvector, \( \mathbf{a}_{j_r} \), and the \( k_r \)-th coordinate, \( a_{k_rj_r} \), were defined with the property:
\[ (\mathbf{a}_{j_r})_{k_r} = |a_{k_rj_r}| = \max_{j,k \in k_r} |a_{jk}| > 0. \]

Where \( a_{k_rj_r} < 0 \), the transform \( \mathbf{a}_{j_r} \rightarrow -\mathbf{a}_{j_r} \) was achieved to obtain \( a_{k_rj_r} < 0 \).

Next, the eigenvectors were permuted to obtain Equation 15.
\[ j_1 = 1, j_2 = 2, \ldots, j_s = s. \]

At this point the transformation matrix \( A \) and its inverse \( B \) was unambiguous.

The new score \( \xi^{j/k}_k \) of the \( k \)-th participant gained in the \( j \)-th task was calculated (Equation 16).
\[ \xi^{j/k}_k = \sum_{r \in j} a_{jr}x^r_k \]

The full score, \( \Xi_k \), for the \( k \)-th participant was formed from Equation 17.
\[ \Xi_k = \sum_{j \in j} \xi^{j/k}_k \]
Notably, the probability vectors, $\xi^j$, were scalable in the following meaning: the new probability vectors, as defined by Equation 18, had also diagonal covariant matrix, $\text{cov}(\xi^j, \xi^k)$ and where the $\xi^j$-s represented independent probability variables, $\xi^j$-s, represented independent probability variables too.

\begin{equation}
\xi^j = c_j \xi^j
\end{equation}

This scaling property was critical in the forming the new scoring schemes. A given scoring scheme can motivate participants (or students) by lowering the maximal value of the scoring in tasks, which were excessively difficult for the participant. Another scoring scheme could emphasize the participants with the highest competency.

The above-described tool was tested successfully on participants of PhO in 2016, and the rescaling of $\xi^k$ was defined as follows:

\begin{equation}
\xi^k = \frac{10}{S(\xi)} \xi^k
\end{equation}

In this equation, $10/S(\xi)$ was a scaling factor with 10 the maximum original score for complete and accurate solving of a physics problem. The appropriate choice of the value, $S(\xi)$, guaranteed the same maximum of 10 for the modified assessment score, calculated by using $\xi$-s, (i.e., $\sum_k \xi^k_{\text{max}} = 10$).

The influence of modifying the overall ranking of PhO participants was analyzed by calculating the differences between the original and the modified scores ($\Delta P$) and rankings of the PhO participants ($\Delta R$). Linear correlations between random variables $X^1$ and $X^k$ were identified from the values of the covariance matrix in Equation 1. The described modification procedure was applied to obtain independent random variables (modified scores of PhO participants).

The effects of modification on results of particular PhO participants showed differences in scores ($\Delta P$) and ranking (order) ($\Delta R$). Figure 1 shows the maximum differences in scores corresponding to maximum differences in ranking and the frequency of modified cases with non-zero differences in scores $f_{1P}(\Delta P)$ or ranking $f_{1P}(\Delta R)$ per one participant.

The effects of modification on results of particular PhO participants were analyzed to observe:

- differences in scores $\Delta P$ and ranking (order) $\Delta R$;
- whether the maximum differences in scores correspond to maximum differences in ranking;
- frequency of modified cases with non-zero differences in scores $f_{1P}(\Delta P)$ or ranking $f_{1P}(\Delta R)$ per one participant.

**Results and Discussion**

Quantitative results of characteristics of the analysis for four physics problems solved in D and E categories are presented in Figure 1 and Figure 2, and in more detail, can be found in Hanáková and Teleki (2017). The PhO participants were ranked according to their original overall scores, with a score of one denoting the best.

![Figure 1: Effect of modification on ranking of Physics Olympiad participants after solving one particular physics problem in D category](source: Authors)
The maximum difference in D category in scores is $\Delta P = +3$, and the maximum difference in ranking, as shown in Figure 1, is $\Delta R = -8$. The PhO participant’s position in ranking changed from 9th to 17th place, where the negative number indicates the result of the PhO participant was worse after modification of the scores. The frequencies characterized above have the values $f_{1P}(\Delta P \geq 0) = 2.1$; $f_{1P}(\Delta R \geq 0) = 0.6$.

The maximum difference in scores in E category is $\Delta P = +3$, and the maximum difference in ranking (Figure 2) is $\Delta R = +20$ (which indicates an improvement for the PhO participant after modification of scores). The frequencies characterized above have the values $f_{1P}(\Delta P \geq 0) = 2.8$; $f_{1P}(\Delta R \geq 0) = 1.7$. Non-zero differences in ranking were observed for each physics problem.

These results show that in observed cases a higher frequency of differences in the scores $f_{1P}(\Delta P \geq 0)$ resulted in a higher frequency of differences in the ranking $f_{1P}(\Delta R \geq 0)$.

The modified overall scores of the PhO participants in D and E categories increased when compared with the original scores, in all cases (Figure 3). We assume that this could be explained by non-zero linear correlations between original scores (random variables).

**Conclusion**

The performance of the PhO participants was quantified and then compared according to the scoring scheme applied for assessing their written solutions to the physics problems. The main objective of this article was to underline the need for improving the scoring scheme and to present and describe a
A statistical tool that could provide a more objective assessment of participant solutions to the physics problems. We found non-zero linear correlations between the probability vectors $\mathbf{X}^j$ and $\mathbf{X}^k$ that were determined using a covariance matrix. This result was considered relevant towards proposing a modification of the scores to provide independent random variables. The study identified certain cases of original scores changing after modification in the range of $-0.4$ to $3.0$ points for individual physics problems. The ranking of the PhO participants also changed after modification in the range of $-12$ to $+20$ places for particular physics problems. As the modification by way of the proposed tool was focused on the results of PhO participants, the context of the modified random variables remains a matter for future research. This paper describes, in detail, a proposed statistical tool as a basis for developing a suitable method of modifying scores as well as analyzing over- or underrating of performance in solving physics problems. Finally, because of its universality, this tool can be applied not only to the Physics Olympiad but also to other cases where solutions to physics problems are assessed.

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A QUARTER CENTURY OF NATO-RUSSIA RELATIONS

Raluca Iulia Iulian

Abstract: After the end of the Cold War, in the new international context, two important actors emerged on the international scene, namely NATO and the Russian Federation. The cooperation between them was a necessity to ensure and strengthen a climate of security and peace in Europe and all over the world. In the new challenges of the security environment, NATO was turned from a purely defensive military alliance for Europe into a political and military alliance that can act wherever needed around the globe. The Russian Federation, the successor of the former USSR and inheritor of its military arsenal, has initiated a transition process towards democracy and market economy. Russia has acted permanently to establish a special relationship with the Alliance, different from that with the other Central and Eastern European countries. The relations NATO-Russia followed a continuous development from 1991 to 2008, with periods of crisis, but hopes of establishing a productive partnership. Then, they went into decline, and in April 2014 they were suspended. The Alliance and Russia have different views on European and global security issues. After 25 years of NATO-Russia relations, this paper aims to point out the main aspects of the stages from 1991 until now and analyze the reasons why the collaboration is not yet productive and cooperative, as shown by recent events.

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Keywords: European security and stability, NATO-Russia cooperation, institutional structures.

Introduction

The political events that took place during the period 1989-1991 have led to profound political changes in Europe, which have radically improved the security environment with consequences at European and global level. The Berlin Wall fell on 9 November 1989 and Germany has been united. On March 3, 1991, the Warsaw Pact ceased to exist and was formally dissolved at the Prague meeting on July 1, 1991. On June 28, 1991, the Council for Mutual Economic Assistance was dissolved too. During 1989 the communist regimes collapsed in Central and Eastern Europe. Moscow's former satellite states have initiated profound economic, political and social transformations. On December 26, 1991, the dissolution of the USSR (Union of Soviet Socialist Republics) took place. Its former satellites have fully regained their sovereignty. Fifteen ex-Soviet republics appeared, along which the largest, which was the Russian Federation or Russia. They had undergone a radical change.

26 years ago, the heads of states of the two Cold War superpowers – the Soviet Union and the United States – Mikhail Gorbachev and Donald Regan, expressed the bilateral willingness of cooperation in the new international context. During the London Summit of 15-16 July 1991, the two heads of states declared their intention to establish a Soviet-American partnership that represents the end of the Cold War. The basis of this partnership was the Soviet-American cooperation during the war in the Middle East (1990-1991).

After the breakup of the Soviet Union, the cooperation between NATO (North Atlantic Treaty Organization) and Russia began. The collaboration between them knew several stages, and different forms of collaboration were created. In time a special relationship had been realized between NATO and Russia. It has experienced periods of development and periods of crisis.

After 25 years of NATO-Russia relations, this paper aims to point out the main aspects of the stages from 1991 until now and analyze the reasons why the collaboration is not yet productive and cooperative, as shown by recent events.

Perceived as a paradox because the confrontation between the United States and the Soviet Union defined the Cold War period, the cooperation between NATO and Russia – the opponents in the Cold War – occupies a predominant place in the evolution of the security environment since 1991 to date. The collapse of the Soviet bloc and the dismantling of the USSR constituted the most influential events of contemporary history. At that moment, the two important actors in International Politics emerged: NATO and Russia. In the framework of the Alliance, the United States carries the weight and possess the important nuclear potential. The Russian Federation is the political and military heir of the former USSR, owning of the nuclear arsenal of the Soviet Union.

1 University Politehnica of Bucharest, iri_2015@yahoo.ro
NATO after the Cold War

In the international context of the post-Cold War period, the Alliance initiated a transformation process to adapt to the Europe's new security situation. At the Summit meeting in London (5-6 July 1990) the heads of states and governments of NATO members decided to adopt the Alliance to the new international situation. For this purpose, a New Strategic Concept has been elaborated to respond to the new risks and challenges. It was adopted at the NATO Summit held in Rome on 7-8 November 1991. Unlike previous concepts, the New Strategic Concept emphasized the cooperation with former adversaries instead of confrontation but added the specific obligation to work towards extending and strengthening security throughout Europe. The New Strategic Concept was based on the principles of cooperation and multidimensional security. The enlargement of the Alliance by the integration of the former communist countries became a priority after 1991 for increasing the area of stability, security, and democracy in Europe. The U.S.A. and its Western Allies expressed the desire to transform NATO into a strategic alliance covering the whole Europe (The Alliance's New Strategic Concept, 1991). During the history, Europe has been confronted with many wars. The goal was to ensure security and stability in the Euro-Atlantic area and beyond.

The area of intervention of the Alliance was extended outside Europe, anywhere in the world where action is needed. Because the threats came not only from Europe but had a global character, it was necessary to restructure NATO and transform it from a military alliance into a political and military alliance, reflecting a new balance between Europe and North America. After the end of the Cold War, the main security threats were the proliferation of weapons of mass destruction, terrorism and organized crime. These new threats are complex and have two dimensions: civil and military. The Alliance had to adapt its policies and institutions in order to meet the new threats of the contemporary world. In these conditions, NATO has been restructured, thus it diversified its attributions, multiplied and diversified its functions. It has emerged as a stronger security and defense organization.

The Strategic Concept adopted at the NATO Summit in Lisbon on 10-20 November 2010 provides the main lines of action of the Alliance for the next decade. The summit was dominated by two major events: the military operations in Afghanistan and a new approach to the relations between the Alliance and Russia. For the first time, an official document of the Alliance stated that Russia is not an enemy and that NATO is a partner for stability and security and a common space of security and stability should be created in which Russia should participate. Regarding the relations between Alliance and Russia, NATO Secretary General Anders Fogh Rasmussen expressed his desire to see progress in cooperation in three directions, which he considers essential to build confidence between allies and Russia: missile defense, conventional arms control and reducing of short range nuclear weapons (Lisbon Summit Declaration, 2010, para. 23).

Nowadays, NATO has to respond to the new challenges enumerated above, but also to the „increasing confidence of Russia in its forces, the country that does not hesitate to use the force to defend their interests against its neighbors”, as affirmed the chief of Czech diplomacy, Karel Schwarzenberg, 10 years after the admission of the Czech Republic to NATO (as cited in Mihăescu, 2009).

Russia after the breakup of the USSR

The Russian Federation, internationally recognized as the successor state of the Soviet Union, heir to its military arsenal, after 1991 experienced a decline in its regional and global influence. In internal politics, it experienced the transition from imperial status to post-imperial status. The Soviet Union was a superpower, one of the two superpowers during the Cold War. After 1991 Russia represented a powerful country, with an important nuclear military potential. Russia kept the atomic arsenal of the former USSR completely and continued the position of the Soviet Union as a nuclear power in the world, with a capacity comparable to that of the U.S.A. In the first years after 1991 it was considered a secondary power pole.

After the end of the Cold War, Russia experienced a period of political and economic transition from centralized economy to market economy, from totalitarianism to democracy. From the economic point of view, some effects of the Cold War led to a stagnant Russian economy and unemployment. During and after the disintegration of the Soviet Union, wide-ranging reforms including privatization and market and trade liberalization were undertaken, including the radical changes along the lines of „shock therapy” recommended by the World Bank and the International Monetary Fund. The result
was a major economic crisis, characterized by a 50% decline in both Gross Domestic Product (GDP) and industrial output between 1990 and 1995 (Glenn, 1996).

The territory of Russian Federation is about 17,000 km² out of 23,000 km² which represent the territory of the former USSR. It remained, however, “a geographical superpower, stretching across 11 time zones, from the southern Baltic coast to the Bering Strait (…) essential to the international system by virtue of its unique geographic position in Eurasia” (Trenin, 2002, pp. 20 and 29). Although it experienced a territorial decrease, Russia is the largest country in the world. In terms of its population, it is currently only the ninth country in the world. At the census of December 2010, Russia's population was 142,905,200 inhabitants (Terzi, 2011). As Trenin notes „Today’s Russia encompasses just about 50 percent of the Soviet population, 60 percent of its industrial capacity, and 70 percent of the land mass. The latter is of key importance” (Trenin, 2002, p.12).

Although Russia cannot be confused with the USSR in size, population and especially as the military and political power, most of its leaders, regardless the political party to which they belonged, did not accept that Russia is a secondary and limited regional power and continued to believe in its great power status. In all administrations of Presidents Yeltsin and Putin „efforts have been made to develop what may be called multi-directional influence: that is, to balance relations with the U.S.A. and Western European states by fostering strategic partnerships” (Smith, 2006, p. 39). Consequently, Russia experienced a consolidation process gradually after 2000, especially in the first decade of the 21st century. This decade represents an important stage in Russian history because it regained the status of great power in Europe and all over the world. From this moment Russia began to reaffirm in international relations, in world politics. These circumstances have led to the shaping of a special relationship of cooperation between Russia and the NATO.

President Putin expressed the intention that Russia reaches the international status of the ex-USSR and maintains control of the former republics of the Soviet Union. Since the collapse of the USSR, Russia continued to pay special attention to the territories that were part of the Soviet Union. The Russian doctrine is founded on the term near abroad (Russian: ближнее зарубежье, blizhneye zarubezhye).

In the National Security Strategy of Russia, NATO is still perceived as an opponent. According to the document approved by the Kremlin in 2009, the NATO expansion is seen as a threat to the Russian national security. It reaffirms Russia's right to use nuclear weapons if the state is threatened. Russia's new military doctrine shows that the expansion of NATO into Eastern Europe is the „main external threat that could lead to an armed confrontation” (Russia's National Security Strategy, 2009).

NATO-Russia cooperation forms

The first step in the evolution of NATO-Russia relations is represented by the “Message from Turnberry” (Scotland), initiated by the governments of NATO members in June 1990. In July 1990 at the NATO Summit in London, offers of friendship and cooperation have been made to the Soviet Union and other countries in Central and Eastern Europe. For this purpose, the contacts with the governments, leaders, and representatives of the Soviet Union and of the ex-communist countries who were invited to NATO Headquarters in Brussels have been established. The bilateral relations have been developed between Moscow and Brussels. NATO Secretary General visited Moscow immediately after the London Summit to „transmit to the Soviet leadership the proposals contained in the Declaration and the decision of the Alliance to constructively use the emergence of new political opportunities” (NATO Handbook, 2001, p.38). An important step was the announcement made by President Gorbachev in July 1990, concerning the acceptance of the inclusion of the East Germany in the Alliance, after the unification.

In 19–21 November 1990 in Paris was adopted the Charter of Paris for a New Europe (Paris Charter) by European governments in addition to those of Canada, the United States, and the Soviet Union. The charter is a common non-aggression commitment, established on the foundation of the Helsinki Accords, and further amended in the 1999 Charter for European Security. Together, these documents form the agreed basis for the Organization for Security and Cooperation in Europe (OSCE).

After the dissolution of the USSR, NATO and Russia begun to develop relations which evolved and were institutionalized in time. NATO took the initiative to get closer to Russia and the states of Central and Eastern Europe, former members of the communist bloc and former NATO adversaries. In the conditions of the transformation of NATO into a political and military organization and redefining
the role of NATO in post-Cold War era, Russia was looking to establish a special relationship with the Alliance, different from that of the other Central and Eastern Europe countries. The special relationship was justified by its economic and military weight and by its nuclear potential.

Since 1991 until now, several forms of collaboration have been established between the Alliance and the Russian Federation. They have gradually increased in complexity: North Atlantic Cooperation Council (NACC) was created on December 20, 1991 renamed Euro-Atlantic Partnership Council (EAPC), in 1997, Partnership for Peace (PiP) created in 1994 and perfected as a Partnership for Peace Intensified and More Operational in 1999, in which Russia has an equal position like the ex-communist countries of Central and Eastern Europe. By the Founding Act on Relations, Cooperation and Mutual Security between NATO and Russian Federation signed on May 27, 1997, the Permanent Joint Council (PJC) was created. It marks the beginning of the NATO-Russia special relations. It was replaced by NATO-Russia Council (NRC) on May 28, 2002.

The creation of NRC represented the realization of a new stage in the relations between the Alliance and Russia. This represents the highly evolved form of cooperation between NATO and Russia until this moment. In this structure, Russia has an equal position to other members and shares the same responsibilities (Danilov, 2013). However, Russia does not have the veto right concerning the decisions of the Alliance, although constantly it acted to get it. The NRC did not bring anything new regarding the security relations between NATO and Russia. The article 5 of the Washington Treaty was not mentioned in the founding documents of the NRC. Relations with NATO remained controversial and inconsistent. They present problems and large differences of opinion. Although there were achievements in the framework of the NRC, there is no „full transparency” between NATO and Russia (Ivanov, 2005).

Favorable proposals toward Russia conditioned the realization of NATO-Russia collaboration institutions. The PiP was signed after long-term negotiations and after concessions made to Russia (the agreement “no vetoes, no surprises”). The Founding Act (the creation of PJC) was signed in May 1997 before the NATO Summit in Madrid (July 1997). NRC was created in May 2002, after September 11 attacks, during the period of collaboration against terrorism between Russia and U.S.A.

**Assessment of the cooperations forms**

The relations NATO-Russia from 1991 until this moment went through several stages. During the period 1991-1993 there were consensual relations between NATO and Russia. The international events influenced the relations between them by approaching the two international actors. In the history of NATO-Russia relations, one important issue is the collaboration between them in the fight against terrorism after September 11. Other international events have disrupted the NATO-Russia relations and generated crisis.

The periods of crises usually were determined by NATO’s actions that Russia did not agree with or Russia’s actions that NATO did not agree with. Thus, the crisis in 1994 was caused by the decision of NATO to start the military intervention in Bosnia without consulting Moscow. In response, Russia postponed the conclusion of the adhesion document to the Partnership for Peace. In 1999, the crisis was determined by the NATO decision of March 24, 1999, to start the bombing of Yugoslavia (Kosovo) which was strongly disapproved by Russia. Another crisis between NATO and Russia was caused by the second NATO enlargement concerning the admission of the Baltic States (2004), countries that Russia considers to belong to its near abroad. Generally each NATO Enlargement toward East generated tensions in NRC. The Alliance included all the ex-Warsaw Pact members and three former Soviet republics, the Baltic countries. Russia had constantly manifested opposition against NATO Enlargement and perceived it as a threat to its national security. According to the Russia Security Strategy „the post-Soviet geographic area should be recognized as Russia’s exclusive sphere of influence” (Margarete Klein, 2014). Gordon Hendrickson, attaché of the US Embassy in Moscow, expressed his conviction that „Russia cannot content to look at the NATO expansion Eastward without taking attitude” (Hendrickson, 2006).

The Russia’s attitude depended on its economic and political development. In the first years after the breakup of the USSR Russia was weak compared to the Soviet Union. The period 2000-2008 represents the economic and political upswing of Russia as a result of the economic and political reforms proposed and put in action during Putin mandates.
Regarding the West, during the first years of collaboration, the Allies presumed that Russia is a country in crisis after the breakup of the Soviet Union. Consequently, they took important decisions without taking into account Russia’s opinion: the military intervention in Bosnia, the NATO bombing of Yugoslavia (Kosovo). These actions sparked discontent of Russia and perturbed their relations. Moscow perceived the establishment of the missile defense shields in its proximity as a violation of agreements made in 1997. According to these agreements, there were not supposed to be important military bases on the territory of the new member states, in the proximity of Russia.

Since 1991 the West has been divided. After the end of the Cold War, the divergences between NATO members became deeper. Therefore, concerning the enlargement process, in time, different positions appeared. The Summit in Madrid (8-9 July 1997) was consensual; there were no divergences between NATO members. At the Prague Summit (21–22 November 2002) there were some hesitations of Germany concerning the admission of the Baltic States. At the Bucharest Summit (2-4 April 2008) the European NATO members were divided for economic reasons and presented opposing points of view concerning the adhesion of Georgia and Ukraine. The division of European NATO members influenced the relations between the Alliance and Russia and gave Russia the possibility of imposing in international politics.

The Russo-Georgian war (August 2008) represented an important moment in NATO-Russia relations. In March 2008, after the unilateral declaration of independence of Kosovo, Putin said that its recognition “undoubtedly fired up separatism and presents a very dangerous precedent” (Putin: Recognition of Kosovo, 2008). This was used as a justification for military actions in 2008 and 2014. The Russia’s actions: the Russo-Georgian war (2008), the annexation of Crimea and the conflict in Eastern Ukraine (2014), which followed after the secession of the provinces Donetsk and Luhansk determined opposition of NATO and the international community. The Ukraine conflict generated the strongest crisis in NATO-Russia relations until now.

Compared to the previous crises which were brief and did not lead to the total interruption of the relations, this crisis led to the interruption of the NRC activity on April 1, 2014, and created suspicion between the two partners. Three NRC meetings took place in 2016, but they did not bring anything new. The NRC did not begin the activity yet. Russia and NATO kept only the diplomatic and military contacts.

**Conclusion**

The NATO-Russia relations presented a predictable evolution after the creation of PJC and NRC. Each attempt to get closer to one another was ended with crises followed by a cooling-freezing period, then another period of improvement, then another crisis. The NATO-Russia relationship has not been consolidated and strengthened in time although there were initial prerequisites for this.

NATO and Russia have different views on European and global security issues. After the Cold War, the Alliance initiated an Enlargement to the East for extending democracy, security, and stability in Europe. Russia has perceived the enlargement of NATO as a threat to its national security. It considers that the OSCE has to be the main entity in charge of European security and that NATO should be subordinated to OSCE. Russia considers that it deserves to have the veto right concerning the Alliance’s decisions. NATO could not accept this because it contravenes the basic principles of the Founding Act. In these conditions, Russia believes that the West did not behave as expected.

Taking into account the fact that NATO and Russia were rivals during the Cold War, approximately a half of century, the creation and institutionalization of relations between them represent important accomplishments for the European and global security and stability. This represents an inedited collaboration between the most powerful military alliance that existed during history and the largest country in the world. Despite the different perceptions and misunderstandings, the beginning of the collaboration between the two rivals of the Cold War represents an important achievement for the European security and stability. The forms of collaborations that have been created can evaluate in time and develop a framework for global peace and prosperity.
References


MAPPING AND RANGING OF CULTURAL AND CREATIVE INDUSTRIES IN THE CITY OF PLOVDIV

Vesela Kazashka,¹ Margarita Ruseva,² Paulina Stoyanova³

Abstract: This paper reflects the goals and objectives of the fundamental scientific research project “Young Scientists 2016” at the Scientific Research Fund of the Bulgarian Ministry of Education and Science. The aim of this research is to analyze and map the cultural industries in Plovdiv. The intention is the resources of cultural industries to be researched using empirical data and then based on this research to be ranged and mapped. Furthermore, the research team is looking for a new model and tool-set for appraisal of the cultural industries. The methods employed are based on success indicators borrowed from economics and statistics.

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Keywords: cultural and creative industries; mapping, ranging, Plovdiv

Introduction

Cultural industries are a reflection of science, education, culture and the personal development of man and the nation. They exhibit historical, cultural, spiritual and religious processes in the community. Cultural industries are an actual sector of economy.

In the last 25 years Bulgaria has undergone a transition from a closed to a market economy. This fact has also influenced the development of the cultural industries in the country. An exchange of cultural and creative resources has been made possible. The representation of cultural industries has been changed, too. Following the accession of Bulgaria to EU, a trend towards stimulating our cultural and creative identity has been noted. The national culture of the EU member states is not only a local national priority of each country, but also of the EU, as seen in the European strategic documents (Barkalova, Kazashka, 2010).

Scoping analyze – target arts

The new opportunities have led to the elaboration and supply of many programs, politics and strategies relating to cultural industries.

Prof. Prodanov (2005) distinguishes four major community functions of culture: The first function is the unifying of the separate individuals into forming a common identity. The second function of culture is forming social capital and trust which facilitates the voluntary gathering of individuals in pursuit of common goals. The third function is legitimation of the authority structures. The fourth function of culture is rendering existential meaning for human life through creating a common horizon of existential acts in large groups of individuals. By means of these functions humans discover the unifying cultural identity that rationalizes their behavior both within and beyond their being. (Prodanov, 2005).

Plovdiv is the second largest city of Bulgaria, next to the capital city, and it is the oldest living city in Europe. It is situated on the banks of the Maritsa river, with green hills in its heart. It has been known, since ancient times, as the “The City of the Seven Hills,” which defines part of its identity. Since the time of its founding in 6 000 BC, it has been continuously inhabited, being a cultural and commercial center. The antique beauty of Plovdiv, its strategic location and the whole year-round cultural events determine it as a place of constant encounters of cultures and civilizations. Plovdiv is a combination of heritage and prospects. It is the heir of many civilizations and their culture, a mixture of unique resources, traditions and ancient and contemporary art.

There are five main rules that govern the urban economy. These are rules that economic entities should comprehend, accept and apply in their actions. They determine the functioning and development of five markets: (1) the commodities and services market; (2) the labor market; (3) the proprietary investments market; (4) the land market; (5) the urban economy public benefits market. From this

¹ Academy of Music, Dance and Fine Arts, cpo@artacademyplovdiv.com
² Plovdiv’s University “Paisyi Hilendarsky”, ruseva_margarita@mail.bg
³ Plovdiv’s University “Paisyi Hilendarsky”, paulina_stoyanova@abv.bg
perspective, the general urban economic development is a function of their dynamics (Urban Research, 2012). The development of cultural industries in urban centers is related to the development of the city itself, the market principles, the labor market, and the proprietary investments.

The resources that make Plovdiv a major cultural center and are a prerequisite for its being a European Capital of Culture in 2019 are as follows:

- Geographic facts – geographic location, landscape, climate, waters, eco-sphere, biosphere;
- Historical and cultural heritage – arts and architecture, living culture and intangible cultural heritage: folklore, crafts, traditions, cultural events;
- Population and personalities (contemporary and historical), inhabitants, cultural diversity;
- Infrastructure – transport infrastructure, tourist destination, halls, facilities, communications, services, banking, hospitality business;
- Economy – existence and implementation of projects, investments, cultural development strategies.

Prof. Ivan Chalakov (2006) has found that cultural industries in Plovdiv represent 10% of the functioning economic entities and account for about 4% of the net profit. Culture industries provide employment to 1 of 20 inhabitants. The employers are mainly micro-companies not exceeding 10 employees and sales volume of Euro 50,000. (Chalakov, 2006).

Studies prove that cultural industries are a dynamic sector with significant effect over the economy of Europe and Bulgaria, and in this particular case – the city of Plovdiv. This effect is a key mechanism and it is generated by the individual need of the cultural industries. The impact of the operations of cultural industries is multidimensional and encompasses:

1) Economic effects demonstrated by employment among the population, making profit, promotion of innovation, and introduction of new technology;
2) Social effects, the result of which is the encouragement of creativity;
3) Cultural effects seen in fostering the cultural diversity, preserving the cultural and national identity, the satisfaction of those engaged in cultural industries.

The sources of funding for cultural industries are various, but, the major part is that of the government. On one side is the regulatory system conforming with the European legislation, and strictly abiding with national cultural traits, and on the other side the government appears as a source of funding through budget subsidies or guarantees on European programs.

Based on specific statistical and economic indicators, the major task of the research team is to conduct an inquiry among those engaged in cultural industries. The result presupposes the possibility of mapping the cultural industries in Plovdiv. This approach would allow for expanding the knowledge and potential of the cultural industries, appraisal, and for the selection of appropriate business models for administration and financing of art organizations.

Mapping would benefit the local government too - in establishing and implementing policies grounded on scientific proof, which includes the funding of cultural industries nationally or locally. Mapping is also useful for strengthening the relationship of culture and business in promoting contacts, visions, programs and development strategies.

This research is being funded by the Scientific Research Fund of the Ministry of Education and the theme of the project is “Art Management: Plovdiv – Modern Trends and Classical Artistry.” By mapping the cultural industries in Plovdiv, their cross section shall be clearly outlined for this city. Applying the market principle, ranging of the cultural industries shall be done. For the mapping and ranging it is not possible to use directly the existing statistical data in the classifiers of businesses without conducting additional research of the registered companies. Therefore, for attaining the research objectives an inquiry shall be used instead.

What is interesting for this research is the progress of economic and market trends in view of assessing the opportunities for utilization of particular investments. The scheduled inquiry shall have a qualitative aspect, too, employing groups of not more than 100 people, in-depth interviews based on a questionnaire.

For conducting the research a systematic approach is selected. The object of the research shall be studied as a whole (the cultural industries of Plovdiv), while composed of separate components. The
required data shall be recorded directly by the managers of the entities engaged in cultural industries. The respondents (legal entities represented by their managers) should meet the following three criteria:

First criterion: companies registered in the city of Plovdiv;
Second criterion: doing creative works or being part of the cultural industry;
Third criterion: performing operations relating to or subject to copyright.

The results shall be analyzed and presented before students, professors, politicians and institutions that could utilize this information in their studies, teachings or businesses connected with art and culture.

The methodology for appropriate mapping is characterized with the following specifics:

- Data is comparable, since this indicator allows for more precise and more detailed measuring on the enterprise level in the sphere of cultural industries;
- This methodology takes into account the market principles of development in the cultural industries of Plovdiv;
- This methodology employs standard statistical indicators approved by the National Statistical Institute of Bulgaria and the European Statistic Office “Eurostat” for 2016.

Based on data received from National statistical institute a scoping analysis of the cultural industries registered in Plovdiv was conducted. The total number of companies registered (2016) was 272, they are differentiated by economic activity as shown in Table 1.

<table>
<thead>
<tr>
<th>№</th>
<th>Economic activity</th>
<th>Number of companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Manufacturing of musical instruments</td>
<td>1</td>
</tr>
<tr>
<td>2.</td>
<td>Preservation and maintaining of cultural and historical heritage</td>
<td>3</td>
</tr>
<tr>
<td>3.</td>
<td>Museums</td>
<td>4</td>
</tr>
<tr>
<td>4.</td>
<td>Music records and producing</td>
<td>5</td>
</tr>
<tr>
<td>5.</td>
<td>Libraries and archives</td>
<td>6</td>
</tr>
<tr>
<td>6.</td>
<td>Radio programs and TV programs broadcasting</td>
<td>7</td>
</tr>
<tr>
<td>7.</td>
<td>Creative activities in the area of literature and art</td>
<td>13</td>
</tr>
<tr>
<td>8.</td>
<td>Photography</td>
<td>55</td>
</tr>
<tr>
<td>9.</td>
<td>Performing arts</td>
<td>57</td>
</tr>
<tr>
<td>10.</td>
<td>Publishing activity</td>
<td>121</td>
</tr>
</tbody>
</table>

Source: Author

Based on the statistical data a scoping analysis was conducted and a special framework has been developed for segmenting the cultural industries in Plovdiv into several sub-sectors depending on the type of the artistic sphere in it. The following sectors are distinguished:

- Cultural industries in the sector of stage arts (opera, theatre, music, dance) of wide publicity and strong social effect;
- Cultural industries in the sector of contemporary visual arts (video, photography, cinema, design, etc.), exhibitions, installations, etc. forms of presenting contemporary art;
- Cultural industries related to cultural historical heritage;
- Cultural industries, inter-relating art, culture, education and modern technology, inter-cultural dialogue, partnering, mobility and European cultural cooperation (workshops, debates, forums, events);
- Cultural industries relating to cultural press, scientific research, documentary editions, collections, analyses and studies;
- Cultural industries for development of alternative space of culture and alternative art forms.

The Scoping analysis is the first step of the fundamental project research. The next stages include developing questionnaire, inquiring focus groups, analyzing data and mapping of cultural industries in Plovdiv.
The inquiry shall be held using a questionnaire with the aim of collecting data on the particular organization, address, the sphere of business, proprietorship of the cultural industry, the size, the funding, the turnover, the wages and the number of employees. The empirical research will be conducted in November 2017.

The planned deadline for concluding the research and completing the project is November 2018.

**Conclusion**

Cultural and creative industries are a strongly innovative component, possessing significant potential for forming capital and the opening of new jobs through generating and utilizing intellectual property. The development of cultural and creative industries and the setting up of partnering networks in this field is a contemporary and vital objective of the modern social and cultural space. One of the most important perspectives of the regional development is the search for opportunities for realisation of creative potentials and for the establishment of innovative business models which contribute to the cultural projects.

**Acknowledgment**

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**References**


National Statistical Institute: Standard statistical indicators list for 2016 http://www.nsi.bg

MODERN MODELS AND APPROACHES FOR DESIGN OF ARCHITECTURE OF A SOFTWARE APPLICATION FOR MONITORING AND QUALITY ASSESSMENT IN HIGHER EDUCATION

Kristina Kilova,¹ Vanya Lazarova,² Tanya Kitova,³ Desislava Bakova,⁴Angelina Kirkova-Bogdanova⁵

Abstract: Processes such as economic and cultural globalization put forward the issue on the quality of education. The increasing interconnectivity between economy and different societal spheres, driven by the accelerated development of information technology and the free movement of capital, increasingly links the prosperity of a country and its individuals to knowledge and technology, to the ability to learn and understand experience. In this context, it is of paramount importance to set national educational goals and to shape relevant policies.

Constructive student feedback, establishment of systems of continuous control, and implementation of changes based on a scientific conceptual framework will help the education to move from quality assurance to quality improvement. The quality of education is a responsibility of all participants – lecturers, students, institution management. Automating the feedback process with students will lead to a faster analysis of the results, making adequate management decisions in order to achieve the ultimate goal – improving the quality of higher education.

In the present paper the need for regularly providing students with the opportunity actively to participate in the management of quality of education is justified. The paper deals with the automation of collection, analysis of the needed information and consequent adequate management decisions. A conceptual model of “Web-based information system for quality assessment of the education” in higher schools with a focus on the survey and its design are also presented.

UDC Classification: 378; DOI: http://dx.doi.org/10.12955/cbup.v5.i1000

Keywords: quality assessment, higher education, conceptual model, information system

Introduction

Quality and its assessment are essential for the modern management of education. It is included in the mission, goals, and tasks of every higher school detailing in the collection, analysis of the needed information and consequent adequate management decisions (Peeva, 2010).

The paper deals with the automation of these processes, including the analysis of the requirements for the development of a model of a “Web-based information system for quality assessment of education” (Web-SAQE) and its design. In the focus of the statement, we present modern models and approaches for a design of the architecture of the software application for monitoring and quality assessment in higher education. Functional and non-functional requirements and restrictions for the system are defined. The Automated Feedback Generator, for example, is an automated feedback software system, designed to provide superior quality assurance and efficiency in both assessing student assignments and providing feedback (Debuse et al., 2007). Testing has demonstrated that it offers quality control, efficiency, and effectiveness while generating consistent feedback from the student’s perspective (Hadzhikoleva et al., 2010).

This paper presents the results of a study examining the major contemporary models and approaches for designing architecture of a software application and its construction. It provides a rationale for selected technology solutions for such a design and construction.

Literature Review

An analysis of the requirements for developing a model of the Web-Based System for Assessing the Quality of Education (Web-SAQE) revealed the following.

¹ Medical University - Plovdiv, Bulgaria, Faculty of Public Health, Dept. "Medical Informatics, Biostatistics and E-learning", k_kilova@abv.bg
² Plovdiv University "Paisii Hilendarski", Bulgaria, vanya@liveauthentic.net
³ Medical University - Plovdiv, Bulgaria, Medical Faculty, Dept. "Anatomy, Histology and Embryology", tanyakitova@yahoo.com
⁴ Medical University - Plovdiv, Bulgaria, Faculty of Public Health, Dept. "Healthcare Management", desislavabakova@abv.bg
⁵ Medical University - Plovdiv, Bulgaria, Faculty of Public Health, Dept. "Medical Informatics, Biostatistics and E-learning", akirkova@meduniversity-plovdiv.bg
Non-functional requirements, called quality requirements, are crucial in building a software system (Bontchev, 2012). The most significant of these are:

- Reliability, to fulfill the defined functionalities under certain conditions for a specified period;
- Multiple uses, the system modules must be reusable and unexpected, or invalid environmental conditions must be tolerated;
- Interoperability, the system must ensure compatibility with other products. It also must comply with established standards and norms for presenting information and technological realization (national and international);
- Scalability, the ability to add new functionalities without the need for major changes in the architecture;
- Sustainability, the designed software system must be resistant to damage;
- Easy maintenance, the system must be designed in a way that it requires easy maintenance;
- Modularity, the individual modules must be tested in isolation before being integrated into the overall system. They have to perform low connectivity and high consistency;
- Easy usability, the system must provide an interface which is easy to understand and use;
- Privacy and data security;
- Internet access including mobility; and
- Simultaneous access by multiple users.

The main restrictions are related to the data processing system, the realization of communication, consistency with copyright law, consistency with legal requirements for exchange of personal data, and access through the Internet (Lazarova, 2015; Doneva et al., 2011).

Thus, the defined requirements for a modern information system show a necessity for designing a Web-SAQE as an information system that provides quality management with the necessary level of customization. Hence, it requires a study of the following components:

- Environment; and
- Users (subjects).

The environment is the main component that contains services for assessing the quality of education, access to surveys, and control of user access to different functionalities of the system. It is represented by a technological platform that provides all necessary elements, technologies for synchronous and asynchronous communication, user management, content management, evaluation and monitoring, and web services.

Data and Methodology

For analyzing the requirements, a classification was created in which the functional requirements were placed into several groups, and quality requirements and restrictions to the system were identified. Target groups and their responsibilities and needs were classified.

The study examined the sites of national and international universities consistent with the educational policies and strategies for the development of higher education. This was prompted by a survey conducted in September 2016 that showed a positive attitude of students toward registration in a Web-SAQE and in completing online feedback surveys as part of the quality management in the Medical University of Plovdiv (Kilova & Stoyanova, 2016). As a result, this study defined functional requirements for a modern information system as follows:

- Maintenance of database about students, teachers, staff, curriculum, and data for suspended students;
- Automation of actions, such as:
  - organizing and conducting surveys to assess the quality of education;
  - processing, analysis, and graphical presentation of data
- User management (roles, rights);
- Import, export data from or to various file formats; and
- Connecting with existing systems.
The users were students, postgraduate students, teachers, and staff from the Medical University of Plovdiv.

An analysis of Web-SAQE design and conditions provided a description of the functional and quality requirements of the system, taking into account the basic subjects, objects, and processes in the field of research into the quality of education. All elements of the architecture of the software application were documented.

**Results and Discussion**

As a result of the studies and systematization of sources, consistent with the functional requirements formulated for the Web-SAQE, the following service groups were differentiated:

1. Administrative assistance to the process of the survey;
2. Process management of the surveys, i.e., feedback system of the medical university as part of the Web-SAQE;
3. User management (roles and rights); and
4. Security management and access to the system.

An essential feature of these service groups was their connection with each other and with external systems. Table 1 provides additional details on the management of the feedback system of the medical university.

### Table 1: Characteristics of actions of the Feedback System of the Medical University (FSMU)

<table>
<thead>
<tr>
<th>Automation of actions</th>
<th>existing survey systems</th>
<th>FSMU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connection with external systems and the ability to import-export data in different file formats</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Automatic processing of collecting general information about the respondent. Integration with existing information system of the medical university</td>
<td>-</td>
<td>√</td>
</tr>
<tr>
<td>Automatic control of the conduct of surveys</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Automatic processing of surveys</td>
<td>-</td>
<td>√</td>
</tr>
<tr>
<td>Archive data on students' opinion about the quality of education</td>
<td>-</td>
<td>√</td>
</tr>
</tbody>
</table>

Source: Author

The automated actions listed in Table 1 were crucial in the design stage of the Web-SAQE. The study identified the following key management processes:

- Automating and creating surveys including defining the purpose and the respondents;
- Gathering information, including protection from unauthorized access and recurrence of responses from one person;
- Data processing, and disclosure and storage of the results; and
- Storing information about the history of voting.

An automated service of the survey process had the aim of automating the management including the administration of the following:

- Publicly available information;
- Planning the educational process; and
- Assessing and analyzing the results.

Figure 1 shows the integration of the Web-SAQE with external information systems of the Ministry of Education and Science (MES), the National Evaluation and Accreditation Agency (NEAA), and the Medical University.
Figure 1: Integration of a web-based system for assessing the quality of education (Web-SAQE) with external systems

ISMU: Information System of the Medical University  
FSMU: Feedback System of the Medical University  
NEAA: National Evaluation and Accreditation Agency  
MES: Ministry of Education and Science  
CMS: Content Management System  

Source: Author

Figure 2 shows the software architecture of feedback system of the medical university integrated with the information system of the medical university.

Figure 2: Software architecture of the integrated environment

ISMU: Information System of the Medical University  
DB: Database  
FSMU: Feedback System of the Medical University  

Source: Author

Figure 2 shows that the functional levels of building the architecture are the web-client, web-server, application server, server database, and requests.  
Figure 3 illustrates the different elements in managing the feedback system of the medical university. These elements are subject to design and future implementation.
The module for monitoring user activity involves realization of a role model in the system for identification and authorization. Figure 4 shows the authorization process.

When the registration is successfully completed, the Web-SAQE sends an e-mail advising this. The user is able to restore their forgotten password. As well, a teacher can also act as an administrator or a manager.

Providing personalized access to a designed software system highlights the issue of protecting data of these services and restricting access to information. For creating access restrictions at a functional level, this group of services must meet the following requirements:

- The student has the right to manage their right to freedom of opinion. If it is already exercised, he or she only sees how the respondents have voted without having access to the analyzed outcomes.
- The teacher sees the percentage of the respondents who have voted at the time. He or she creates, edits and deletes the questions in the survey. If the survey is 100% completed, the teacher is able to end the form completion before the deadline.
The manager or supervisor defines the cognitive aim and the management; he or she identifies those who are responsible for the survey and sets the duration of the survey; he or she is informed about the process of conducting the survey and then of its results.

Creating restrictions at a database level are performed by
- administrator of the system;
- teacher; and
- administrator of the survey.

These requirements provide two levels of information security: functional security and data security. Functional security involves determining user access to system functions. Data security includes providing user access to the specific data.

The information system provides services for user management and access control to information. The system allows access in two ways: 1) through public (anonymous) access, and 2) through identification and authorization.

Regarding approaches in the design of software architecture, modern paradigms for designing the architecture of the software application offered by Bontchev (2012) are object-oriented design, component-oriented design, design based on a contract and context-oriented programming, and service-oriented architecture design.

The object-oriented design is based on creating classes as a container of objects. Component-based architecture and service-oriented architecture are currently at the center of the object-oriented design. The component-oriented design software introduces a new paradigm in which systems do not work from scratch, but rather involve a cluster of existing components (Berberova & Bontchev, 2009). Their construction aims to reduce the cost of the assembly through prototyping rapid-built software systems that are flexible, lightweight and easily maintained.

The design, based on a contract and context-oriented programming, requires software designers to define the interface specification of the software components precisely. A major part of this methodology is the question of how the elements cooperate with each other.

Designing the architecture of the Web-SAQE involves the component-oriented paradigm (Figure 5). This is due to the large range of complete technology solutions that currently exist.

**Figure 5: Component-based model of web-based system for assessing the quality of education (Web-SAQE)**

| ISMU: information system of the medical university |
| FSMU: feedback system of the medical university |

Source: Author
The design of the individual components is governed by two main principles in software design: poor connectivity and strong consistency. The less information exchanged between the components (i.e., components are simpler), the weaker will be the connection. The main task for consistency is for all elements inside the component to solve a common problem (Stoyanov, Stoyanova, & Doychev, 2006).

**Conclusions**

The presented model of the feedback system of the medical university as a component of the Web-SAQE complies with specific requirements for compatibility with the university information system and forms part of it. The Web-SAQE is designed to operate as an integrated Web-based system. It provides a high level of security and safety of the data (in data transmission so that they cannot be intercepted or modified) by the creation of backups, archiving, recovery, and protection. A high level of data integration is maintained by providing a repository for data and system development for updating the data, suggesting the use of an integrated and dynamic database. The Web-SAQE provides access to all pre-authorized users (students, teachers, and employees) regardless of their location. The system is compatible to work with mobile devices (smartphones, tablets, and netbooks). The architecture of the system is based on a modular principle for easy integration into various functional modules. Finally, the survey module, which is incorporated in the Web-SAQE, provides the ability to manage surveys dynamically.

**References**


Abstract: Healthcare specialists should have a sound level of computer literacy to work with medical information systems, electronic health records, telecare solutions and other modern ICT applications. A successful career in an ICT supported position as in healthcare requires proficiency in using computer technology in performing tasks. The knowledge about the level of computer literacy of our students allows two important decisions to be taken: first – the necessity of restructuring the content of the subject “Informatics” to make up for the gaps from previous education in technologies and second – the evaluation of volume and nature of electronic educational resources to be included in the training.

The aim of the present study is to assess computer literacy of health care students and to investigate the self-assessment of their computer skills.

Materials and methods: The study was conducted in the period April – December 2016 among 279 students from different health care specialties. To receive an objective grade, computer literacy was assessed by a didactic test specially designed for this purpose. The process of creation and validation of the assessment tool is discussed. Students were also asked to self-assess their computer literacy.

Results: The students demonstrated good computer literacy with no statistically significant impact of gender and age. Female students tend to underestimate their computer skills, while men have realistic self-assessment. Students become more critical with age – older students have lower self-assessment compared to their real performance.

Conclusion: The computer literacy of healthcare students is not alarmingly low, it allows them to take full advantage of e-learning. However, the course in informatics should include more activities that would allow them to upgrade their computer skills.

UDC Classification: 378; DOI: http://dx.doi.org/10.12955/cbup.v5.1001

Key words: computer literacy, assessment, healthcare, students, medical informatics

Introduction

The use of information and communication technologies in medicine and healthcare requires professional competence that includes computer skills. Healthcare specialists should have a sound level of computer literacy to work with medical information systems, electronic health records, telecare solutions and other modern ICT applications. Healthcare students are not technologically oriented since they have chosen a humanitarian profession. Their interests are focused in an area different from the technology, and we cannot expect them to master excellent digital skills. The knowledge about the level of computer literacy of our students allows two important decisions:

1. The necessity of restructuring the content of the subject “Informatics” to make up for the gaps from previous education in technologies.

2. The evaluation of volume and nature of electronic educational resources to be included in the training.

The aim of the present study is to assess the computer literacy of pre-graduate healthcare students and to investigate the self-assessment of their computer skills. The production and validation of the assessment instrument – a didactic test is described. The results are statistically processed, analyzed and conclusions are drawn.

Literature review

National League for Nursing states that computer literacy content focuses on computer basics and the use of generic software applications such as word processing, databases, presentation software, and the use of electronic communication such as email. (National League for Nursing).

Computer literacy is the foundation of information literacy – a broader concept for abilities for information search, retrieval, evaluation, usage, processing, and presentation. According to Anderson and Gantz (2013), computer related skills and especially Microsoft Office are in the top twenty skills for tomorrow’s best jobs. A successful career in an ICT supported position as in healthcare requires proficiency in using computer technology in performing tasks. As Safabakhsh et al. (2016) state, the

1 Medical University”, Faculty of Public Health, email: akirkova@meduniversity-plovdiv.bg
implementation of evidence-based practice requires nurses and nursing students to be computer literate. This statement is valid not only for nurses but all healthcare staff and students. Nevertheless, the well-understood necessity of such skills for healthcare staff, Michel-Verkerke (2010) reveals that computer literacy is not at an adequate level for all nurses. Topkaya & Kaya (2014) summarize that ICT competencies are not acquired at the undergraduate and graduate levels of nursing education.

Spenser (2012) explains that the National League for Nursing, the American Association of Colleges of Nursing and other institutions prompted initiatives to make informatics a fundamental part of nursing education. Deltsidou et al. (2010) say that there is a slow emergence of nursing informatics in nursing curricula even in developed countries. At the Medical University of Plovdiv, informatics has been included in the curricula of all healthcare specialties since 1993. Since then, the course has been regularly updated to reflect the technological advances and their implementation in healthcare, in general, and in the context of the national healthcare system. Nowadays the content focuses on two competencies:

- Information literacy and presentation skills;
- Understanding of ICT in healthcare and medical information systems, working with software for medical practice.

As Choi & Martinis (2013) point out, studies on informatics competency assessment in undergraduate and graduate nursing students are scarce. Most of the research on the subject is based on self-reported questionnaires, rather than objective tests of skills. Self-assessment reflects personal confidence and self-esteem and as such is not objective. Elder & Koehn (2009) argue that nursing students rate themselves higher on their skills than their actual performance of computer skills. Similar results are published by Grant et al. (2009). Discrepancies between assessed and perceived knowledge and skills may lead to stress and withdrawal of technologies in real settings. Lin stresses the inadequate attention paid to computer literacy and computer competency scale validity (2011). Elder & Koehn (2009) also discuss the value of using a computer graded assessment. In our research, special attention is paid to construction, statistical analysis and validation of the assessment tool.

According to Digital Economy and Society Index 2017 (https://ec.europa.eu/digital-single-market/scoreboard/bulgaria), low performance in digital skills acts as a brake on the further development of Bulgaria’s digital economy and society. Informatics and Information Technologies are mandatory disciplines in primary and secondary education in Bulgaria. A pilot online national external evaluation of digital competences of tenth-grade students from secondary schools in all the 28 areas of the country was conducted in 2016. The average success rate was 50.03% (Ministry of Education and Science of the Republic of Bulgaria, 2016). These facts are worrying, and the level of competence of students for working with computer and information in electronic format is put into question.

**Methods and materials**

The study was conducted in the period April – December 2016. The survey was anonymous and 279 students from different health care specialties at Medical University – Plovdiv agreed to participate. To receive an objective grade, computer literacy was assessed by a didactic test specially designed for this purpose. The students were also asked to self-assess their computer literacy on a five point scale from poor (2) to excellent (6) prior to the test. The influence of gender on grade and self-assessment was analyzed by nonparametric tests of Mann-Whitney and Kruskal-Wallis for independent samples. The relationship between grade and self-assessment was analyzed by Wilcoxon nonparametric test for two related samples. Bivariate Spearman correlation was used to study the relationship between age and grade or self-assessment. We accepted 95% confidence interval. Data were processed with the statistical package SPSS 17.0.

**Construction of the assessment instrument**

The test aimed at measuring the level of knowledge and skills of students in the following areas:

- Operation systems and organization of information;
- Word-processing and spreadsheets;
- Safe networking.

Windows 7, MS Word 10 and MS Excel 10 were accepted as working environments.
The test was based on criteria, i.e. it measured the degree of achievement of educational goals in the defined areas of knowledge, as set out in the Informatics and Information Technologies curricula in the secondary education (Ministry of Education and Science of the Republic of Bulgaria, 2016). The originally developed test contained 30 multiple choice questions with one correct answer and three distractors. The main reasons for choosing this type of questions were:
- Fast and objective assessment;
- Ability to evaluate not only reproduction of knowledge, but also comprehension and application;
- Students are not required to demonstrate reasoning, give examples or original ideas, i.e. situations where multiple choice test items are difficult to apply.

Some of the questions were taken from Mateva et al. “Medical Informatics – test items and practical exercises” (2015). Most of the questions were written specially for this assessment tool. The questions assessed the competence of students at different cognitive levels. The principles of creating quality multiple-choice questions, outlined by Burton et al. (1991) were observed in adapting and writing test items.

The test was content valid, because:
1. Skills and knowledge in each of the three upper mentioned areas of assessment were measured by at least three test items, and
2. Each question was discussed with experts – the staff of the department “Medical Informatics, Biostatistics and e-learning” at the university.

Criterion validity could not be defined because there was no benchmark test to compare results. Construct validity had not been determined because the results of the validation testing did not comply with the requirements for a factor analysis.

Face validity was guaranteed by the experts’ opinion that it seemed to be a proper way of testing the level of computer literacy of health care students.

In order to validate the tool 35 students agreed to do the test anonymously, conscientiously and without cheating. They were given 30 minutes.

The received results were processed with the program for psychometric analyses jMetrik (http://www.itemanalysis.com/index.php). The aim was to select for the final version the items which:
1. Had a difficulty level 0<p<1, i.e. there were no questions answered by everybody as well as questions that nobody had answered;
2. Had a discrimination coefficient r>0.2, according to Shotlekov (2015)
3. Did not compromise test reliability.

The analysis of the test items revealed that there were no questions that did not fulfill the first requirement, but there were nine test items with discrimination coefficient below 0.2. The analysis of the internal consistency showed Cronbach’s alpha α=0.76. Further analysis showed that if each of the nine questions with r≤0.2 were removed, the Cronbach’s alpha would increase. So, the number of the test items was reduced to 21, and the new version was tested again. The results showed that all questions comply with the requirements, α=0.82 and there were no questions that if removed, the reliability would increase.

A question was considered answered correctly if there was only one answer and it matched the right one. The final score was the total number of correct responses, min. 0 and max. 21. The results from doing the test by the students were: $\bar{x} = 12.09$, $M_e=13$, $M_o=14$. The frequency distribution of scores has a weak left negative skewness, so the conclusion was that the test was medium to easy for the students. In such cases, according to Ivanov (2006) the cut-off score for equating to a five-point scale is 30% of the total score, which is 7 for our test. The equating of the score to a grade on the five-point scale from “Poor” 2 to “Excellent” 6, which is the formal assessment scale in Bulgaria was done through splitting the score above 7 into approximately equal intervals (Table 1), as described by Shotlekov (2015).
Table 1: Scale for the test assessment of the students’ computer literacy

<table>
<thead>
<tr>
<th>Score</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 7</td>
<td>Poor 2.00</td>
</tr>
<tr>
<td>7, 8, 9, 10</td>
<td>Fair 3.00</td>
</tr>
<tr>
<td>11, 12, 13, 14</td>
<td>Good 4.00</td>
</tr>
<tr>
<td>15, 16, 17, 18</td>
<td>Very good 5.00</td>
</tr>
<tr>
<td>19, 20, 21</td>
<td>Excellent 6.00</td>
</tr>
</tbody>
</table>

Source: Author

Results and discussion

The age of the students varied from 18 to 45 years, n=269, $\bar{x}=22.42\pm5.57$. Ten students did not announce their age. Distribution by gender was: men: n=53, 19.00%; women: n=226, 81.00%. According to the Mann-Whitney test there was no statistically significant difference in the age distribution between genders – $p=0.146$. We might expect age and gender to affect computer literacy independently.

The students’ grades as results of the didactic test and their self-assessments are given in Table 2 for men and for women.

Table 2: Students computer literacy grade and self-assessment

<table>
<thead>
<tr>
<th>Gender</th>
<th>Computer literacy</th>
<th>Self-assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Grade</td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>$\bar{x}\pm S$D</td>
<td>$\bar{x}\pm S$D</td>
</tr>
<tr>
<td>n</td>
<td>53</td>
<td>53</td>
</tr>
<tr>
<td>Women</td>
<td>$\bar{x}\pm S$D</td>
<td>$\bar{x}\pm S$D</td>
</tr>
<tr>
<td>n</td>
<td>226</td>
<td>226</td>
</tr>
<tr>
<td>Total</td>
<td>$\bar{x}\pm S$D</td>
<td>$\bar{x}\pm S$D</td>
</tr>
<tr>
<td>n</td>
<td>279</td>
<td>279</td>
</tr>
</tbody>
</table>

Source: Author

The average computer literacy of the investigated sample of healthcare students at the Medical University of Plovdiv was good. The percentage distribution of grades is given in Figure 1.

Figure 1: Distribution of grades among healthcare students

The students, who study health care specialties at Medical University Plovdiv are computer literate. The ratio of those, who are not, i.e. who received “Poor” is low – 4.42%, same is the percent of excellent students. Less than a quarter of the students – 24.34% got less than 50% of the total score – these are the students with poor and fair grades.

Ranasinghe et al. (2012) report that nearly half of the first year medical students in Sri Lanka obtained computer literacy score less than or equal to 50%. Results of a study in Iran by Zarei, Rokhafruz & Dianat (2012) showed that medical students’ familiarity with computers were low. A study by Deltsidou et al. (2010) indicated that there was a deficit in nursing students’ IT competencies in
Greece. On the contrary, Choi & Martinis (2013) found out that undergraduate nursing students at the School of Nursing at University of Massachusetts were competent in basic computer knowledge and skills. Compared with their colleagues from other countries, our students have a sufficient level of computer knowledge and skills.

Ranasinghe et al. (2012) and Deltsidou et al. (2010) point out owning a personal computer as a strong predictor for computer skills availability. Our previous research, Kirkova-Bogdanova et al. (2016) revealed that the ratio of students possessing their own computer with internet connectivity is relatively high – 83.75%, compared to other countries. Another major factor, raised by Ranasinghe et al. (2012) for sound computer literacy – previous formal education is also fulfilled for our students. This explains their relatively good understanding of using computers.

Ikolo & Okiy (2012) found gender differences in computer literacy skills of medical students with males more familiar with computers than females. Safabakhsh et al. (2016) found gender differences only in the connectivity aspect of computer literacy. Ranasinghe et al. (2012) did not find significant gender differences in the mean score of a computer literacy questionnaire. We did not find statistically significant difference between computer literacy of men and women – p=0.080. We explain this with the equal opportunities for men and women for education. Another possible explanation is that men, who choose a health care career are not so technologically orientated as they are believed to be.

The results of our survey showed that students tended to underestimate their computer skills and their self-assessment was statistically significantly lower than their actual grade – p=0.0001. We found the statistically significant dependence of self-assessment on gender – p=0.025. Further analysis showed that it is the women, who have a significantly lower self-estimation – p=0.0001, while men demonstrated realistic judgment of abilities to work with computers – p=0.362. Literature findings do not support this result. According to Grant et al. (2009) undergraduate university students in North Carolina had a higher perception of their proficiency level than their performance on the assessment for word-processing and spreadsheets. Elder & Koehn (2009) also support the fact that students overrate themselves. A study in Romania by Cazan et al. (2016) reveals that there are no significant differences between the male and the female participants concerning computer self-efficacy. Our students demonstrate critical thinking about their skills. Women do not feel well prepared to work with computers, and they need more encouragement. The implications for the teachers are to include more practical training for basic computer skills in the informatics classes for the students to improve their computer literacy and to increase their self-esteem and confidence to work with computers.

Niyomkar (2012) found a positive relationship between age and computer literacy in undergraduate nursing students – as age increased, computer competency advanced. We did not find a significant correlation between age and computer literacy – r=0.088, p=0.150. However, a statistically significant weak negative correlation existed between age and self-assessment - r=-0.3142, p=0.0001. Results indicate that older students have the same computer skills as their younger colleagues, but their self-effacement increases with age. Educators should pay attention to older students’ concerns, assure them and make them feel comfortable with technology.

**Conclusion**

The computer literacy of health care students is not alarmingly low. It is good enough to enter and complete the course in informatics successfully. It allows them to take full advantage of e-learning. Nevertheless, computer literacy does not differ across gender and age, female students, who are the majority, self-assess themselves lower than their actual skills. The same applies for older students. The course in informatics should include more activities for upgrading computer skills on the one hand, and building confidence and a feeling of comfort with computers on the other. Increasing the computer literacy and self-efficacy of our students is a guarantee for a successful career.

**References**


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2 Correlation was significant at the 0.01 level (2-tailed).


Матева, Н., Боева, Т., Килова, К., Пейчев, Ж., Димчева, Т., & Киркова, А. (2015). Medical Informatics - Test Items and Practical exercises [Медицинска информатика - тестови въпроси и практически задачи]. Plovdiv [Пловдив]: Medical University Plovdiv [МУ Пловдив].

PROJECT MATURITY OF ORGANIZATIONS IMPLEMENTING RESEARCH PROJECTS - PREPARING FOR QUESTIONNAIRE RESEARCH

Agata Klaus-Rosińska,1 Jan Betta2

Abstract: The purpose of this article is to provide a way of creating a maturity model for organizations implementing research projects. This will be done with an emphasis on constructing questionnaires to collect the necessary data. The result of the article is not the final version of the questionnaires but a guideline on how the construction can look like. The article presents also the reasons and explanations why maturity models in project the management area are important. The methods used in the article are literature review and lessons learned from previous experiences.

JEL Classification Numbers: D02, M21; DOI: http://dx.doi.org/10.12955/cbup.v5.1002

Keywords: maturity, project, questionnaire

Introduction

The issue of the research fits perfectly into the project management area, which importance from the last century growing all the time (Project Management Institute Inc., 2013). More and more organizations carry out their activities through projects, in addition there is a noticeable increase in the complexity of the projects. A new challenge for organizations is (among others) the multi-project environment (Spalek, 2013). For organizations implementing research projects a multi-project environment is visible. The development of "science" is carried out through projects (requirements of funding bodies) and the number of projects is increasing. The reason for this is the greater amount of possibilities of the funding for research projects, the need to raise the prestige of the organization and the need to develop the potential of the faculty’s staff. According to Piecuch (2015), management of research projects is project management in a distributed and multi-project environment, which faces a number of problems. They are primarily related to:

- high rate of failures of projects, characterized by not achieving the intended outcomes within them,
- lack of good practices based on the team’s experience which implemented the projects and after their completion were terminated,
- inefficient planning and use of human resources for the implementation of projects, mainly due to the creation of new teams often involving people without necessary experience in project management,
- lack of uniform standards of project management, which should be applied to all teams implementing projects,
- lack of control of the portfolio of projects implemented by the scientific institution.

Difficulties in project management in the university environment (so, in the typical research organization), have been identified in (Klaus-Rosińska and Zablocka-Kluczka, 2014):

- rigid organizational structures that are unsuitable for the implementation of the project,
- lack of formal authority for projects and their managers,
- poor internal and external communication,
- inadequate or overly formalized project documentation,
- inadequate or poorly designed mechanisms of project quality management,
- lack of qualified project personnel.

Research project management is difficult. Their effective realization requires the organization having competences in the area of project management and the ability to manage multiple projects simultaneously (Piecuch, 2015). Research projects are characterized by a great diversity (in terms of the variously defined size of the project, the organizational structure, the stability of the project team, division of labour among the members of the project team, qualifications, degrees and titles held by members of the project team) (Birnbaum, 1977), which significantly makes their coordination hard.

1 Department of Computer Science and Management, Wroclaw University of Science and Technology, e-mail: agata.klaus-roinska@pwr.edu.pl
2 Department of Computer Science and Management, Wroclaw University of Science and Technology, e-mail: jan.betta@pwr.edu.pl
The project maturity model dedicated to organizations conducting research projects will assess the severity of applied solutions (implementation principles), methods and processes of research projects management. Performing an assessment of maturity in the organization of the research project management is the starting point for the continuous process of improvement in the area of research projects and performance of the whole organization. The findings of the evaluation would allow to get to know the strengths and weaknesses of the organization in relation to the management of research projects and thus to identify and determine the actions which should be taken in order to increase the effectiveness of the management of these projects. The results of the evaluation would also provide information about the causes of the problems identified for research projects and tell to stakeholders about the consequences of the usage of incorrect or non-uniform procedures. Also, the findings can indicate the organizational improvements which should be implement, resulting from the knowledge of project management (Piecuch, 2015; Rad and Levin, 2006).

**Project maturity models**

Maturity models in project management are related to the issue of maturity in economic sciences. The maturity here can be understood as the ability of the organization and/or its processes to improve and thus to bring better results (Rosemann and de Bruin, 2005). The literature on the subject also refers to the term of maturity level, which can be defined as the degree of achievement of the directives indicated by the adopted concept (Kucińska-Landwójtowicz and Kołosowski, 2012). The mentioned definitions indicate that maturity defines a path that an organization and/or processes goes through, along with getting experiences. The path is visible in maturity models.

In the project management area, there are many maturity models developed for specific branches, mainly for software and civil engineering industries. However, top researchers like Crawford (2006) or Kerzner (2001) regarding maturity in project management suggest designing a universal model assessing maturity for every type of organization. Since the last century a number of project management maturity models have been developed. It is possible to find more than 30. The majority of these models indicate 5 maturity levels, where the first level is the ‘initial’ level (here there is no established project management practices), and level 5 is the ‘optimising’ level where the company is fully mature (Pretorius et al., 2012). In the literature often appear models like (Spałek, 2014):

- **OPM3: Organizational Project Management Maturity Model,**
- **PMMM: Project Management Process Maturity Model,**
- **CMM: Capability Mature Model (and its improved version CMMI: Capability Maturity Model Integration),**
- **Prince 2 Maturity Model.**

Nevertheless, we did not find the model of maturity in project management, which have been developed strictly for research projects (see more about maturity models related to research projects in Klaus-Rosińska, (2016)).

Considering the above mentioned statement, researchers from Wroclaw University of Technology intend to complement the knowledge of assessment with the maturity in research project management. The main objective of their research is to propose the concept of maturity assessment in the management of research projects, aimed at improving the performance of organizations implementing research projects. In order to achieve the main goal, it will be necessary to implement the specific objectives:

1. to examine the area of project management in organizations carrying out research projects in order to identify functional solutions and adopted strategies,
2. identification of the characteristics of research projects and their comparison with characteristics of other project types (IT projects and construction projects will be considered), which will help to determine the suitability of project management maturity models which are used in organizations conducting these types of projects on maturity assessment in research projects management,
3. to examine existing models of maturity in project management, showing their flaws, areas for improvement and to determine their fitness for assessing the maturity in research project management,
4. to propose a model of maturity in research project management and its initial verification,
5. to develop a set of best practices (recommended paths) aimed at raising the level of maturity in research project management.

The research hypotheses are as follows:

- **H1**: In the organizations implementing research projects, there is a need to improve performance in the area of project management,
- **H2**: In organizations implementing research projects, models for assessing the project maturity are rarely used,
- **H3**: Organizations carrying out research projects, would await the development of a set of good practices (recommended paths) which help the achievement of higher levels of maturity in research project management,
- **H4**: Organizations which acquire experience in implementing research projects, improve the effectiveness of such projects.

**Preparation for questionnaire research**

In the study research methods like surveys, in-depth interviews with people from the area of project management (project managers, contractors, people of administrative support) and persons managing organizations implementing research projects will be applied (amongst others). For the purpose of conducting surveys and interviews, questionnaires to gather the material needed for fulfilling the specific objectives: (1), (2) and (3), will be developed.

The construction of the questionnaires will be based on:

1. previous but recent research, indicating critical success and failure factors for research projects (the project related to this topic is currently implemented at Wroclaw University of Science Technology, the title of the project is "Identification of success and failure factors of research projects", Grant no.: NCN 2014/13/B/HS4/01660, Funding agency: National Science Centre (NCN) in Poland, Funding period: from 2015-03-17 to 2017-03-16),
2. bibliographical overview of existing best practices in project management area (including research projects), and the analysis of them,
3. bibliographical overview of existing best practices of maturity models in project management area, and the analysis of them.

Showing how to develop questionnaires can be useful for:

- organizations carrying out research projects. They would need the development of appropriate questionnaires. Therefore, it can be a “good practice” for them too.
- researchers, people working inside research projects, who wants to do similar scientific works.

Taking into account four research points of view: the nature of the problem, the goal of the research, the underlying theory and the appropriate techniques (Miller and Salkind, 2002), the presented research is applied in one of them. The presented research is focused on a technique related to data gathering.

Sampling is one of natural methods of studying the stochastic phenomena. There is no unique quality standard necessary in each sampling. This quality depends on the stage of research work and on the destination of information being the sampling result (Rossi et al., 1983). Questionnaire are one of recognized and most important tools of sampling and data collection in applied research. The questionnaire is a self-completed document, which is filled in by respondents (Dornyei and Taguchi, 2009). The list of questions depends mostly on the author’s creativity, who should take into account the time and cost restraints. The final quality depends on responder’s perception and their answers. Both kinds of questions – open and closed – are admitted, but the authors should be conscious of advantages and disadvantages of both (Rossi et al., 1983).

Some recommendations of question formulation should be observed (Rossi et al., 1983):

- vocabulary should be simple,
- question shouldn’t be too long,
- inappropriate questions specify alternatives rather than indicating one possibility,
- the questions should respect some psychological order,
- questions on one subject should be grouped,
length of the questionnaire depends on many factors, like psychological preparation of respondents,

- nature and quantity of resources needed,
- questionnaire format is important and should be chosen properly.

The questionnaire can contain three types of questions: factual, behavioural and attitudinal. General parameters of each questionnaire are: length layout and attention to sensitive subjects and anonymity. The main points of the questionnaire are: title, instructions, questions, complementary information and the closing part (Rossi et al., 1983).

Conclusions

The final construction of the questionnaires could be a useful tool for achievement of research objectives. It should accomplish all the principles of questionnaire development mentioned above, and conform to the classic "rules of art." The authors are conscious of the necessity to make this questionnaire as flexible as possible, because of the high level of complexity, innovation and incertitude of research projects.

Acknowledgements

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ANALYSIS OF THE PROFESSIONAL SATISFACTION OF PHARMACISTS IN BRATISLAVA

Zuzana Koblišková,1 Zuzana Haramiová,2 Tomáš Tesár3

Abstract: A pharmacist is an expert on medications. At the same time as the most accessible health care provider, the pharmacist fulfills an important social mission. For a pharmacist, work satisfaction plays an important role in several aspects of his practice in a pharmacy. Our primary goal was to conduct a local analysis with the purpose of testing the proposed questionnaire evaluating various dimensions of the professional satisfaction of pharmacists. Our secondary goals were as follows: to analyze individual dimensions of pharmacists’ professional satisfaction, to assess the quality of life in the context of the pharmacists’ professional satisfaction and to analyze the impact of selected characteristics (age, location of the pharmacy) on the pharmacists’ quality of life. The study is based on a questionnaire survey among pharmacists in Bratislava from July to September 2016. Data were collected in person. Respondents were randomly selected from community pharmacies. Equal number of respondents were selected from three different types of pharmacies: a) public pharmacy or its branch in a medical facility or a health centre b) public pharmacy or its branch in a shopping centre c) public pharmacy or its branch in a residential housing development. The results of the study show that the professional satisfaction of pharmacists in Bratislava is evaluated positively. Out of all 27 questions of the questionnaire, only three were evaluated negatively. The analysis points out that pharmacists are dissatisfied with the conditions in the workplace, regulation and legal responsibilities stemming from the profession of a pharmacist, healthcare system, and health insurance companies. The majority of the pharmacists characterized their state of mind on the job as concentrated. Older respondents were more tired and less energized. With regards to the location of a pharmacy, respondents that work in pharmacies located in residential housing developments feel the most concentrated. The knowledge of needs and problems of the profession is the essential precondition for its continued successful development, and its position in current as well as future European and Slovak healthcare systems. Until now, the quality of the professional life of pharmacists has not become a subject of systematic research and evaluation in Slovakia. Our study showed that the professional satisfaction of pharmacists in Bratislava is evaluated positively.

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Keywords: pharmacist, professional satisfaction, pharmaceutical care

Introduction

Pharmaceutical care

Slovak Act No. 362/2011 Coll. defines pharmaceutical care as one of the three forms of health care provision, and from the perspective of the Slovak legislation, it covers the providing, preparation, inspection, storage, dispensation of medications with the exception of preparation of transfusion medications and medical aids, mail order dispensation, providing expert advice about medications and medical aids, and consultations with regard to determination and monitoring of the treatment. Pharmaceutical care is provided: 1. in public pharmacies that are set up as educational bases 2. in public pharmacies and branches of public pharmacies 3. in hospital pharmacies 4. in dispensaries of medical aids 5. in dispensaries of orthopedic and prosthetic medical aids. Stanko & Minarovič (2011) state that based on the legislation of definitions and the conception of pharmaceutical care development defined by international authorities in the field of health and pharmacy, basic roles, and functions in the pharmaceutical care system can be categorised according to the character of individual activities into following groups: a) logistics b) dispensation c) consulting d) distribution e) screening and monitoring f) other activities.

Professional satisfaction of pharmacists

Snopková et al. (2014) argue that since pharmacists play a key role in informing patients about prescribed medications and ensuring suitability of the prescribed treatment, it is important to consider the question of which qualities of a pharmacists’ work environment have a connection with the integration of the pharmacotherapeutic monitoring into the daily practice, and what obstacles are present in this process. For a pharmacist, the work satisfaction plays an important role in many aspects of his practice in a public pharmacy. A low level of work satisfaction can have a negative impact on his work performance. Dissatisfaction can also influence the way a pharmacist interacts with patients. Consequently, patients tend to limit their cooperation with a pharmacist. It is important to obtain information about pharmacists’ attitudes toward performing their work, and about factors associated with their work attitudes. Given that healthcare workers can suffer from stress, especially due to the

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1 Faculty of Pharmacy, kobliskova@fpharm.uniba.sk
2 Faculty of Pharmacy, haramiova@fpharm.uniba.sk
3 Faculty of Pharmacy, tesar@fpharm.uniba.sk
long-term effect of negative factors present in the workplace, their work attitudes should be examined. Matthew et al. (2008) describe the positive influence of pharmacists’ work satisfaction as follows: 1) A satisfied pharmacist at work will positively impact his community; as a result, fewer work position changes occur 2) Work satisfaction of a pharmacist positively impacts his own mental and physical health. 3) A satisfied pharmacist positively impacts the patient and his health.

**Workload in the pharmaceutical profession**

McCann et al. (2009) emphasize that pharmacists today need to meet many high (professional, communication) demands. This fact is caused especially by a rising competition in healthcare and the need to improve healthcare services. This change may positively impact patient’s satisfaction (Mináriková et al., 2015; Mináriková et al., 2016). This trend has shown to have an influence on the overall prosperity of community pharmacy and both accessibility and availability of pharmaceutical care (Malovecká et al., 2015, Malovecká et al., 2016). However, as a result, pharmacists at work often deal with stress and mental strain. Pelcák & Tomeček (2011) define workload in a pharmacy as a sum of specific situations and activities (breach of the confidentiality zone, communication with problematic types of patients, dealing with complaints) that can be subjectively associated with mental burden. Consequently, cumulative stress can lead to professional failure or personality disintegration.

**Methodology**

The analysis of pharmacists’ professional satisfaction in Bratislava was carried out between July and September 2016. Data collection was realized in person. Respondents were randomly approached in community pharmacies. We aimed at collecting responses from an equal number of respondents from three different types of pharmacies:

- a) a public pharmacy or its branch in a medical facility or a health center
- b) a public pharmacy or its branch in a shopping center
- c) a public pharmacy or its branch in a residential housing development

In total, we obtained 25 questionnaires from each type of pharmacy. Overall, 75 respondents from a total number of 23 pharmacies participated in our research.

The questionnaire consisted of the following parts:

- Dimension A: internal environment – altogether nine questions were allocated here, pertaining to the organization of a pharmacy as a workplace, work hours, and relationships in the workplace.
- Dimension B: external environment – 9 questions were allocated here, pertaining to legislative issues in providing pharmaceutical care, relationships with health insurance companies, professional organizations, and patients.
- Dimension C: personal satisfaction – 5 questions were allocated here, pertaining to personal matters such as financial remuneration, career advancement, etc.
- Dimension D: quality of life – 3 questions were allocated here, pertaining to a subjective assessment of the state of health, quality of life during the last month, and its comparison with the time period of 10 years ago.

Satisfaction was evaluated using 26 predetermined questions (Are you satisfied with…) using a 5-point Likert scale (no – more likely no – neither yes nor no – more likely yes – yes).

The results were processed using the Microsoft Excel program and expressed quantitatively (count, percentage). We consolidated the proportions of respondents from the Likert scale into three ranges as follows: 1) no / more likely no, 2) neither yes nor no, 3) more likely yes / yes.

**Results**

Dimension A was focused on evaluation of the internal environment. Here, pharmacists expressed the highest level of satisfaction (82.66%) with the question concerning superior-subordinate communication. Satisfaction with a work team, the atmosphere in the workplace, communication of tasks, feedback based on work performance, and satisfaction with the support from the direct supervisor were rated highly positively (81.33%). More than half of the respondents (54.66%) were satisfied with the determination of work hours and the length of their work day. In this dimension of questions, respondents were the least satisfied with conditions in the workplace (satisfaction was expressed by only 33.33% of pharmacists). Table 1 displays the results from Dimension A in detail.
Table 1: Respondents’ satisfaction – dimension A = internal environment (n = 75)

<table>
<thead>
<tr>
<th>Question</th>
<th>No / more likely no</th>
<th>Neither yes nor no</th>
<th>More likely yes / yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are you satisfied with the determination of your work hours?</td>
<td>19 (20.00)</td>
<td>15 (20.00)</td>
<td>44 (54.66)</td>
</tr>
<tr>
<td>Are you satisfied with the length of your work day?</td>
<td>17 (22.66)</td>
<td>18 (24.00)</td>
<td>40 (53.33)</td>
</tr>
<tr>
<td>Are you satisfied with other conditions in your workplace (lighting, temperature, air circulation, etc.)?</td>
<td>34 (45.33)</td>
<td>16 (21.33)</td>
<td>25 (33.33)</td>
</tr>
<tr>
<td>Are you satisfied with your work team?</td>
<td>8 (10.66)</td>
<td>6 (8.00)</td>
<td>61 (81.33)</td>
</tr>
<tr>
<td>Are you satisfied with the superior-subordinate communication?</td>
<td>7 (9.33)</td>
<td>6 (8.00)</td>
<td>62 (82.66)</td>
</tr>
<tr>
<td>Do you consider the atmosphere in your workplace to be open and friendly?</td>
<td>10 (13.33)</td>
<td>5 (6.66)</td>
<td>60 (80.00)</td>
</tr>
<tr>
<td>Are your tasks communicated clearly to you?</td>
<td>9 (12.00)</td>
<td>7 (9.33)</td>
<td>59 (78.66)</td>
</tr>
<tr>
<td>Are you satisfied with the support from your direct supervisor?</td>
<td>4 (5.33)</td>
<td>15 (20.00)</td>
<td>56 (74.66)</td>
</tr>
<tr>
<td>Are you satisfied with the feedback you receive based on your work performance?</td>
<td>7 (9.33)</td>
<td>11 (14.66)</td>
<td>57 (76.00)</td>
</tr>
</tbody>
</table>

Source: Authors

Dimension B assessed the external environment. Here, most positive aspects were: attitude and respect of patients and pharmacists' readiness for their profession during their studies. Cooperation with physicians and employment opportunities available abroad were also rated highly positively (72.00%). Almost 59% of the pharmacists were satisfied with the opportunities for continuing education and activities of professional and specialized organizations for pharmacists. In contrast, pharmacists expressed a high level of dissatisfaction (77.33%) with the healthcare system, and with the cooperation with health insurance companies. Dissatisfaction with the regulation and legal responsibilities stemming from the pharmaceutical profession was expressed by almost 51% of respondents. Table 2 displays the results from Dimension B in detail.

Table 2: Respondents’ satisfaction – dimension B = external environment (n = 75)

<table>
<thead>
<tr>
<th>Question</th>
<th>No / more likely no</th>
<th>Neither yes nor no</th>
<th>More likely yes / yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are you satisfied with the attitude and respect of patients toward you?</td>
<td>9 (12.00)</td>
<td>10 (13.33)</td>
<td>56 (74.66)</td>
</tr>
<tr>
<td>Are you satisfied with the cooperation with physicians?</td>
<td>10 (13.33)</td>
<td>11 (14.66)</td>
<td>54 (72.00)</td>
</tr>
<tr>
<td>Are you satisfied with the opportunities for continuing education?</td>
<td>8 (10.66)</td>
<td>23 (30.66)</td>
<td>44 (58.66)</td>
</tr>
<tr>
<td>Are you satisfied with activities of professional and specialised organisations for pharmacists?</td>
<td>14 (18.66)</td>
<td>19 (25.33)</td>
<td>42 (56.00)</td>
</tr>
<tr>
<td>How satisfied are you with the regulation and legal responsibilities stemming from the profession of a pharmacist?</td>
<td>38 (56.66)</td>
<td>20 (26.66)</td>
<td>17 (22.66)</td>
</tr>
<tr>
<td>How much are you satisfied with the healthcare system?</td>
<td>58 (77.33)</td>
<td>9 (12.00)</td>
<td>8 (10.66)</td>
</tr>
<tr>
<td>As a pharmacist, how satisfied are you with health insurance companies?</td>
<td>56 (74.66)</td>
<td>10 (13.33)</td>
<td>9 (12.00)</td>
</tr>
<tr>
<td>Do you think you were prepared adequately for the profession of a pharmacist during your studies?</td>
<td>11 (14.66)</td>
<td>9 (12.00)</td>
<td>55 (73.33)</td>
</tr>
<tr>
<td>Do you think you would be able to find employment as a pharmacist abroad?</td>
<td>8 (10.66)</td>
<td>19 (25.33)</td>
<td>48 (64.00)</td>
</tr>
</tbody>
</table>

Source: Authors
Dimension C concerned pharmacists’ personal satisfaction. Here, responses were positive to all of the questions. The most positively rated aspect (100.00%) was professional pride. Pharmacists expressed a high level of satisfaction with their work position and job content (78.66%), and relaxed feeling at work (77.33%). Furthermore, 68.00% of pharmacists expressed satisfaction with the acceptance of their proposals and requests in the workplace and 60.00% with their financial remuneration. Table 3 displays the results from Dimension C in detail.

Table 3: Respondents’ satisfaction – dimension C = personal satisfaction (n = 75)

<table>
<thead>
<tr>
<th>Question</th>
<th>No / more likely no n (%)</th>
<th>Neither yes nor no n (%)</th>
<th>More likely yes / yes n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are you satisfied with your financial remuneration?</td>
<td>16 (21.33)</td>
<td>14 (18.66)</td>
<td>45 (60.00)</td>
</tr>
<tr>
<td>Are you satisfied with the acceptance of your proposals and requests in the workplace?</td>
<td>8 (10.66)</td>
<td>16 (21.33)</td>
<td>51 (68.00)</td>
</tr>
<tr>
<td>Does your current work position and job content meet your expectations?</td>
<td>7 (9.33)</td>
<td>9 (12.00)</td>
<td>75 (78.66)</td>
</tr>
<tr>
<td>Overall, do you feel relaxed at work?</td>
<td>4 (5.33)</td>
<td>13 (17.33)</td>
<td>58 (77.33)</td>
</tr>
<tr>
<td>Are you proud of being a pharmacist?</td>
<td>0 (0.00)</td>
<td>0 (0.00)</td>
<td>75 (100.00)</td>
</tr>
</tbody>
</table>

Source: Authors

All aspects within Dimension D evaluating pharmacists’ quality of life were rated positively. Pharmacists were most satisfied with their quality of life in the last month (76.00%) and their current overall physical and mental health (74.66%). The question in which pharmacists were asked to compare their current quality of life with their quality of life 10 years ago, was rated positively as well. Table 4 displays the results from Dimension D in detail.

Table 4: Respondents’ satisfaction – dimension D = quality of life (n = 75)

<table>
<thead>
<tr>
<th>Question</th>
<th>No / more likely no n (%)</th>
<th>Neither yes nor no n (%)</th>
<th>More likely yes / yes n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are you satisfied with your current overall physical and mental health:</td>
<td>4 (5.33)</td>
<td>15 (20.00)</td>
<td>56 (74.66)</td>
</tr>
<tr>
<td>Have you been satisfied with your overall quality of life in the last month?</td>
<td>4 (5.33)</td>
<td>14 (18.66)</td>
<td>57 (76.00)</td>
</tr>
<tr>
<td>Is your current quality of life better than it was 10 years ago?</td>
<td>6 (8.00)</td>
<td>18 (24.00)</td>
<td>51 (68.00)</td>
</tr>
</tbody>
</table>

Source: Authors

Analysis of the impact of selected characteristics on the pharmacists’ quality of life
The results of the analysis show that the majority of pharmacists in each age group described their state of mind on the job as “concentrated” (Table 5, Figure 1). Pharmacists aged 31-45 feel the most “concentrated” (79.31%) on the job, while the least “concentrated” on the job is the youngest group of respondents. Our analysis suggests that there is a correlation between the respondents’ age and state of mind while performing their work at a pharmacy: the older the respondents were, the more “tired” and “less energized” they felt.

Table 5: Respondents’ state of mind during their work at a pharmacy depending on their age (n = 75)

<table>
<thead>
<tr>
<th>Age</th>
<th>Tired, n (%)</th>
<th>Concentrated, n (%)</th>
<th>Energised, n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤30 years of age</td>
<td>1 (3.33)</td>
<td>15 (50.00)</td>
<td>14 (46.66)</td>
</tr>
<tr>
<td>31–45 years of age</td>
<td>2 (6.89)</td>
<td>23 (79.31)</td>
<td>4 (13.79)</td>
</tr>
<tr>
<td>46–61 years of age</td>
<td>4 (13.79)</td>
<td>10 (66.66)</td>
<td>1 (6.66)</td>
</tr>
<tr>
<td>&gt;61 years of age</td>
<td>1 (100.00)</td>
<td>0 (0.00)</td>
<td>0 (0.00)</td>
</tr>
</tbody>
</table>

Source: Authors
In regard to the pharmacy location, respondents working in pharmacies localized in residential housing developments feel most “concentrated” (76.00%). Pharmacists working in shopping centers feel least “concentrated,” while at the same time, they are the most tired of all pharmacists.

Table 6: Respondents’ state of mind during their work at a pharmacy depending on the location of a pharmacy (n = 75)

<table>
<thead>
<tr>
<th>Location of the pharmacy</th>
<th>Tired, n (%)</th>
<th>Concentrated, n (%)</th>
<th>Energised, n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical facility or health centre</td>
<td>2 (8.00)</td>
<td>15 (60.00)</td>
<td>8 (32.00)</td>
</tr>
<tr>
<td>Shopping centre</td>
<td>5 (20.00)</td>
<td>14 (56.00)</td>
<td>6 (24.00)</td>
</tr>
<tr>
<td>Residential housing development</td>
<td>1 (4.00)</td>
<td>19 (76.00)</td>
<td>5 (20.00)</td>
</tr>
</tbody>
</table>

Source: Authors

Discussion

Increasing demands on professional and communication competencies, rising competition in healthcare, and integration of healthcare services all impact sustainability of a traditional manner of pharmacy development. The emphasis on quality of pharmaceutical care lies above all in the responsibility toward the patient. Nowadays, it is important to give enough space to the satisfaction of professionals – pharmacists as well and to look for new opportunities to improve their professional life. A positive evaluation emerged from a study of the American Pharmaceutical Association, regarding the quality of professional life of pharmacists in a pharmacy environment, and focused on issues pertaining to work satisfaction, career advancement, realisation of plans of organizations, and patient care. However, it discovered differences in the quality of professional life related to practice in the area of primary care,
depending on demographic and gender variables. Urbonas et al., 2010 conducted a study in Lithuania focused on the professional satisfaction of pharmacists. This study analyzed the attitudes of pharmacists toward the quality of pharmaceutical care. Their results showed the positive evaluation of pharmaceutical care by the pharmacists. However, the individual healthcare systems of the European Union still do not pay enough attention to the professional satisfaction of pharmacists. Moreover, financial remuneration impacts the quality of pharmaceutical care as well. The study carried out by Mosadeghrad et al., 2008 endorse the fact that financial remuneration could increase the level of professional satisfaction of pharmacists, and thus improve the quality of provided health services.

Conclusion
Patient satisfaction is one of the main indicators of the quality of provided pharmaceutical services. The identification of weak points in the pharmaceutical profession and subsequent targeted solutions open possibilities for increasing professional satisfaction and self-confidence of pharmacists as healthcare workers. The knowledge of needs and problems of the profession is the essential precondition for its continued successful development, and its position in current as well as future European and Slovak healthcare systems. Our primary goal was to carry out a local analysis using a questionnaire evaluating various dimensions of the professional satisfaction of pharmacists. We have analyzed individual dimensions of pharmacists' professional satisfaction, assessed their quality of life in the context of their professional satisfaction and evaluated the impact of selected characteristics (age, location of the pharmacy) on their quality of life. The results of our study suggest that professional satisfaction of pharmacists in Bratislava is evaluated positively.

References
ART MANAGEMENT: A NEW DISCIPLINE ENTERING THE CULTURAL AND ACADEMIC LIFE IN PLOVDIV

Vasil Kolev,1 Asya Ivanova2

Abstract: This paper presents the conditions of economic and political changes within the 90s in Bulgaria and the necessity of a new way of thinking at managing cultural institutions in the conditions of the market economy. As a response to that problem it was created the first of its kind in Bulgaria master’s degree program „Art management.” For that purpose a brief overview of the formal models of funding the arts worldwide are presented along with the characteristics at regional levels which led to the creation of the new educational programme. The main disciplines studied in the educational module aiming to develop a new set of skills among artists are listed with a brief introduction of their scope. A local survey conducted at the Academy of Music, Dance and Fine Arts – Plovdiv, analyzing the interest of the first of its kind in Bulgaria master’s degree program „Art management” is presented. The initial result of the evolution of the educational programme based on the number of students enrolled per year are the motivation for the start of a larger research project “ÄRT” funded by the SRF, Ministry of Education and Science.

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Keywords: art management; arts funding, university education

Arts and management

Art is one of the greatest achievements of human civilization. Communicating with it elevates, enriches and ennobles us making us better, wiser and more sensual. The pleasure and joy that people experience when communicating with art would not have been possible without the targeted and actual implementation of management of Art or as it’s called in this specific area art management. (Busheva, Stoichkova, Aratunyan-Vasilevska, & Konstantinova, 2014, p. 7)

One result of the political and social upheaval of the last 400 years has been the establishment of institutions designed to provide continuing support and recognition for the artist and the arts. The increasing complexity of an industrially and technologically based society hastened the shift from the artist-manager as the dominant approach to organizing and presenting the arts. As many communities began to establish arts institutions late in the nineteenth century, year-round management experts began to emerge. Many arts institutions now appear to be organized along patterns similar to large business corporations. (Byrnes, 2013, p. 24)

Economic realities for the arts at 20th century

Although management is a unique activity growing for centuries, particularly in arts management is even more specific in terms of the final product and the need for realization not only of creative excellence, moral and cultural benefits but also financial results.

Irrespective of the large economic costs of modern developments of arts and placing them at free market conditions, there was no serious research nor any publications on the economics of the arts until the mid-60s. Pioneers in the area of economics of the arts are two American scientists William Baumol and William Bowen, who in 1965 published their work “On The performing arts: The anatomy of their economic problems” after conducting vast economic research in the USA, United Kingdom, Australia and New Zealand on the economic and financial difficulties the arts were facing.

Baumol and Bowen determined the main economic principles under which the arts functioned and the real necessity of outside financial aid. They laid the foundations of the so called “positive theory of financial aid of the arts” (Baumol & Bouen, 1965).

In the modern world there are various forms of financial support for the arts. In her work "Management of the Arts" Lydia Varbanova a Bulgarian scientist examines the evolution of the forms of State funding and the involvement of market principles in the arts world and determines the existence of three formal macroeconomic models:

- Model of full State finding of the arts- this model is spread across Central and Eastern Europe between the 50’s and the 90’s and its main characteristics are:
  1. The State is the main financial source for development of creative organizations
  2. Cultural politics are orientated to direct financing of the arts

1 Academy of Music, Dance and Fine Arts, vasko_kolev@abv.bg
2 Academy of Music, Dance and Fine Arts, asiaiv71@gmail.com
3. There is little diversity in the forms of organization of cultural institution
4. There is stability in the development of the arts
5. There is no market for the arts
6. The arts are accessible for wide audiences

- **Model for development of the arts at free market conditions** – this model originated in the USA and its main characteristics are:

Main institutional form of the creative industries is private organization
1. Managers in the arts are mainly mediators between the artists and the audiences, with a main concern of selling the art product
2. There is a wide and developed market for art products and artists
3. The artists are mainly temporarily hired for a specific performance

- **Mixed model for developing of the arts** - this model originated in the United Kingdom and today is widely spread across Europe. The proportions between state funding and financing at market principles varies between different countries. The mixed model has the following characteristics:
1. Different sources of financing are available- state, private sector, variety of forms of charity
2. There is a wide variety in terms of purpose of creation, financial sources, forms of organization and management for the creative industries
3. Part of the art organizations are funded by the state, the rest are funded by themselves mainly with selling their art products

In the contemporary world of arts the differentiation of the tree models is more theoretical then practical. The American free market model "has been fractured” in the 60’s with the creation of the National Endowment for the Arts, stabilizing the legislation for encouraging the investments in the arts and the emergence of the first non-profit organizations, today it is leaning more towards the mixed model for development of the arts. (Varbanova, 1997, pp. 46-49)

**The necessity of change and the response of the academic society**

In Bulgaria after the political changes in the 90’s and the transition to democratic government and free market economy, the model for development of the arts has changed from “state funding” to “mixed model of funding”. The state funding of the cultural industries was reduced but it is still the main source of income. The art organizations were facing the necessity of raising additional funds thru ticket sales, outside sources - sponsors, patronage and charity. In that point of time the functions of the art managers were strictly administrative, but the transition from centralized state funding and management of the arts and placing them in market conditions requires from the art managers to build a vaster and more comprehensive management skill set.

In response to the need for new management skills the Academy of Music, Dance and Fine Arts - Plovdiv developed a new educational module for Master’s degree “Art management”. It is the first educational program of its kind in Bulgaria. The main disciplines included in the program are:

- "Art management” – studies basic management theories, characteristics of business environment in terms of specific organizations associated with different types of art, basic management functions, the stages of the management process; It aims not only to acquire knowledge but also to develop skills to carry out all management tasks in the arts.

- “Legal Framework and Cultural Policy” - it aims to give students basic knowledge in the matter and should help them to develop sound knowledge on the use of the art products as well as ways to prevent unregulated and illegal exploitation of intellectual property.

- “Cultural Industries” – studies structure, organization and management of various art organizations in the field of cultural industries.

- “Public Relations” - studies the role and importance of communications and public relations in modern society; the connections between the concepts - public relations, popularity, marketing, advertising and publicity; the functions of PR in various organizations and their place in the organization structure.

- “Marketing” - the aim is to give basic knowledge and initial skills in marketing and advertising, developing skills to conduct market research and the organization of successful advertising.

- "Project Management"- the accession of Bulgaria to the European Union in 2007 opened new opportunities for securing additional external funding for the art organizations through
participation in projects under the programs financed by European funds, leading to the addition of a new discipline in the tuition module.

The tuition program is fully customized and aimed at developing managing and marketing skills in the field of arts at the conditions of the market economy.

As we all know any change in the routine of our lives is perceived to be difficult. The presentation of the new training module of the Academy of Music and Dance Arts raised mixed opinions and the interest in the program was not high as it can be seen from “Figure 1” representing the number of students enrolled in the specialty since its existence (please mind that the Academy is a boutique University with 800 students in total).

![Figure 1. Art management students since the creation of the program](source:Authors)

The first students who signed up for the new educational program in master’s degree were bachelors from the Academy of Music, Dance and Fine Arts – Plovdiv. After graduation, the first students found easy realization as managers in the cultural industries and one of them created his own boutique theatre. In subsequent years, the interest in the specialty has increased not only from students of the Academy who perceived “Art management” as a natural development of their education, but also by managers of cultural institutions conscientious of the necessity of obtaining managerial skills. A curious fact is that after the first four years of existence of the program, interest in the specialty was expressed by people who had no previous education in the arts. The increased interest in the program and stable number of students over the years led to a natural inclusion of “Arts management” as an education module in other universities in the country under different names.

**Conclusion**

In conclusion, we can say that the Academy Of Music, Dance and Fine Arts laid the foundations of the “Art Management” in Plovdiv and that the impact of its development will have a beneficial effect across all cultural industries in Bulgaria. None-the-less the specialty “Art Management” is in total compliance with the idea of an university education – to create interdisciplinary and thinking professionals. The results of the survey in the Academy of Music, Dance and Fine Arts were the motivation for the initiation of a lager research project „Art management: Plovdiv – new tendencies and classical art (ART)“.

**Acknowledgment**

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**References**


FROM CREATIVE THINKING TECHNIQUES TO INNOVATIVE DESIGN SOLUTIONS – THE EDUCATORS’ PERSPECTIVE

Joanna Maria Kowalewska,1 Maria Jolanta Soltysik2

Abstract: For every designer, it is crucial to be creative. But generating new, innovative ideas tends to be a difficult task. Nevertheless, some technique can be used to improve the quality of the designing process. Getting knowledge about such tools can be of much value for all future architects and engineers. This article presents an original academic course, which was inaugurated in 2015 at the Faculty of Architecture in Gdańsk University of Technology and organized for the first year students of Spatial Planning. The course was repeated in 2016 and is being currently led in 2017. The title of the course was ‘Garden Cities and the Gardens in the Cities. A Course with Elements of Training Creativity’. The aim of the course was to encourage the participants to develop their creativity by introducing creative thinking techniques and thus to facilitate their projects. Among the recommended creative thinking techniques were mainly the ones presented in the ‘Odyssey of the Mind’ educational program, including such techniques as the ‘Mind Map,’ the ‘Brainstorm’ and the ‘Superheroes.’ Moreover, during the study, participants had a chance to improve their team working skills. The practical usage of the introduced innovative methods was to be tested on issues concerning green environmental projects in urban areas. At the end of the course, most of the participants declared, in the final students’ questionnaires, to use the recommended techniques in future, and that they strongly appreciated all that they had learned during the study.

UDC Classification: 37:[71+73] ; DOI: http://dx.doi.org/10.12955/cbup.v5.1005

Keywords: creative thinking, problem-solving techniques, academic course, innovative designs, team working skills

Introduction

In this article, we present a structure and basic tasks of a new original academic course, which was introduced at the Faculty of Architecture in Gdańsk University of Technology (2015, 2016, 2017). We describe the main parts of the course in detail, which were: theoretical background lectures, creative ‘warm-up’ activities and problem-solving techniques. At the same time, we paid attention to another basic aim of the course, which was the development of team working skills of the participants. In the last part of the article, we present the process of evaluation of the students’ work and the final results of the students’ questionnaires.

Traditional and non-traditional way of creating projects

Traditionally, at the beginning of the creation process, a designer usually sits over a blank sheet of paper and tries to find an idea for the project. More often than not it is quite difficult to get one. For many reasons, one can be ‘blocked’ and needs help to proceed with his work. Therefore, the architects and designers should know that there are several specific techniques to facilitate the designing process. These techniques give us a tool – a detailed instruction what actions to undertake in order to generate many creative ideas for our project. However, the question is: how to teach the future designers about the non-traditional, more innovative ways of design? How to teach them ‘the problem-solving techniques’ and ‘creative thinking’?

Innovative course for students

The above questions were the primary drivers for introducing a new academic course for the first year students of Spatial Planning at the Faculty of Architecture in the Gdańsk University of Technology in the year 2015. The title of the course was ‘Garden Cities and the Gardens in the Cities. A Course with Elements of Training Creativity’. The 15-hour course consisted of seven meetings, six of which were divided into three parts: a theoretical background lecture, creative ‘warm-up’ activities and implementation of problem-solving tools and techniques. The course ended with a final presentation of the project (at the 7th meeting), which was entitled ‘The Fantastic Innovative Green City.’ Every group of students had to do one such presentation, which needed to contain five obligatory elements: (1) A keynote-slogan of the city; (2) An original architectural idea for a Vertical Farm; (3) An unusual building/structure covered with a green roof; (4) One defined social or spatial problem to be solved by citizens; and (5) At least one other green or ecological solution created by the group.

1 Faculty of Architecture, Gdańsk University of Technology, joanna.kowalewska@pg.edu.pl
2 Faculty of Architecture, Gdańsk University of Technology, mjsol@wp.pl
Some parts of the course were inspired by the famous worldwide program – ‘Odyssey of the Mind’ (Kowalewska, 2016). It is an international educational project, introduced in over 25 countries. It promotes a creative, problem-solving competition, that was developed and started in 1970’s at Rowan University in New Jersey in the USA (Creative Competitions Inc., 2017). In that competition, teams of up to 7 members, in four age divisions (from primary school to university students) compete in two basic categories – long-term problem-solving presentation and spontaneous problem-solving presentation. The long-term problem-solving presentation is an eight minute public performance on a given topic, prepared by the team before the competition; whereas the spontaneous problem-solving presentation is a short answer to the task, given to the team at the day of competition to be solved right away in a few minutes (Odyssey of the Mind Polska, 2017). One of the authors of this article has been a team member of that program and since 2004 has been a volunteer for Polish part of the ‘Odyssey of the Mind.’ Therefore, using this experience in her educational practice seemed to be a natural consequence and resulted in the organization of the training creativity course at the Faculty of Architecture in Gdańsk in 2015.

The first part of the class: a theoretical background lecture
At the beginning of every meeting during the course, the teacher was presenting a theoretical background of the subject. Since the main theme was ‘Garden Cities and the Gardens in the Cities,’ every lecture reflected the different aspects concerning the most important ‘green’ solutions for an urban space in modern history. Among those solutions were: (1) the idea of Howards’ Garden Cities of Tomorrow; (2) the concept of green roofs; (3) the modern projects of vertical gardens; (4) the contemporary idea of vertical farms; and (5) the new concept of a social farm. There were two goals in those lectures. The first was to deliver a basic knowledge about some significant historical and contemporary solutions for green urban areas, and the second was to inspire innovative ideas as a good continuation of the former creativity - not just a repetition.

The second part of the class: creative ‘warm-up’ activities
The second part of each class were short ‘warm-up’ activities, stimulating the participants’ way of thinking. In order to prepare students for creative work during the further part of the meeting the lecturer gave them a simple task, involving invention and innovation. The task could be connected with a sort of design, drama or artistic activities, performed either in a team or individually. At the same time the teacher encouraged participants to look at the problem from a few different perspectives, preferably quite unusual ones. Some of the tasks could be inspired by the spontaneous part of the ‘Odyssey of the Mind’ educational program and could introduce a kind of competition between the groups of students. For example, during the 2016 year course, the chosen task-competition was ‘who would build more bridges connecting two tables in a limited time and using limited materials.’ After that competition, the winner group was presented with a catalog of ecological solutions in urban areas. Figure 1 presents a photo of one of the groups solving this task.

The third part of the class: the problem-solving techniques
The last part of every class in the course was the introduction of so called problem-solving techniques. Students could learn how to use this tool to solve their designing problems. For example – to make the final design of ‘The Innovative Fantastic Green City’ each group of students was asked to generate at least 60 ideas, using for it all of the five recommended problem-solving techniques. Those techniques were: the ‘Mind Map’ technique, the ‘Brainstorm’ technique, the ‘Problem Reversal’ technique, the ‘Superposition’ technique and the ‘Superheroes’ technique. They are today the most popular thinking techniques during various kind of workshops.

The ‘Mind Map’ technique, in its contemporary form and under this name, is known since the 1970s when it was popularized by Tony Buzan. According to Buzan (2005), it is a graphic technique used to unlock the capability of the brain to develop creativity in solving problems. To use this tool one has to write a keyword in the center of the sheet of paper, and then, around the keyword, a few associations and memories connected with it. The next step is to write other associations to the ones already noted, creating kind of a tree or a map. Those notes could be in the form of graphic images or simple words, drawn or written in different colors. Part of the process of the ‘Mind Map’ creation is shown in Figure 2.
The ‘Brainstorm’ technique is the most popular one of all the creative problem-solving techniques, and is based on noting down all the answers and ideas that can be given to the chosen ‘primary question.’ It was invented by Alex Osborn in 1950s. Osborn (2009) indicates four main rules of the technique. The first of them says to leave away criticism, as at the first stage of the technique there is no such thing as a wrong answer. The second rule is that the wild ideas are much welcome. Next guideline highlights that the more ideas would be noted, the more possible it is to find a creative solution. The last one recommends to combine and improve answers and ideas using them as an inspiration for further actions. Consequently, a group of participants simply write down all the answers to that ‘primary’ question that come into their minds. That technique has also some modifications. Among them there is the ‘Problem Reversal’ technique, introduced by Charles Chic Thompson. According to Thompson (2007) starting the ‘Brainstorm’ with a reversed question may bring even more innovative and adequate results.

The next technique introduced during the course was the ‘Superposition’ technique. This one refers to the ability to connect distant things and phenomena. As Szmidt (2013) indicates it rests on connecting two or more objects to get a new one after proper modifications. Firstly, the user writes associations to some separate objects. Later, he draws individual associations to different objects and tries to connect them creating a new idea.

The last technique introduced during the course was the ‘Superheroes’ technique. It was created by Arthur B. Van Gundy and its main goal is to look at the given problem from the new perspective – perspective of a superhero. At the beginning, the group of participants notes a problem to be solved and some names of superheroes. For each of the heroes the group writes down also the hero’s superpowers and all the team members have to recognize all of the chosen characters. Then the team writes down how each of the superheroes would solve the given problem using his superpowers. Further on, as Lewandowska-Walter et al. (2015) describes those ‘super’ methods are converted or are the inspiration for inventing the ‘real’ methods of solving the problem.

Every part of the final students’ presentation had to be done by a different technique. The ideas for the keynote-slogan for the city ought to be developed with the ‘Mind Map’ technique. An original architectural ideas for a Vertical Farm should be created using the ‘Brainstorm’ technique, while the concepts of an unusual building or a structure covered with a green roof had to be generated with the ‘Problem Reversal’ method. The ‘Superheroes’ technique should be used to prepare one defined social or spatial problem to be solved by citizens, whereas the ‘Superposition’ technique ought to be employed to create at least one other green or ecological solution to the design of ‘The Fantastic Innovative Green City.’

Team-work activities
The crucial part of the course were the teamwork activities. They were very important in developing the ability of cooperation, which was and still is one of the most desired manpower ability at the labor market according to Lowden et al. (2011). During the whole course, the students worked in groups of 5 to 7, creating their final project presentation together. The groups were chosen randomly during the first meeting. In the beginning, some students did not like that idea, but in the end, it appeared that the
majority of them appreciated the possibility of working with teammates they would never choose by themselves. In that way, members of the groups had different backgrounds, attitudes, styles of working and experience, which as the result gave a greater variety of ideas. To strengthen the groups’ identity, every team had to choose their name. The names were arbitrary, like for example Urban Heroes, Blue Forks or Fantastic Designers of Green Cities – as were the ones chosen during the course in 2015 and 2016. From the teachers’ perspective, it was also important that every student had to work with many others because during the warm-up activities groups were chosen each time differently. But the final project was done by the ‘basic’ teams – the teams with names.

Final presentations
The results of the teams’ work were presented during the 7th meeting. Time of presentation was strictly limited to 10 minutes. The method of presentation was facultative. Even though some of the groups (5 out of 13) chose simple PowerPoint presentation, there were also many other interesting forms of final reports, such as drama, songs, films, and models. Figures 3 and 4 show some of the final presentations of the 2016’s course.

<table>
<thead>
<tr>
<th>Figure 3: Students’ final presentation with a keynote ‘Clean air – pure thoughts’</th>
<th>Figure 4: Students’ final presentation in the form of drama</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Image" /></td>
<td><img src="image2.png" alt="Image" /></td>
</tr>
<tr>
<td>Source: Author</td>
<td>Source: Author</td>
</tr>
</tbody>
</table>

**Evaluation criteria**
To ensure that the students obtain fair and differentiated marks at the end of the course, there were three main evaluation criteria. Each team got the scores for the group project presentation, but at the same time each individual got scores for the involvement and presence in the class.

Scores for the group’s presentation
Each of the five obligatory elements of the presentation was scored for its originality and degree of refinement. Teams also got scores for the cohesion of all the elements of the project and originality of the presentation form. In every category, the group could get 10 points. Additionally, if all members of the group took part in the presentation, they could get ten extra points.

Involvement in the preparation process
As the educators were not able to observe each individual’s involvement in the team’s work, this part of the evaluation was made by the students themselves. Every student was asked to value the teamwork and involvement of the other members of the group, sharing among them 100 points in both categories. A large majority of the students divided points evenly. However, some of them differentiated the scores to reflect the actual individual involvement and thereby influenced the final marks of their teammates.

Attendance during the course
In this type of the course, which was focused on the teamwork activities during the class, it was not possible for the students to make progress without a presence in the class. Scores for attendance were an integral part of the mark. However, individual cases were discussed if needed.

**Students opinion in questionnaires**
At the end of each year of the course, students were asked to fill the questionnaires. After the courses in 2015 and 2016 there were 84 participants in total that filled the questionnaires. The questions referred to each part of the class. In the first part, there were questions testing the overall opinion of the course, checking whether it was interesting, attractive, and useful for the participant. In further
three parts, the teachers asked the detailed questions to verify how students valued the blocks of the theoretical background lectures, the warm-up activities, and the problem-solving techniques. In the last part of the questionnaire, there was some space for comments. Below, the authors of the article are presenting detailed results of each part of the questionnaires, filled after the courses in years 2015 and 2016.

Students’ overall opinion of the course
At the beginning of the questionnaires, the participants were asked if the course was interesting. The answer ranged from 1 to 5 points, which indicated the range from ‘not interesting’ to ‘very interesting.’ 42% of the students gave the course the highest score, 37% marked 4 as a score in this category. Seventeen students ticked middle score (3 points), only 1 person selected 2 points, while no one stated that the course was not interesting.

Next, the students were asked if the course was attractive. As it had happened earlier, they could give from 1 to 5 points as the answer. 39% of the respondents gave the course the highest score, and the same number of respondents chose 4 as a score in this category. Fifteen students (18% of the surveyed) ticked the middle score, two students selected 2 points as an answer, and only 1 person judged course as not attractive at all.

The results of the students’ evaluation concerning the usefulness of the course were slightly worse. 53% of the respondents gave the course the highest scores (5 or 4 points). Only one person judged the course as not useful at all, while ten students selected 2 points as their answer. Figure 5 shows that 33% of surveyed students ticked the middle score.

Students’ opinions on the theoretical background lectures
Further part of the questionnaire had four questions concerning the theoretical background lectures. The first question in this part tested whether the gained knowledge at this part of the course would be used in future. The possible answers were: definitely yes, rather yes, maybe, rather not, definitely not. Most of the participants (65%) chose ‘rather yes’ as an answer, fifteen students (18%) seemed to be sure to use this knowledge in future, whereas 17% selected ‘maybe’ as an answer. No one declared not to use the theoretical knowledge of ‘green’ solutions in urban areas in future. Then the students were asked to choose the ‘green’ solutions, which were presented during the lectures and which they liked most, and reckoned as the most effective and useful in future. 40% of the participants chose green roofs as the solution they preferred, and 43% of them pointed out that solution as the most probable to be used in future. On the other hand, the biggest group of students considered not only green roofs but also vertical farms as the most effective ‘green’ solution for urban space. This data are presented in Figure 6.

<table>
<thead>
<tr>
<th>Figure 5: Respondents’ answers to the question: To what extent was the course useful?</th>
<th>Figure 6: Respondents’ answers to the question: Point ‘green’ solution you consider the most effective</th>
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<tr>
<td><img src="image1.png" alt="Figure 5" /></td>
<td><img src="image2.png" alt="Figure 6" /></td>
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Source: Author
Students’ opinions on the warm-up activities

Four questions concerning the warm-up activities were in the next part of the questionnaire. The first of these questions verified whether the tasks given during those activities would be useful in future. The possible answers were: definitely yes, rather yes, maybe, rather not, definitely not. The total of 28% of the participants declared that they ‘rather’ or ‘definitely’ would use that kind of activities in future, while 26% would ‘rather not’ or ‘definitely not’ use them. The most numerous group of students (39 persons) selected ‘maybe’ as the answer though. Then the students were asked to choose the warm-up activity that they liked most and considered the most efficient and useful in future. In that category, they pointed out the spontaneous task of the ‘Odyssey of the Mind’ as the most popular (28%), the most efficient (29%) and the most probable to be used in future (32 %) kind of warm-up activity. But as it can be seen in Figure 7, every warm-up activity presented during the course was declared to be used in future by at least ten students. What is more, only 8 out of 84 participants did not point out any of those tasks.

Students opinion on problem-solving techniques

Another part of the survey concerned the problem-solving techniques introduced during the course. The first question examined whether respondents would use them in future. The possible answers were: definitely yes, rather yes, maybe, rather not, definitely not. The great majority of respondents (84%), declared ‘rather yes’ or ‘maybe’ as the answer, while eight students (10%) were sure to use the techniques in future. As can be seen in Figure 8, only 6% of participants answered ‘rather not’ or ‘definitely not.’

Figure 7: Respondents’ answers to the question: Point warm-up activities that you would use in future

Figure 8: Respondents’ answers to the question: Would you use problem-solving technique in future?

Then the students were asked to choose the technique that they liked most and considered to be most effective and useful in future. The technique which was pointed out was ‘Brainstorm,’ and it was chosen not only as the preferable technique but also as the most effective and useful in future by 28-31% of participants. Seven students regarded every of the introduced techniques as useful and only five people did not choose any of those tools.

Students’ suggestions and comments

In the last part of the questionnaire, there was some space for the students to write their suggestions and comments. Only 26 out of 84 students decided to enter a few remarks. The majority of the comments were positive – saying that the course was very nice and suggested that there should be more hours devoted to it. However, 12 comments could be qualified as negative - four of them concerned the organization issues while eight claimed that the atmosphere of the course was too relaxed and that tasks were too easy.
Results of the questionnaire

To summarize the above-mentioned results of the questionnaire, most of the participants considered the course to be interesting, attractive and useful. What is more, the great majority of the students declared to use the achieved theoretical knowledge about the ‘green’ solutions for the cities in future. Furthermore, the majority of the participants allow the possibility of using the warm-up activities as well as the problem-solving techniques in practice.

Conclusion

If we take into account the high quality and variety of students’ projects presentations, as well as the good results of the students’ questionnaires, the conclusion is that the goals of the course were achieved. In particular, the structure of the course appears to be correct, it was properly led and evaluated. Nevertheless, there is still room for improvement, regarding mainly the organization matters and the teachers would introduce them. But the fact is, that after the 2015 year edition, the teachers were asked to repeat the course in the years 2016 and 2017. It means that not only was it appreciated by the students but also by the staff and head of the Faculty of Architecture.

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HOW UPRISING IN ROMA FAMILIES HAS CHANGED OVER THE CENTURIES
Michal Kozubík,1 Barbora Odrášková2

Abstract: This study compares family upbringing in Slovak Roma during the 18th century with that of current times. It attempts to identify parallels between the Samuel Augustini’s 18th-century masterpiece: Gypsy in Hungary, and more recent data from a long-term study of Roma people in the eastern Slovakia–Poprad District. Open and axial coding inspired by the Strauss and Corbin Grounded Theory method is used to analyze the data. The primary results reveal that the common feature in all social classes of the settlement is a strong relationship between children and family. The poorest parents fail to provide adequate living conditions. Their children are brought up on the ‘street’ and come home only when hungry, thirsty, or want to sleep. Parents do not support further education of their children for several reasons: fear of an unknown environment, distrust of most educational institutions, or financial benefit of the family.

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Introduction
Despite the Romological literature containing many scientific works and quality final research reports, there exists a gap in knowledge regarding the field of Roma education, with centuries of literature focused on inhabitants of Eastern Slovakia segregated settlements. The traditional Romany culture of Wallachia Romany is recorded in more detail. First, the work by Horváthová (1964): Gypsies in Slovakia, to date, is unbeaten in its complexity of detail. Socio-cultural regulations are described in detail in, Amáro Trájo [Our Life], by Wallachian Roma authors, Stojka and Pivoň (2003). However, this study focuses on the almost forgotten work of Samuel Augustini ab Hortis: Gypsy in Hungary (1775–76). In fact, this is the very first ethnographic work dealing with Roma life in the territory of Slovakia. This work contains information about the origins of Roma based on the work of several European period scholars. One motive for writing the Augustini monographs was the radicalization of opinions of a part of the Hungarian public for solving the ‘Gypsy’ issue. The situation, after more than two hundred and fifty years, may be similar. The aim of this study is to analyze the work of Augustini, to identify parallels between the past and present in the context of cultural change affecting the Roma living in the Podtatransky Region. Theoretical sensitivity and ethics of scientific research were considered in writing this article. The study of the traditional elements of Roma culture cannot be done “at the table” (Kozubík, 2015, p. 8). The history of famous anthropological works that record the study of culture from a distance includes the notable work of Benedict (1946). This present study explores the Roma culture through fieldwork, centered on the environment of Eastern Slovakia settlements. The aim was not to explore in a manner type regarded by Roma as “a ‘gadjo’ [white man, non-Roma] explores the Romany in the tube” (Kužel, 2004, p. 9). The examination of classes of cultural phenomena in a given environment requires considerable knowledge from social science disciplines. Some time was spent directly in the settlement, shaking hands, eating, and drinking with the residents. Such an approach is thought to bring new dimensions of knowledge (Kozubik 2013; 2015).

Data and Methodology
The study involved ethnographical field research. Ethnography combines various techniques and methods of data collection and evaluation (Brewer, 2000). It can be defined as the study of people in their natural environment using methods that describe their social perception and everyday experiences. It requires the direct and active involvement of the researcher.

1 Michal Kozubík, Faculty of Social Sciences and Health Care, Slovakia, mkozubik@ukf.sk
2 Barbora Odrášková, Faculty of Social Sciences and Health Care, Slovakia, barbora.odraskova@ukf.sk
Samples

Methods of data collection involved observation, individual and group interviews, and collation of artifacts, and historical and current documents and videos.

Study Location

There were several reasons for selecting Popradský region in Podtatranský district. One was the parallel in origins of Augustini ab Hortis Samuel and an author of this article. Both authors were born under the Tatra Mountains; Augustini in Veľká Lomnica (b. 1729) and Kozubík in Poprad (b. 1981), and thus, both can relate to the life of the Roma under the Tatras. Moreover, an important consideration was that Augustini described the culture of Roma in a geographic area familiar to the author.

Analyses and Reporting

The work was analyzed and interpreted using ‘thick description’ (Geertz, 1973) and ‘grounded theory’ (Strauss and Corbin 1997). The Geertz’s method treats the social science data in a way that recognizes cultural context and examines the sense of the observed phenomena. Geertz stressed that explaining social science is not necessarily simple, but rather involves the replacement of complicated images with simpler ones with the impressive clarity often associated with plainer illustrations (Geertz 1973, p. 33).

Geertz further stated:

In finished anthropological writing … this fact that what we call our data are really our own constructions of what they and their compatriots are up to – is obscured because most of what we need to comprehend a particular event, ritual, custom, idea, or whatever is insinuated as background information before the thing itself is directly examined. (1973, p. 9)

This original citation illustrates Geertz’s work most appropriately.

Results and Discussion

Roma Upbringing in 18th Century

The most critical passages of Augustini’s work can be found in the description of education for Roma children: “Their lack of morals and exuberance cannot be attributed to other causes, but the lack of education.” When closely monitoring the text of Gypsy for any changes in Roma education, which extends from birth to adulthood, one realizes that not only Augustini’s physical but also his mental balance is being devastated, degraded, and disgraced (Augustini, 1775). The next part of the text is similarly critical. One of the most important views applicable to this day is his opinion that: “…their marriage and household is then in the same mess they have seen and learned from their parents” (Augustini, 1775, p. 26). He also states that Roma “people are extremely fertile” and from early childhood, they teach their own children to steal. He even writes that Roma mothers defend themselves against attacks and strikes to their small child, who they usually carry wrapped in a sheet. Finally, he notes that there is a small group of families that are “similar to other useful people.”

Roma Upbringing in 21st Century

Being present among Roma families and children is one of the most important focuses of social work with these families. Field social work that involves staying within the natural environment of socially deprived families is essential for determining the family history and for other professional and consulting practices. Where the education of preschool-aged children is severely neglected, it is the duty of social workers to intervene. The most commonly applied and effective tool is the establishment of a special beneficiary. The introduction of such a role is regulated by §23 of Act no. 417 of 2013 on material needs. In the environment of segregated settlements, most frequently the village acquires this position. The Office of Labour, Social Affairs, and Family designates the special beneficiary, especially when the existing provision of benefits in material needs does not fulfill its purpose. In such cases, the financial support intended to cover basic needs for the children is misused for various reasons. In particular, this misuse includes incompetent spending, “everything is spent in three days,” usury, and expenditure on alcohol and other social-pathological phenomena. Where a village has a field social worker, the responsibility for this agenda becomes theirs primarily. Considerable power accumulates in the hands
of these professionals. They have the right to work with the family and divide and use the allowance to satisfy basic needs of the children and the family. The fact that raising children is gradually changing for the majority of the population is evident in the testimony of H.R. (25–30 years old, female):

We had an education of a ‘strict hand.’ This we could not do what our children can now. Mama just looked at me, and I had to go into the bedroom and had to stay there for half a day. We were hungry, thirsty until she did not come to ask: kids do you want something to eat? But now I do not command my children, but they command me. But it is not only our children but also white; it is about all. We have respect for our parents. I have my own kids, but I do not light a cigarette in front of them. I have respect, you know.

The statement: “We do not command our children, but they command us” was a surprising finding in this study. The Roma themselves realize what it is like for the majority. But they cannot explain the resulting situation and what has changed between the education of their parents and themselves, as realized by a Roma man, P. A. (26 years old):

I think we fail in many cases. The emphasis is given to irrelevant rather than to the essential. You have more important things and less important things. I would say that there is something a little reversed. I noticed that the mistake in education among us, the Romany, is that we do not keep our word, and then the children are rebellious, that I have a problem with my mother, with my father. I, for instance, now that my kid is on the earth, I ignore it. It is screaming, no! I do not care! But some else yes. And listen, then when the child grows up, it boldly yells on father and mother! It can boldly gain what it wants. So it is no longer the word of a father and mother, but the word of a child. I see it as very bad and distorted, but in many, many families it is like this. Even I was raised like this.

While recording this interview in a modest cottage, there was a mother who was confronted by her son’s words. She expressed herself as follows:

Well, you were brought up like this, you were spoiled, but you never told me anything bad. This is already in you! You swore, okay, but you were five, six years old! But as you were 14, 15 years old you were a normal boy. (P.B., 50 years old, female)

The responses have been deliberately published word-by-word, in a slightly abridged version of the interview. Members of both middle and upper social classes, living in segregated parts of the study villages of Kravany and Hranovnica, expressed similar opinions. In what was considered the poorest classes of the settlements, the love of children was observed as immense. This observation was noted in everyday routines, for example, with the care of newborns, the mother would embrace her child lovingly, or the father would caress his son. Verbal responses can often be framed towards what the researchers want to hear. Hence the truth in these could be greatly distorted and they lacked adequate validation. However, it is difficult to fabricate the non-verbal communication, body language, looks, or gestures. Nevertheless, there were also opposite opinions:

Education is different when you compare the settlement, Mlynská street and SNP street (the poorest parts of settlement). They do not have the upbringing of children in the settlement. Children educate themselves; they only bring those children. We are divided into three groups, such as family (i.e., poor, settlement, author’s note), medium family and a better, higher family. Sometimes parents respected their children and children their parents. Then the parents cared about the education, attended parents’ meetings at school, there was a hall full of sitting parents, and they were interested. (L.H., 45 years old, male)

In all three social layers of the Roma community, the love of children was evident. These Roma children are the reflection of their culture. Few ‘white’ children are brought up on the street with a key around their neck. The Roma children are raised by the settlement. This contradiction is best described by a Roma woman (H.P., 40 to 45 years old):

We, the Roma people, terribly love our children. We would give them even our last; even the white kids do not have this what Roma children have. Every day with our children is sweet,
even if there is no money, I do not know ... even when she does not cook (mother), but she
gives the children what they want, mom will buy it to them, even if she does not cook what she
would like to cook. She cooks a full pot of soup, but she will satisfy her children. At least on
the 18th, 19th, 20th of the month (date of money allowance for poor people in Slovakia). It does
not matter which family, but they give their children also from the last. Last few years, the
children do not want to go to school on 18th, 19th, 20th, because they go to pick up allowances
with their parents. We can thus say that they cannot live off, they do not have, but they look
after the children. They love their children, but it is about the time and education.

Conclusion
Every day spent in the settlement was an experience, and each visit of a new family brought some new
knowledge. The atmosphere was unique in all respects. During the interview, people kept coming to the
house as children, family members, and others wanted to see a ‘gadjo’ [white person], who for them
was the journalist writing a book about their life and culture. They would mend the television and
position the satellite. The children were crying, and the adults were smoking tobacco from a rolled
cigarette. In this atmosphere, it was almost magical to talk about the relationship between parents and
children. The period of ‘enlightened’ is gone and so are the views of Augustini ab Hortis Samuel on
education. It is not just about the mothers who bear children into a pit, teach them to dance, collect alms,
and steal. Roma people, similar to Slovak people and all human beings, love their children and realize
that education is important, especially at a young age.

The main differences between centuries is more freedom in family education in the present. It shows
mainly in the independent decisions of the children: choice of partner and career. The principal common
thing which is the same within centuries is strong familial bond not only between close family members
but also between distant relatives.

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IDEAS ABOUT NATIONAL IDENTITY IN RUSSIAN LITERARY REVIEW,
HISTORICAL AND LITERARY DISCOURSES OF THE 19TH – EARLY 20TH CENTURY
Viacheslav Krylov¹

Abstract: This article analyses the evolution of literary reflections among the representatives of the 19th-early 20th-century trends and schools where ideas on national literature distinctness were formed. The study specifies both an invariant of the notions of national literature identity and individual variations that did not find further development in literary self-awareness. The essays of the 1870-80s suggest that there was formed an image of the original literature opposed to European literature. A new impetus to the problem of national identity in literature was attached to the era of the Silver Age; however, the analysis of the literary review, historical and literary discourses of the turn of the century leads to the conclusion that it was in this era that the ideology of literary centrum was further strengthened, and the exclusive status of Russian literature in culture received detailed reflection.

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Keywords: national identity, Russian, literary centrism, discourse.

Introduction
There exist well-known ideas made by foreign writers and researchers about the national originality of Russian literature. However, the study of a national identity requires a view made by the natives since the concept of identity presupposes a stable self-image developed in self-reflection and introspection. According to the British researchers Simon Franklin and Emma Uiddis, ideas about Russia and Russian... to a great extent are the fruit of those who can be called “the producers of culture” “in the broadest sense of the word” (Franklin and Uiddis, 2014). They also stated that a significant part of Russian culture, either directly or indirectly, to a greater or lesser degree, is addressed to itself and is permeated with the theme of Russia and Russianness (Franklin and Uiddis, 2014). Russian criticism, journalism, and the history of literature exist as a feature of culture in which the Russian theme is constantly discussed and dreamed of.

One of the forms of literary self-consciousness is criticism, especially the critical and aesthetic texts of the writers themselves, their declarations and manifestos. The ideas developed in them about Russian literature as a holistic phenomenon, its specific features, and national identity have undergone a long evolution – from the Romantics – Pushkin, Gogol, I. Aksakov, to the Symbolists – S. Vengerov and others.

The aim of this article is to present a comparative analysis of reflections on literary reviews of representatives of different trends and schools of the 19th-early 20th century, during which the construction of ideas about the national originality of literature was carried out. The materials and results of the research can be used in teaching the history of Russian literature. They also contribute to the study of the issues of national identity in Russian culture. In the course of the study, new questions arose related to the study of the fate of the literary-centrist ideology in the Soviet and post-Soviet epochs.

Data and Methodology
In recent decades, the topic of national self-identification, the study of the mythology and the ideology of imperial consciousness, their reflection in various cultural practices have been of interest in contemporary humanities. One of the latest issues of the independent Russian journal Novoe literaturnoe obozrenie was devoted to the theme “The Imperial Imagination and Cultural Policies”. The editorial staff rightly proceeded from the premise that “cultural texts and cultural sources can sometimes tell us more about imperial ambitions and fantasies than the openly declared political projects” (Prokhorova, 2017). Many researchers turn for the reconstruction of national identity to the texts of fiction, but even today literary review, historical and literary discourses are still on the periphery of the research interest. The basis of our research is the methodological idea that literary criticism is not only a reflection on literature, but also a discussion about the social structure of society, psychological problems; it is a way for a person to take a closer look at life. The concepts

¹ Kazan (Volga Region) Federal University, krylov77@list.ru
introduced by Wilde (1966), Frye (1973), Hartman (1980), and Man (1983) influenced our understanding of the literary review discourse.

Results and Discussion

The experience of German aesthetics was of great importance for Russian literature, including the impact of understanding of the nation and national identity that goes back to Herder and the German Romantics.

The topic of national identity dates back to the era of Romanticism. From the standpoint of the aesthetics of Classicism, this or that national manifestation in literature was recognized as an unauthorized deviation from the universal human norm which rested on rational grounds. But the pre-Romantics raised the topic much earlier. Here is an example of the opening of A. Turgenev’s “Speech on Russian Literature” read in “The Friendly Literary Society” in March 1801, “On Russian Literature! Can we use this word? Can it be an insignificant notion for something that does not exist?” (Turgenev, 1980). Following A. Turgenev, the famous slogan of the Russian Romantics “We have no literature” was developed by V. Kiukhelbeker, A. Bestuzhev, D. Venevitinov, A. Pushkin, and early Belinsky. All of them blamed the contemporary literature for imitation, reckless following of patterns, and oblivion of national identity. It should be noted that it triggered the mechanism of diachronic excluding of certain texts from the literature that Yu. Lotman wrote about: “Exclusion of certain texts from literature occurs not only synchronically but also diachronically; the texts written before the appearance of the declared norms or not related to them are considered non-literature” (Lotman, 1992).

D. Venevitinov in his article “On Enlightenment in Russia” (1826) argued that Russia had received everything from the outside; this concerned the feeling of imitation, complete absence of any freedom and true activity. He called the position of Russia in the literary world as “completely negative” (Venevitinov, 1980).

Romantic treatises were created in the rhetoric of the expected future, anticipation, passionate expectation of the original Russian literature. Romantics reasoned to a greater extent that we could have a truly folk poetry.

The most important Russian浪漫istic treatise “On Romantic Poetry” by O. Somov begins with a typically romantic thesis: “Literature of every nation is a self-explanatory picture of its customs, traditions and a way of life. Every writer, as if involuntarily, displays folk features. Thus, it is almost possible to guess the composition of a German, an Englishman or a Frenchman, at least in translation”. (Somov, 1974). Somov argued that the properties of poetry depended on the “spirit of the language,” “inclinations and customs of the people,” properties of the surrounding objects. (Somov, 1974). In Russia, there are all conditions for a truly original literature, free from imitations.

In this respect, the evolution of Belinsky's views on the specifics of Russian literature is indicative. There is good reason why his first significant work was titled “Literary Dreams.” Here Belinsky also noted the absence of Russian literature. Having put forward the thesis, Belinsky at the same time was full of confidence in the emergence of original literature:

“We have no literature. I repeat this with delight, with pleasure, for in this truth I see a pledge of our future successes. Take a good look at the course of our society, and you will agree that I am right” (Belinsky, 1948a).

Six years later, in the review “Russian Literature in 1840”, while reviewing the question of lack of literature in Russia, Belinsky argued, “The source of literature of the people may not be some external impulse or an external push, but only a world outlook of the people” (Belinsky, 1948b). According to Belinsky, Russian literature started with Pushkin – “this is not Russia’s acquaintance with Europe, but Europe’s with Russia” (Belinsky, 1948a).

The article “The general Meaning of the Word Literature” displayed a change of the tone of the assessment. European influence on Russian literature was interpreted by him from the standpoint of special properties of the Russian character (NB: long before Dostoevsky!). And in the review “Russian Literature in 1842” (after the publishing of “The Dead Souls”), he definitely said, “Our social life is predominantly expressed in literature” (Belinsky, 1948b). Literature strengthened “on the basis of
Russian nationality, entered the life of society” (Belinsky, 1948b). Thus, one can conclude that Belinsky was one of the first to state the fact of literary centrism in Russian culture.

Revealing the influence of literature on society, Belinsky noted:

“Our literature has created the morals of our society, raised several generations, and formed a kind of public opinion” (Belinsky, 1948c).

It was then that the tradition of criticism to determine not only the content properties of Russian literature but its enhanced functional role in society too was introduced. Henceforth, most of the discourses on Russian literature were created within the literary-centric focus. Rare voices of a different position do not change the general picture, but they cannot be ignored.

Thus, I. Aksakov, in his article “On the Exaggerated Significance Attached by Us to the Action of Literature”, expressed, contrary to the general opinion, an unexpected thought, “...because of our abnormal social development, literature does not mean what it must mean to us, it is forced by circumstances to play a role that is not characteristic for it, and, in fact, illegal. In all other educated countries, literature is one of many organs by which the actions of the social organism are committed” (Aksakov, 2006). This is no longer a recognition of merits, as Belinsky did; an exaggerated significance of literature is a “wild anomaly” (Aksakov, 2006).

The Slavophil discourse excluded a positive influence of such literature on society, the tyrannical power of literature was an imaginary power. This trend was continued in the early 20th century. The reasoning of I. Aksakov is attributed to those peripheral voices, which were destined to manifest later. But on the whole, the arguments about Russian literature since the 1840s were built in the rhetoric of what was accomplished, albeit with constant reservations about the “youth” of Russian literature. M. Alekseev wrote, “A few decades later everything that Belinsky dreamed about and believed in became a real fact and was fully realized. A friend and pupil of Belinsky, I. Turgenev, acquired the pan-European significance, Herzen’s voice sounded throughout Europe and in all European languages, he was followed by Leo Tolstoy and Dostoevsky who received worldwide recognition” (Alekseev, 1976).

Starting with the 1870s and 1880s, when Russian literature gained recognition in Europe, critical discourses were based on the juxtaposition of Russian and European literatures. Here, first of all, it is necessary to name the speeches of I. Turgenev (June 1878, Paris, The International Literary Congress) and S. Vengerov. In these arguments, there was constructed an image of original literature that exerted an immeasurably greater influence on Russian society than in European countries.

Returning to the logic of criticism of the 1870s-80s, one can note that it always strove to raise Russian literature. Academician M. Alekseev drew attention to the storm of indignation caused by Turgenev’s speech at the Paris Congress among all Russian writers and in the Russian press, “Why did, according to Turgenev’s critics, he chose such criterion for the value of Russian literature as its proximity to European models?” (Alekseev, 1976).

At the same time there appeared arguments about the originality of the form of Russian literature expressed in the writer’s own environment. For example, L. Tolstoy’s article “A Few Words About the Book “War and Peace” (1868).

In the late 19th – early 20th centuries the problem acquired a new impulse: there was an aspiration to integrate, give results of the literary development of the entire 19th century – the “golden” century of Russian literature, during which the language, forms, and the content of literature changed so much and its influence on Russian society changed radically.

During this period, we can speak of two positions in relation to literary centrism, of the coexistence of two, to a certain extent, oppositional ideologies. One ideology appealed to literary centrism as the core property of Russian culture and even, despite its crisis, sought to “preserve,” that is to keep the special status of literature.

A literary historian Petr Morozov in a little-known essay “Russian Literature in the 19th Century” (1902) outlined the path of new Russian literature from the time of its apprenticeship and imitation to independence. Russian literary heritage of the 19th century was contrasted here with the decline of the last decade. “Our literature has always set itself the goal of life teaching – to help a thinking reader in their quest to understand the surrounding life.” (Morozov, 1902).
According to Morozov, at a time when Russian literature acquired national identity and gained world recognition, modern literature began to decline, “our literature was constantly losing the thread of its once organic development; new writers do not know whether to continue Turgenev and Tolstoy or follow Zol’s footsteps, or imitate Ibsen, or transplant the rotten shoots of French decadence into the Russian soil” (Morozov, 1902), that is, its identity is lost.

Other less prominent voices (although their number increased in the Silver Age) talked of “moving” literature to a normal, equal place among all literature in a broad sense (here you can see the continuation of I. Aksakov’s point of view).

In a little-known article by Nikolai Shapir with an indicative title “Literature Teaching” published in the journal “Russian Thought” (1913, no. 4), a special public role of literature in Russia became a reflection of the low intensity of the national culture. (Shapir, 1913).

“It is necessary to put literature on a par with all other books” (Morozov, 1902).

In this regard, the attitude of critics to contemporary literature changed. For some, as has already been shown at the example of Morozov’s work, Russian literature finally acquired a national status, but it lost its identity. Others saw in the contemporaries’ attempt to “teach” (Gorky and others) a step back.

Lev Shestov, defining the distinctive properties of Russian literature (“simplicity, truthfulness, and perfect absence of rhetorical embellishments”), saw in them “a consequence of our relative lack of culture” (Shestov, 1996). In the book “The Apotheosis of Groundlessness” (part 2, Chapter 45), he contrasted Western European and Russian people, which, according to Shestov, also influenced the writer’s behaviour, “A European person relies only on themselves and nobody else. They firmly believe that if they do not help themselves, then no one will help them. Accordingly, all their thoughts are directed to the best possible arrangement of their life... Russian writers, with few exceptions, quite sincerely despise the pettiness of the West”. (Shestov, 1996).

Perhaps the most serious blow to the literary-centred ideology was inflicted by V. Rozanov in his late articles of 1917-18 in which he drew an almost apocalyptic image of the entire country’s demise from literature. He, in fact, made Russian literature the culprit of the Russian revolution. (Rozanov, 1995).

But, despite these tendencies of revision of the existing paradigm, the literary-centric discourse still prevailed in the Silver Age in judgments both of symbolist and religious and philosophical criticism, and the trend of “pushing back” literature remained on the periphery of public consciousness.

Russian symbolism from the late 1900s, having acquired a neo-Slavophile orientation, was also in this paradigm. A significant place in Andrei Bely’s article “The Present and Future of Russian Literature” (1909) occupied a comparative characterization of Russian and Western European literature (as already noted, the Russian discourse on literature in the 19th century rarely touched upon meaningful characteristics), “The task of contemporary Russian literature is to accept the provision of Western European aesthetics: the form is inseparable from the content. But Russian literature will never agree to such a conclusion. A form is only a product of religious creativity. A literary device is the outward expression of a living confession”. (Bely, 1994).

Therefore, we can see that the literary-centric discourse of the early 20th century appealed to the past; it was filled with the memory of the tops of the 19th century.

A kind of final historical and literary reflection on Russian literature was Semyon Vengerov’s presentation “What Is the Charm of Russian Literature of the 19th century?” (The speech was delivered in Moscow on October 22, 1911 at the celebration of the centennial anniversary of the Society of Lovers of Russian Literature.). S. Vengerov dwelled on the question: what is actually Russian literature. He did not follow the path of functional definitions of literature, but tried in a capacious but expressive form to define its key meaningful constants. To determine the essence of Russian literature, Vengerov used the term “suggestion” introduced by J. Guyot referring it to the word “charm.” This, according to Vengerov, was “the only key to understand Russian literature in particular” (Vengerov, 1919).

Russian literature, according to Vengerov, was created remarkably by a “conscience-stricken gentleman.” Developing the populist argument, Vengerov saw it in the “conscience-stricken gentleman” as the main source of its “charm and spell.” And even for the unprivileged intellectual who succeeded him in the 60s “the problem of conscience, the problem of subjugating the personal good to
the common good proved to be... as burning as for the “conscience-stricken gentleman.” (Vengerov, 1919).

Reconstructing the model of life in Russian literature, the type of thinking reflected in it, behavior and attitude toward life Vengerov argued that in Russian literature “the ideal of personal happiness is completely banished.” “Personal happiness in the understanding of Russian literature is either criminal, if it is created at the expense of others, or, at best, is vulgar. The fact was striking and at the same time profoundly touching, profoundly significant for the establishment of the heroic character of the 19th-century Russian literature: there is no Russian novel, no Russian story written by a real coryphaeus with the so-called happy denouement which was typical of European literature and first-class writers”. (Vengerov, 1919).

This ethical orientation of Russian literature created a special emotional pathos: “Hence another source of fascination of the 19th-century Russian literature is what I call Great Sorrow. It seems to me that this Great Sorrow, spilled all over new Russian literature, is in close organic connection with the entire Russian national character. Russian landscape is sad, which, however, Nekrasov so yearned for among the luxurious nature of the south. A Russian song is sad, “like a moan,” by the definition of the same Nekrasov... But the sadness carries unspeakable beauty. Carefree and cheerful laughter is completely alien to Russian literature. It knows only bitter laughter”. (Vengerov, 1919).

Conclusion

Thus, we examined in the diachronic aspect a set of ideas of Russian writers about themselves at different stages in the development of literature. The study specifies both an invariant of the notions of national literature identity and individual variations that did not find further development in literary self-awareness. The starting point of the formation of Russian literature uniqueness is attributed to the pre-Romanticism. Necessity for original Russian literature inspired A. Turgenev to claim that Russian originality should manifest itself, first of all, in the surrounding life free from uncritical borrowing. Following A. Turgenev, the idea of denying truly national literature in Russia became a trend and was continued in the speeches of Kiichelbecker, Bestuzhev, Venevitinov, Pushkin, and early Belinsky. A symbolic expression of this idea is the formula “We have no literature.” Most romantic treatises were written in the rhetoric of the expected future. Belinsky’s articles occupy a special place in the formation of ideas on national literature originality. Besides, his early works resemble the findings of romantic aesthetics. However, after reviewing Russian literature of the 1840s, we can say that he linked the history of literature with the world outlook of the people. Belinsky was one of the first to note the tendency for emerging literary centrim in Russian culture. Starting with Belinsky, most of the critical, historical and literary discourses about Russian literature were created with the focus on literature.

The article highlights two opposing ideologies based on the essays of the critics of the late 19th-early 20th century. One of them appealed to literary centrim, but the number of those critics who talked about the artificiality of such a situation increased. Nevertheless, the ideology of literary centrim remained predominant. The fate of these views in the Soviet and post-Soviet eras may be the topic of a separate study.

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TRANSLATION AND DICTIONARIES IN FOREIGN LANGUAGE ACQUISITION: 
THE CASE OF THE LATVIAN LANGUAGE

Diāna Laiveniece,1 Linda Lauze2

Abstract: In modern linguodidactics, there is no uniform understanding of the necessity of translation in the acquisition of a foreign language. The aim of the research is to find out the language attitudes held by full-time and Erasmus exchange program foreign students towards translation in acquiring Latvian as a foreign language on language proficiency level A1 and A2.

The research is based on a qualitative study dealing with the results of survey data as well as direct observations inferred from the work with foreign students. The questionnaire consists of 11 questions on translation and usage of dictionaries and a question about personal information. The answers of 35 respondents from 12 countries have been analyzed. 91.43 % of the respondents enjoy translation tasks, only 8.57 % of answers are negative. The highest evaluation was given for word translation, that is, 4.23 for translation from a foreign language (Latvian) into English (being the intermediary language) and 4.15 the other way round in a five point scale. Diverse linguistic experience, differences among language systems, students’ language attitudes establish the purposeful use of translation in foreign language acquisition.

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Keywords: Latvian as foreign language, foreign language acquisition, translation, dictionary, plurilingual teaching/learning environment

Introduction

Translation is a major component in foreign language acquisition at an early stage, particularly at A1 and A2 level, when learners’ knowledge of English is insufficient, minimal or the learners even do not know the language at all. Translation is one of the ways that serve as a transition from one language to the other. It is either used automatically or in cases when the teacher asks students to translate. In most cases, we translate a foreign word, sentence or text if we do not understand them. Language learning is, in any event, a transference process in which literal, word-for-word translation is essential at early stages.

In some publications authors (Carreres, 2006; Marquíes-Aguado, Solis-Becerra, 2013; Mutore, 2013) compare didactic guidelines on translation as a tool for language acquisition in the education process of translators and interpreters. Also, the Common European Framework of Reference (CEFR) for Languages focuses on mediation strategies when discussing language learner’s communication. “In mediating activities, the language user is not concerned to express his/her meanings, but simply to act as an intermediary between interlocutors who are unable to understand each other directly [...]”. Examples of mediating activities include spoken interpretation and written translation as well as summarising and paraphrasing texts in the same language when the language of the original text is not understandable to the intended recipient.” (CEFR, 2001, p. 87) To translate orally or in a written form, one’s command of the language is to be on a rather high level. This study focuses on the early stage of foreign language learning when translation helps to understand the person who learns the language rather than others, so this aspect will not be discussed in more detail.

Methodology

The aim of the research is to find out language attitudes held by full-time and Erasmus exchange program foreign students towards translation in acquiring Latvian as a foreign language on language proficiency level A1. Studies on updating translation in the acquisition of foreign languages form the theoretical basis of the research (Cook, 2010; Leonardi, 2011; Mogahed, 2011; Dagiliené, 2012; Tsagari, Floros, 2013; Fernández-Guerra, 2014, etc.). The empirical part of the research is based on a qualitative study dealing with the results of survey data carried out in 2017 as well as direct observations inferred from the work with foreign students. The questionnaire consists of 11 questions on translation and usage of dictionaries and a question about personal information (age, gender, native language, and proficiency in foreign languages). The sample consisted of 35 respondents – 11 female

1 Faculty of Humanities and Arts, Liepāja University, diana.laiveniece@liepu.lv
2 Faculty of Humanities and Arts, Liepāja University, linda.lauze@liepu.lv
and 24 male, 19–45 year old bachelor and master level students from 12 countries (Lithuania, Portugal, Ukraine, Turkey, India, Sri Lanka, Pakistan, China, Russia, USA, Germany, Nepal). Students mentioned 13 different mother tongues (Urdu, Tamil, Punjabi, Turkish, Hindi, Sinhala, Nepali, Lithuanian, Russian, Chinese, German, Portuguese, Ukrainian), three respondents were bilingual (English/ Russian; Tamil/Sinhala; Urdu/Punjabi). All respondents understand English, to about a half of them English is the only foreign language, but 17 students indicated that they know other foreign languages at different levels, in some cases, also mentioning Latvian language skills. The research also analyses the usage of dictionaries in learning the Latvian language as a foreign language.

Results

First, it was found out in the survey what respondents do if they do not know the meaning of a word, by offering the possibility to mark several options of the six answers provided (see Figure 1). In general, foreign students have ticked 64 choices, preferring the answer look it up in a bi-lingual dictionary (29.69 %). Direct observations show that in cases in which students have chosen the option toask somebody for help (15.62 %) it reflects two kinds of activities – during a class ask a course mate who is also a foreign student or the language teacher and outside classes ask a native speaker that is usually a student living in the university dormitory. It should be noted that the respondents’ knowledge of the language is not sufficient yet to analyze the usage of the new word in context as they are elementary learners. This option is selected just by 10.94 % of the respondents who know some other foreign language, quite often even two, three or four languages. Students use bi-lingual dictionaries more often than explanatory dictionaries. It corresponds to learners’ language skills necessary for simple language proficiency level, that is, students can use a bilingual dictionary and are aware of the need to check the used words and their meanings carefully (Šalme, Auziņa, 2016, p. 174).

Figure 1: Activities in cases when the meaning of a word is unknown (%)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>look its translation up in a bi-lingual dictionary</td>
<td>26.69</td>
</tr>
<tr>
<td>analyse its usage in the context</td>
<td>17.19</td>
</tr>
<tr>
<td>try to guess its meaning</td>
<td>17.19</td>
</tr>
<tr>
<td>ask somebody for help</td>
<td>15.62</td>
</tr>
<tr>
<td>look its explanation up in an explanatory dictionary</td>
<td>17.19</td>
</tr>
<tr>
<td>other</td>
<td>10.94</td>
</tr>
</tbody>
</table>

Analyse the current issue Do you consider a book format dictionary or a digital one to be more convenient for usage in language acquisition? Why? We can conclude that 81.82 % of the respondents consider digital dictionaries as the most suitable ones, 9.09 % of the students use both types of
dictionaries, but 9.09% point out the advantages of paper format dictionaries. There are some common positions:

- I use both versions. However, during the last three years I used the Google version as it is faster than the standard dictionary (male, 45, USA);
- Digital one. Easy to search, easy to use, handy (male, 28, Pakistan);
- I prefer digital one because on the Internet I can listen to the pronunciation and learn the language better (male, 21, Pakistan);
- Digital ones are easier to use, but I like a book format dictionary and touching a real dictionary. Reading explanations from them is more permanent (female, 19, Turkey);
- I consider a book format because it is easy to understand (male, 25, India).

Students highlight the following advantages of digital dictionaries: they are modern, you can quickly find and understand words, they are portable, and you can hear the pronunciation of the word. The authors can agree with a foreign student who says:

- The digital dictionary is very useful because it’s easy to take away like in the phone and it is updating after some time. So, that’s why we are able to set more information (male, 32, Pakistan).

Another advantage is that the words are arranged in a definite system and that it is easy to understand the meaning of a word.

Since learning a foreign language is connected with specific cultural and social differences, pictures can help with getting to know the meaning of new words. For example, learning the vocabulary concerning fruit, a picture of a melon may assist the student to understand that the Latvian language has two different words: melone (‘melon’) and arbāzs (‘water-melon’). When teaching the phrase bērzu sula (‘birch sap’) pictures of a birch and birch sap help students to have an idea of this drink. All respondents (100%) confirmed that pictures are useful for understanding the meaning of a new word when it is necessary to clarify it.

In the survey respondents were asked to rate the usefulness of the translation, both from Latvian into English and from English into Latvian, as a means of learning a foreign language. Translation of different level language units (a word, a phrase, a grammatical unit, and a text) was assessed on a five-point scale where one stands for not at all useful and 5 for very helpful. In all the translation positions the index is higher than 3.5 (see Figure 2). In the translation from the Latvian language into English, word translation ranks highest – 4.23, and translation of a grammatical unit is the lowest – 3.51 points. There are slight differences in the translation assessment from the English language into Latvian. The translation of a word ranks the highest here as well – 4.15 points and the translation of a grammatical unit is the lowest as well – 3.67 points. The results show that elementary learners are not yet aware of the significance of the word’s grammatical meaning. In flective languages, both lexical and grammatical meanings of the word are important to understand a text.

**Discussion**

In modern linguodidactics, there is no uniform understanding of the necessity of translation in the acquisition of a foreign language. The question about translation as a teaching method and the use of it in foreign language acquisition has become essential in the recent ten years. Currently, there are radically restrictive policies. In some researches translation is disproved and considered as an artificial, unproductive, totally useless exercise and a frustrating, not motivating learning activity (see for example Fernández-Guerra, 2014, p. 154). Other researchers, on the contrary, point out that translation is a cognitively meaningful and purposeful language learning exercise.

In some foreign language learning methods, such as in the grammar translation method, translation is one of the most important training techniques. It helps learners to more accurately understand whether the meaning of words, their grammar forms, and syntactical structures are similar in their native language or the intermediary language to those in the target language they learn (Skujina, 2011, p. 91).

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3 In their answers students’ use of language is preserved.
Whether the translation component from the classical methods of foreign language acquisition will be integrated into the modern teaching methods – that is the question that is currently topical for foreign language teachers. There is an opinion that translation as one of the foreign languages learning techniques is suitable for teaching literary (formal) language or working with linguistically oriented language learners who like learning grammar and vocabulary in detail (Carreres, 2006). Whereas, when teaching the so-called “average learners,” translation is completely inappropriate. It is well known that translation is a complex activity associated with language, culture, communication and cognitive factors (Fernández-Guerra, 2014, p. 157). Therefore, not all language learners can do a qualitative translation.

At the beginning of the 21st century the issue of using translation in the foreign language learning process and the productivity of the communicative approach, as well as the evaluation of modern teaching methods, has become topical (see for example Cook, 2010; Tsagari, Floros, 2013). In the previous centuries, when foreign language learning was dominated by other approaches, mainly the above mentioned grammar translation method, translation as a right or wrong teaching method was not discussed or considered. Nowadays there is a need to improve the communicative language learning method by adding translation tasks (Mutore, 2013, p. 96). It is undoubtedly influenced by the availability of new technologies – if learners have a Smartphone, they also have the most extensive translation options.

It is more and more increasingly stressed that translation itself is a useful skill. In the globalized world and multilingual society, translation as a means of public communication is around us. We see it in announcements, labels, menus, news subtitles, etc. (English Language Teaching Global Blog 2011) and it is just logical to consider the question how to use translation in language learning.

To understand the issue of “for and against translation in language learning,” it is worth learning more about at least one publication against translation in language learning and try to rebut it taking into account recent positions. For example, in the introduction of the book “Translation and Language Teaching” seven arguments are mentioned against the use of translation in language acquisition (Malmkjær 1998, p. 6). The interpretation of these arguments follows, and they are at least partly rebutted from a modern foreign language learner.

![Figure 2: Comparison of usefulness of translating from Latvian into English and from English into Latvian](image_url)

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### Table 2: Comparison of usefulness of translating from Latvian into English and from English into Latvian

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<th>From Latvian into English</th>
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<tr>
<td>a word</td>
<td>4.23</td>
<td>4.15</td>
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<tr>
<td>a phrase</td>
<td>3.63</td>
<td>3.76</td>
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<tr>
<td>a grammatical unit</td>
<td>3.51</td>
<td>3.67</td>
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1. Translation is independent and radically different from the four skills which define language competence: reading, writing, speaking, and listening. Rebuttal: for some time already thinking is considered to be the fifth language skill (Fisher, 1990). You cannot use the language without thinking. Translation, if it exceeds the boundaries of one lexeme, requires lots of thinking, so, when you translate, your habit to think about language is developed which in its turn contributes to the development of all four language skills above mentioned.

2. Translation takes up valuable time which could be used to teach those four skills. Rebuttal: you do not need to do translation during all language lesson, though translation can be helpful to develop the skills of independent work.

3. Translation is unnatural. Rebuttal: in today’s dynamic world it is not possible for monolingual speakers to learn all the necessary foreign languages at a level of the native language or for bilingual language users at a level of the first and the second language, so the translation is a natural daily necessity (see more: Leonardi 2011).

4. Translation misleads and prevents students from thinking in the foreign language. This view can be partially accepted, but only in respect of productive language skills: speaking and writing. Reproductive language skills (listening and reading) are improved by using translation.

5. Translation is a severe test of language skills. Rebuttal: translation cannot be the only way of testing language skills, but it is beneficial for testing vocabulary.

6. Translation produces interference. Rebuttal: interference is a natural consequence phenomenon of two language contacts, which is reinforced not by literally translating words and phrases but by the uncritical attitude to the use of language.

7. Translation is only appropriate for training translators. Rebuttal: if the translation were applied only to the education of interpreters and translators, the mutual impact and interconnection of both areas – didactics of translation and language learning would not be widely studied.

In the process learning the Latvian language as a foreign language, translation is not used to translate everything that learners do not know, but only in some cases when there is a reason to believe that learners have not understood something. In such situations, it is essential not to translate the entire sentence or text, but to highlight only some words or phrases and ask the learners to explain them in intermediary language. As soon as the teacher feels that translation is not needed, namely, the unknown words or phrases do not interfere with understanding the text and using it; translation becomes the language learner’s individual choice.

What language learner already knows, gives him a positive self-esteem, allowing him to look at the yet unknown without suspicion. Therefore, when involving translation, the language teacher should focus more attention on the new language elements and not ask students to translate what the learner already should know from previous studies. Though, if it is required, it can be seen as a motivating activity – when translating language learner gets a confirmation that they know and understand a lot of the target language. As is known, understanding in reading or listening – perceptive skills – precedes always productive skills. It is worth using the target language as a motivating factor when learning the target language (see also Mogahed, 2011).

Sometimes when you need to get a more accurate meaning, for example, šķūnis (‘shed’) or ligzda (‘nest’), which learners do not also know in English being the intermediary language, either a third language – the native language – is involved in the translation process. As mentioned before, the availability of electronic dictionaries in mobile phones makes this process much easier and faster.

In this respect, the so-called transparent vocabulary – international words or phrases, whose pronunciation/spelling and meaning students are already known to students, such as kiwi, garage, mango yogurt. Those are words whose meaning and form are recognized and understood immediately because they are similar to corresponding native language words. Transparent vocabulary is “the first key to information decoding” (Gridina, 2006, p. 148). Latvian language as a foreign language is often learned in a plurilingual learning environment in which language learners use knowledge of several languages to learn the target language. Plurilingual approach “is based on the belief that learners of a new language look for similarities between the new language they are learning and others they already know and that in communicative situations the influence of those familiar languages appears in the use
of the new language” (Bliska, 2015, p. 5). A person does not learn every language in isolation but forms links with the languages known to them, constructing metacognitive strategies, called language acquisition and is also used in language use. In the process, it does not matter which language “promotes recognition” (Bliska, 2015, p. 92).

One of the arguments why translation as part of foreign language learning is not considered appropriate is the fact that getting to know the meaning of the word by translating it. It is used in an instant action (the sentence is understood), but you do not memorize it, because you do not create associations which can be done, for example, by using pictures or detailed explanations. The quickest way to understand the unknown word is to translate it in the language the learner knows. However, it does not promote the memorization process. Therefore, if the translation is used in the language learning, learners must work with their dictionaries – their notes where all the new words are recorded and later remembered.

Using personal dictionaries ensures learning the meanings of the word, but does not guarantee its inclusion in active vocabulary; therefore the new words have to be included in the further learning process, both texts, and tasks, several times. If learners still do not understand the translated word, the teacher has to return to the first context in which the word was used. In this process, it is better to use the target language rather than translation, as in this way associations are created that promote memorizing the word. The use of cognitive effort and associative thinking to recall the meaning of a translated word is an important part of foreign language learning.

Both during and after the lesson when students do different tasks independently, translation is done with the help of a bilingual dictionary. When working with dictionaries, you need to focus on the lexical and grammatical aspect of the Latvian translation. At the early stage of language learning, students find it difficult to choose the best translation if the dictionary offers some options. Students have not formed the feeling for the foreign language yet. Thus they trust the dictionary and use the first word the dictionary offers.

Some foreign students are interested in the use of bilingual dictionaries in paper format; therefore they ask the teacher to suggest which one would be the most suitable for them. The authors have to admit that both English-Latvian and Latvian-English dictionaries lack metalinguistic information, which is important for Latvian language learners. Let us consider the verb to buy (‘pirkt’). The English-Latvian dictionary gives the English pronunciation of the word, states what part of speech it is, provides the dominant forms of the verb and the translation into Latvian is given, as well as prefixes that change the meaning of the verb are added (Kalniņa, 2001, p. 37). In the Latvian-English dictionary, the information on the verb pirkt (‘to buy’) is scarce – only the English translation and pronunciation of the verb are given (Kalniņa, 2002, p. 476).

Conclusions

To conclude it has to be admitted that when using translation, one must take into account the individual needs of learners, the process of their thinking when they want to understand the meaning of syntactic units not only at lexical but also at a grammatical level. Metalinguistic explanation in the intermediary language can be used both in simple cases to show the difference between phrases (for example, Es esmu meita (‘I am a daughter’) and Man ir meita (‘I have a daughter’)) where the dative case is necessary instead of the nominative case compared to the rule of the English language and in more complex situations in which misunderstandings have arisen. 91.43% of the respondents enjoy translation tasks, only 8.57% of answers are negative. Word translation has got the highest evaluation – 4.23 for translation from a foreign language (meaning Latvian) into English (being the intermediary language) and 4.15 in a five-point scale for translating from English into Latvian. As elementary learners, students use bi-lingual dictionaries more often than explanatory ones.

Although in language acquisition pictures and images can ensure the perception of the meaning of the word, in the translation process dictionaries help most of all. Taking into account today’s situation when the Latvian language as a flective language may also be a foreign language, the compilers of bilingual dictionaries should supplement Latvian language dictionaries with metalinguistic information to make them useful for learning the Latvian language as a foreign language. Diverse linguistic experience, the difference among language systems, students’ language attitudes establishes the purposeful use of translation in foreign language acquisition.
References


APPLICATION OF MOTIVATION-HYGIENE THEORY AMONG WORKERS OF SOCIAL CARE INSTITUTIONS

Rovena Kushta

Abstract: Motivation of workers is a field of interest to any institution. Motivated workers displaying high levels of satisfaction, or otherwise lack of dissatisfaction, have a positive impact on the overall work performance. The study aims to measure motivation levels and the influence of factors such as motivation-hygiene on satisfaction/dissatisfaction level among workers of social care institutions. A quantitative method of assessment is used. The sample consists of 110 workers. Results show a positive and statistically significant correlation between motivation factors and the levels of satisfaction with work. Responsibility is the selected factor with the biggest impact on satisfaction by the workers of the institutions surveyed. There is a positive but not statistically significant correlation between such factors as hygiene and lack of satisfaction at work. To the workers, the responsible supervisor is the factor with the biggest impact on the lack of satisfaction at work, while administrative policies are calculated as being \( r \) (Pearson) = \(-0.27\) and \( \sigma = 0.761\), which shows that they influence the dissatisfaction levels at work. Therefore institutions must pay attention to motivation strategies with the purpose of increasing satisfaction and thus decreasing dissatisfaction levels at work.

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Keywords: motivation, workers, Herzberg’s theory, Institutions of Social Care

Introduction

A series of definitions of the concepts of motivation at work have been proposed since the beginning of the 20th century. According to Maslow (1946) “Motivation is a desire, a tendency, a drive to complete a task or a job started earlier.” Vroom (1964) sees motivation as closely related to performance at work and stresses out that “the more motivated are workers in their work, the higher will their performance and results be.” While Golembiewski (1973) defined motivation as “a willingness of the organization to fulfill the established goals by taking advantage of the sources at disposal.”

While in the 21st century other authors have studied motivation at work from different perspectives. Cole (2004) gives the definition as “the willingness of the individual to exert high level of effort to reach organizational goals, to satisfy some personal need.” While Armstrong and Taylor (2014) put forward that “motivation is the art which helps people to focus their thoughts and energy on performing his/her tasks in the best way possible.”

Several theories are observed in the field of motivation. Individuals have different needs, set goals to attain and undertake a series of actions. As a result, a single theory or strategy is not capable of satisfying everyone. Theories of motivation try to analyze and explain why workers tend to react accordingly to their efforts and personal contribution. They also describe the efficient ways how institutions/organizations can stimulate their employees toward achievement of results, and why there are not satisfying an individual’s personal needs. Thus, the different theories are widely used by managers to explain the motivation of employees.

All theories can be grouped into two categories:

- Theories which try to explain motivation by focusing on content (the inside) - analyzing factors in the mind of an individual which stimulate, control, or hinder behavior and the way which individual lists them according to the degree of importance s/he places on them.
- Theories that try to explain processes explaining and analyzing the way how behavior is stimulated, controlled, or hindered; focusing on thoughts and cognitive processes which take place inside the human mind and affect behavior.

For the purpose of this study, we chose to focus on Herzberg’s theory of motivation-hygiene. Herzberg’s theory has widespread due to the practical implications it has had on the motivation of workers. Herzberg (1966) concluded that the opposite of satisfaction is not dissatisfaction, unlike what was previously held. Upgrading work conditions does not necessarily result in a higher level. Based on the results of the study, the opposite of “satisfaction” is “non-satisfaction” and the opposite of

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1 European University of Tirana, Department of Education, Tirana, Albania, rovena.lika@uet.edu.al
“dissatisfaction” is “non-dissatisfaction”, while the factors contributing to satisfaction are separate and different from the ones which lead to dissatisfaction.

Factors that bring about satisfaction are the above mentioned inner factors, which Herzberg (1966) termed as motivating factors, while the factors that lead to dissatisfaction are outside factors for which he used the term hygiene factors.

More concretely, a state of dissatisfaction may be caused by the company’s policies, supervision, interpersonal relations, and salary or work conditions. When these do not meet a satisfactory level, workers tend to feel dissatisfied. On the other hand, when these factors measure to a sufficient level, workers are simply not dissatisfied. Satisfaction means achievement, gratefulness, work itself, responsibility, promotion, and these are the factors which account for motivation, while the absence of the abovementioned does not result in any particular dissatisfaction.

**Methodology**

The object of this study is to measure the level of motivation and the impact that factors motivation-hygiene, have on satisfaction/dissatisfaction levels among workers of Social Care Institutions in Tirana.

Hypotheses of this study are:

1. A positive relationship exists between motivating factors and satisfaction at work.
2. A positive relationship exists between hygiene factors and lack of satisfaction at work.

**Measurement instrument**

The study uses a quantitative method, which consists of a questionnaire as an instrument to measure the level of motivation and the impact of factors motivation-hygiene on satisfaction/dissatisfaction among workers of social care institutions. The questionnaire consists of 48 questions in total.

Subjects were asked questions to gather demographic data such as: gender, age, education, job position in the institution they work and the period of time they have been occupying the position.

The second part consists of 31 questions regarding the level of satisfaction and dissatisfaction. Subjects were asked if they feel satisfied with their work; if they are familiar and agree with the institution’s policy; if they get along with the other work mates; if they find their salary decent; how do they perceive supervision at work; if they find their work environment acceptable, etc.

The third section asks respondents 12 questions on factors that are sources of motivation or not at work. Subjects were asked how motivating factors (achievement; promotion; work itself; recognition; responsibility and advancement) and hygiene factors (administrative policies; responsible supervisor; work conditions; salary; interpersonal relations and status) influence the motivation of employees at work.

**Results**

Most subjects were females (91%), aged over 48 years (40%), having high school education (49%). Most respondents occupied the position of caregiver and working period in that position stretching over 1-5 years.
What is evident is that there is positive (indicated by Pearson’s coefficient) and statistically significant (P-value=sig being smaller than 0.05 in all cases) relation ship between each factor and satisfaction at work. This can also be explained by the correlation motivation-satisfaction.

For the respondents, “responsibility” factor has the biggest impact on satisfaction (Pearson=0.436), pointing to the fact that workers prefer being responsible for the work they do and feel satisfied with this fact. “Work itself” factor follows logically (Pearson=0.418) demonstrating that workers like their job and are satisfied with it, while, “recognition” factor has the lowest impact on job satisfaction to the surveyed subjects (Pearson=0.194).
As it can be viewed from the table not every relation between hygiene and lack of satisfaction factors is equally important from the statistic point of view. It is clear that the “responsible supervisor” factor (Pearson=0.327 and sig=0.000) has the biggest impact on the lack of satisfaction. Workers value supervisors for the task they perform and consider them as a factor contributing to dissatisfaction. On the other hand, the other factors do not show a statistically significant relation which means that they are not responsible for lack of satisfaction. “Administrative policies” show even a negative relationship with lack of satisfaction.

**Correlation between motivating factors and satisfaction at work**

Based on the data from the above table a positive relation exists between motivating factors and satisfaction at work, where \( r=0.484 \) and \( P \)-values=\( \text{sig}=0.000 \). Therefore to workers of Social Care Institutions in Tirana, motivating factors (achievement, promotion, recognition, work itself, advancement, and responsibility) influence satisfaction at work, which confirms Herzberg’s theory.
Correlation between hygiene and lack of satisfaction at work

Table 4: Correlations

<table>
<thead>
<tr>
<th></th>
<th>Hygiene factor</th>
<th>Lack of satisfaction</th>
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</thead>
<tbody>
<tr>
<td>Hygiene factor</td>
<td>Pearson Correlation</td>
<td>1.000 0.143</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>0.000 0.123</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>110 110</td>
</tr>
<tr>
<td>Lack of satisfaction</td>
<td>Pearson Correlation</td>
<td>0.143 1.000</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>0.123 0.000</td>
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<td></td>
<td>N</td>
<td>110 110</td>
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Source: Author

Through the data obtained from this study we conclude that, “the relation between hygiene factors and lack of satisfaction is positive, but not one which is statistically significant”. This means that the phenomenon is not true in all cases, or in other words hygiene factors do not always influence on the lack of satisfaction.

To the respondents (workers of social care institutions) hygiene factors (institution’s policies, supervisor, interpersonal relations, salary, work conditions, status) do not always bring lack of satisfaction.

Conclusions
This study, targeting workers of social care institutions in Tirana, aimed to measure motivation levels and the impact of factors motivation-hygiene on the level of satisfaction/dissatisfaction at work experienced by the workers of the surveyed institutions. After analyzing the quantitative data collected through the questionnaire carried out among 110 workers, we conclude as follows:

The staff of social care institutions consists mainly of females, which points to the fact that caregiving is viewed as a gender role associated with women, but also because caregiving is often the job preferred by many of this gender category.

Motivation factors show a positive relationship with satisfaction at work, and among the factors, responsibility was the one ranking highest in terms of impact on satisfaction levels for the workers of social care institutions.

Workers of social care institutions consider work in itself a source of motivation for performing their tasks, which is observed by the positive relationship between this factor and satisfaction at work.

Praising workers for their effort and professional advancement was seen as a source of encouragement and enthusiasm at work by the respondents, which is confirmed by the positive and statistically significant relationship between this factor and satisfaction at work.

Workers of social care institutions result to feel satisfied with their job, which can be seen in their answers to the question if they would prefer to work somewhere else not in the field of social care.

Social care institutions encourage promotion opportunities, and to the workers of these institutions this is seen as a motivating factor that leads to satisfaction at work.

Social care institutions acknowledge cases when their workers do unpaid work, which results in being a factor that increases enthusiasm and encourages workers, therefore having an impact on satisfaction.

Responsible supervisors are deemed by workers as the factor having the biggest impact on lack of satisfaction, indicating that they agreed with supervising practices at their workplace and found their supervisors supportive rather than reproaching.

Workers admitted having friendly relations with co-workers, which according to Herzberg’s theory is viewed as a factor influencing lack of satisfaction.

Workers spoke highly of their work environment, which proves that work conditions are a factor which leads to the reduction of dissatisfaction among workers of social care institutions.
Salary and status are factors which increase enthusiasm and encouragement at work, and in the case of workers of social care institutions correlations show that there is a positive relationship between factors and lack of satisfaction, but not statistically important, which means that when the factors are of a low level they do not always result in lack of satisfaction.

Administrative policies show a negative but not strong relation with the lack of satisfaction at work, which according to Herzberg means a hygiene factor resulting in dissatisfaction.

Recommendations

Some recommendations that can improve the situation are listed as follows:

- Importance should be given to the work performed by the employees as referring to the wage system, and rewarding financial stimuli should be applied in order to increase satisfaction at work.
- More frequent seminars and training sessions should be organized by the institutions or higher hierarchic structures, thus encouraging participation and inclusion of workers as a valuable asset.
- Qualification of workers, particularly of those having direct contact with the target, should be of a university level conveying the necessary professional competence for a more efficient performance at work.
- Supervising practice to acquire a supportive role for workers due to its impact on satisfaction at work.
- Institutions to provide agreeable work facilities to serve performance, the accomplishment of objectives and increase of satisfaction levels.
- Collaborative interpersonal relations should be fostered by eliminating hierarchical barriers which result in reduced levels of dissatisfaction among workers.

References


Overview of legal framework of public private partnerships in Albania

Ermira Lleshi

Abstract: Albania has made positive steps in improving the legal framework of Public Private Partnerships (PPPs) and the political environment. The laws have encountered several amendments in the last 10 years, but there is still room for improvement. Albania has incorporated the EU directives and the UNCITRAL recommendations into PPPs legislation and we have to admit the effectiveness of the law 125/2013 “On concessions and public private partnership.” This paper aims to present a view of the actual legal and sublegal framework of PPPs in our country and to note the development of this sector in potential benefits for both sectors, private and public.

Moreover, judicial quality has improved in Albania even though there is room for further improvement. Moreover, there has been noticed a strengthening of institutional capacity due to co-ordination of consultants and external advisers, but government agencies are at the early stages of developing PPPs. The political environment for PPPs is favourable, especially in the energy and transport sector. Further improvement is required in the transparency and fairness of procedures in practice.

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Keywords: Albania, Public private partnership, benefits, legal framework, government agencies

Introduction

Public Private Partnerships (PPPs) are nowadays a very good instrument of the private sector in compliance with the public sector. Many countries are turning to PPPs in order that the private partner helps the public partner in various areas financially. PPPs are used to hide public borrowing, whereas they provide guarantees in long-term state for profits to private companies (Hall, 2014). A PPP is a contract made amongst a public authority and a private partner in which the private partner incomes and exercises features same as a public authority and it is paid by this one for the services of works in long term payment.

Albania is also a country where PPPs have known a great development especially after the year 2000. They are more used in the field of infrastructure and water. It is clear that governments prefer the method which is most suitable to establish the most money. The aim of Law 125/2013 is to sustain a friendly and sustainable scheme for building up, attracting and facilitating investments, which are realized as public private concessions/partnerships. The legislation is actually a modern one and has different positive aspects that have regulation in the field of public private partnership, but there is still much to be done to improve transparency and to facilitate procedures.

The concept and definition of PPPs

PPPs are needed to fill the gaps of two other traditional contracts of public administration, such as public procurement and concession. PPPs are the involvement of the private sector in the goods and works generally supported by the public sector. A characteristic of PPPs is the transfer of risk from the public entity to the private entity.

There are various definitions of this concept according to different sources. The PPP Knowledge Lab defines a PPP as “a long-term contract in between a private entity and a government entity, for securing a public asset or service, in which the private entity brings a considerable risk management responsibility, and the payment is related to performance” (World Bank, 2014).

According to Investopedia, public partnerships between a public entity and private-sector are used to finance, establish and perform projects (Investopedia, 2017). Otherwise, a public private partnership is a legal contract between the public and private sectors for the arrangement of assets and the distribution of services that assigns responsibilities and risks between the various partners (Partnerships British Columbia, 2003). According to the Law Dictionary, PPPs are projects that will be useful to the public that are partly owned by the public sector and partly by a private entity (The law dictionary, 2017).

1 University of Tirana, Faculty of Law, Tirana, Albania, ermira.lleshi@yahoo.com
In several countries, the concept of PPP is applied as a guard term for various types of collaboration among a public entity and a private entity, while in other countries there is a clear difference of regime for PPPs and concessions.

As Albania aspires for EU membership, the domestic legislation is aligned with European legislation. On the other hand, EU legislation does not have a definition of PPPs. Generally, the term points out to forms of cooperation between public institutions and private sector which aim to secure funding, building, renewal, administration or conservation of an infrastructure or the arrangement of a service (European Commission, 2004). Regarding the OECD, PPPs are designate as an agreement among the public authority and one or more private entities according to which the private entity distribute the service in such a way that the service distribution objectives of the public authority are regulated with the benefit objectives of the private entity and the success of the alignment depends on an adequate transfer of risk to the private entity (Burger and Hawkesworth, 2011).

According to Law no. 125/2013 “On concession and Public Private Partnership in Albania”, a PPP contract means a contract for public works or a contract for public service that fulfils the conditions which designate it as a Public Private Partnership, as stipulated in this law and, which is signed between the Contracting Authority on the one side and economic operator selected as most successful tenderer on the other (Albanian Assembly, 2013).

The main purpose of this joint venture is to develop the efficiency and quality of service and goods.

**Differences between PPPs, public work contracts and concessions**

In a perspective, the regulatory framework of PPPs/concessions acts as a *lex specialis* from the regulatory frame of public procurement. In almost all legislations, the rules of public tenders precede those of PPPs/concessions. It is also obvious that the majority of rules and procedures of public procurement are applied for PPPs/concessions. Governments prefer the method which is appropriate to establish the most value for their money.

The main difference between them is that in public work contracts the risk of success of the work weights on the public authority. Furthermore, there are methods that are applied to secure the value for money (Burger and Hawkesworth, 2011).

It is widely admitted that concessions are one of the types of PPPs, so we cannot pretend to clearly demarcate these two concepts. One of the main differences is the procedure of payment. In the case of PPPs, the public authority pays the private entity for the offered services/works, while in the case of concessions, usually the revenues of the private partner are created by the payment they collect by the sale of product of the concessionaire project to the third parties (Burger and Hawkesworth, 2011).

Another difference between them is the transfer of risk. In some countries, the risk may remain totally on the contracting public authority, but in the case of concessions even if the risk is divided between parties it is mainly held by the private partner. Appropriate risk transfer from the government to the private sector is the main requirement if PPPs are to distribute services of high-quality and with effective cost to consumers and the government (International Monetary Fund, 2004).

**The contract of public private partnership according to the Albanian law**

Law no. 125/2013 “On concessions and public private partnership” treats concessions as a form of PPP. As they are treated with the same law, we may say that the public private partnership contracts are global. According to Albanian law, PPPs are a wider concept than concessions, they include concessions but at the same time they are clearly different from them.

- **Parties in the PPPs contract**

  The two parties of the PPPs contract are the Public Authority and the Economic Operator, according to articles 3/2, 3/3, 3/22, 3/23 and 8 of “Law no. 125/2013 “On concessions and public private partnership.”

  In addition, the contracting authorities are stipulated in the above law, meaning the bodies that shall undertake a procedure for concession/PPP. According to article 13 of the law these bodies are: the Parliament, the line ministries, Council of Ministers and the local government authorities. The contractor is the economic operator that is going to sign the contract with the public authority. For purposes of this law, special purpose vehicle can be set up which is a private legal entity with its main office in the Republic of Albania, which is established upon the demand of the Contracting entity by
the economic operator selected as the most successful tenderer and, with which the contract shall be signed thereof (Albanian Assembly, 2013). The economic operator is the contractor which means the natural person or the legal personal, or group of people or other bodies in the market that offer public work or services. It is obviously deducted by article 8 of the law that concession contracts may be signed between two public bodies, a PPP can be signed only by a public authority and a private partner. In this form of the contract, we have a transfer of the public sectors of a public interest to the private partner. If there is no transfer from public authority to the private partner, of organization, management and accountability of the specific sector of public interest, we do not have to deal with a concession/PPP contract.

- Area of implementation of the law “On concessions and public partnership” in Albania

As we mentioned above, the PPPs are applicable in realization of works and also in services. It is stipulated in article 4 of the law the concrete area where this kind of contract is implemented in Albania. The areas are: all types of transport; distribution of electricity and energy; production and distribution of water; waste management, including their collection, transfer, treatment and disposal; telecommunication; various areas of science and education; areas of tourism, leisure and hospitality; areas of culture, sports, health, social services; prison; rehabilitation of forests; industrial parks, mines and similar business support infrastructure; housing; public administration facilities, IT and database infrastructure; Urban/suburban rehabilitation and development; agriculture. In each case, the Council of Ministers, upon the recommendation of the line ministries or, upon proposals, which they receive from local government units or central bodies of Concessions/PPPs policies, shall decide on the Concessions/PPPs to be implemented in other sectors. (Albanian Assembly, 2013).

Moreover, the law “On concessions and public partnership” envisages the specific cases where it is not implemented, where exception take place. So, the law shall not apply: under the low monetary threshold; when their achievement must be accompanied by certain security measures in conformity with the laws in force, or when the protection of the State’s main interests is required; and for the acquisition or rental, by financial methods, of immovable property. Nevertheless, financial service contracts concluded at the same time as, before, or after the contract of acquisition or rental, in whatever form, shall be subject to the Law; the acquisition, development, production or co-production of program material or commercials intended for broadcasting by broadcasters or publication in the media, and contracts for broadcasting time; Concessions, which are subject to different rules and are awarded pursuant to special procedural rules of international organizations; For arbitration and resolution services; For financial services linked with the sale, purchase or transfer of securities, in particular transactions by contracting authorities to raise money or capital; For air transport; Concessions/PPPs, which are subject to different rules and are awarded in accordance with international accords, which the Albania concluded with several states, signed according the Treaty on the Functioning of the European Union, and which include, supplies, works or services intended for joint application or use the projects by the countries that are members; Concessions/PPPs, which in case that this Law conflicts with an obligation of the State under, or arising out of, an agreement of an international organization, the provisions of that agreement shall dominate. In all other aspects, award procedures and principles shall be governed by this Law; service concessions awarded by a Contracting Authority to another Contracting Authority, or to an association of Contracting Authorities, on the basis of an exclusive right which they enjoy according to the legislation (Albanian Assembly, 2013).

**Forms of PPPs in Albania**

Pursuant article 8/4 of the Law, depending on the means of remuneration as well as allocation of key inherent risks, a PPP may be realized either as Public works concession, or Public service concession, or Public works contract, or Public service contract (Albanian Assembly, 2013). These are the forms of a PPP contract and there is no reason to confuse them with the concession or public procurement contract. In the concession contract the remuneration is granting to the concessionaire the right to use the work or service, and in case it is foreseen, it includes a payment by the public authority, and the risk is transferred also to the private entity. Whereas in procurement contract remuneration of private entity is composed by the payment of a price by the public entity and risk is held by the public authority.
Legal framework of PPPs
Albania has a specific law that deals with PPPs, whereas there are other countries that do not have a dedicated law. The basic law that elaborates PPPs in Albania is Law no. 125/2013 “On concessions and public partnership.” Decision of Council of Ministers no. 575, date 10.07.2013 “On Approval of Rules for Assessment and Granting with Concession / Public Private Partnership.” Decision of Council of Ministers no. 130 date 12.03.2014 “On the electronic performing of the competitive procedures of concession/PPP.” Decision of Council of Ministers no. 634 date 01.10.2014 “On approval of rules for Assessment and Granting with Concession / Public Private Partnership of public work and services for building, operating, maintenance and rehabilitation of national streets.” Decision of Council of Ministers no. 211 date 16.03.2016 “On creating and administrating of electronic register of concession/Public Private Partnership.”

Whereas during the public procurement stage, the process is based on legislation for public tenders. So, legislation and by-laws are as followed:


Besides the above legal framework in the PPPs procedures, there are also more general laws which are applied when there is no explanation in the specific laws and subordinates. Thus, the Administrative Code of Procedures and Civil Code are fruitfully implemented.

Whereas in an institutional view, the competent authorities that are part of a PPP project are the ministries, municipalities and districts. In cases when according to the provisions of the law, the object of contract and specific competencies, competence for a concession project or PPP, can belong more than a public authority that fulfills the conditions to be a contractual authority, then the Council of Ministers with a special decision, assigns the contractual authority or authorities, case by case. (((ATRAKO)))

Besides the mentioned authorities, there are more authorities involved in the procedure of concession or PPPs according to their field of competences, such as Council of Ministers, ministry of economy, ministry of finances, Commission on Public Procurement and Agency of Treatment of Concessions.

Legal procedure of PPPs
There are several steps that must be fulfilled in order to finalize a PPP. The law no. 125/2013 envisages the legal procedure, which is divided in concrete actions pursuant the law. The first phase is the stage of identification of the project, which begins with a proposal for the possibility of a PPP project. The proposals shall come from the public authority competent of the field in which is undertaken the project, other public institutions, organizations, investors, etc. The common is that the proposal must be evaluated by the public authority competent of the field in which the project is undertaken.

It continues with the assessment of the proposed project. This is a stage in which the concrete project is analyzed and an opportunity is made for evaluation in order to realize if the project is possible to be implemented. The competent public authority for the identification, evaluation and granting the project of PPP, according to law no. 125/2013 and the Decision of Council of Ministers no. 575, is the public authority competent for the object of the PPP. This public authority appoints an ad hoc commission. It aims that all the stages of the legal procedures of PPPs are followed by a specific structure and with specialized staff. The commission is in charged to make a prior verification of the project proposed. Regarding the results of this evaluation the commission prepares a report regarding the possibility of the realization of the project and presents it to the public authority. Moreover, pursuant article 19 of Law no. 125/2013, the commission shall prepare the Feasibility Study which consists of an operational summary, general project description, technical financial economic and legal analysis, environmental study and nature implication, and accompanying annexes, required addendums, conclusion and recommendation. In this meaning, the commission gives to the public authority a complete view and a deep analysis of all aspects of the project elements. The results of the Feasibility Study are crucial to
the public authority because this document serves as a core document to evaluate if the concrete project shall be implemented or not. If the evaluation of the project gains a positive evaluation, it continues in the other stage, which is the granting of PPP. This stage includes other procedural stages, which begin with the public tender competition and the evaluation of the bids by the private operators. Pursuant article 23 of the law, the most economically viable offer based on various criteria. In the tender documents, it should be envisaged prior the evaluation coefficient and the respective marks, of each of implemented criteria. In case of unsolicited proposals, the proposer shall compete with the other offers. Otherwise, in cases the unsolicited proposer is approved a bonus by Council of Ministers, he competes with a bonus up to 10% of total points of competition. Tender procedure starts with contract notice which consists of intention of contracting an entity to grant a concession. In cases when this stage is finalized with success, it proceeds with the conclusion of the contract. Before the signing of the contract, there is prior action taken by contracting authority, which guarantee the contract by the private partner, such as the value, form, and manner. This serves as a compensation tool for the damage caused in case that the contract fails. The conclusion of the contract is the finalization of this process. The duration of the contract shall not extend 35 years according law no.125/2013. The contract shall envisage the rights and obligation of the parties with the general principle of balance of their rights and obligations. The contract should foresee the risks that are foreseen for the implementation of the contract, the division between the two parties. The risks should be charged to the party that is objectively capable to manage it. The contract shall also envisage the conditions regarding the works and services and the mechanisms of payment. Another key element of the contract are the sanctions and penalties in case of violation of contract and the mechanisms for solution of disputes. The conclusion of the contract is not the final stage because it is included in the stage of management of the contract, monitoring the effective implementation of the contract until the successful implementation of the project. 

Advantages of Law no. 125/2013 and by-laws

The aim of the Law is to provide a positive and sustainable framework for attracting, promoting and helping investments, which are realized as public private concessions/partnerships. The legislation on this field tries to establish a good basis in the field of investments with cooperation among public and private partners. The law relies on these principles: transparency, non-discrimination, proportionality, efficiency, equality, reciprocity and legal security. The principle of transparency is sine qua non for the application of the others. It is closely related with the information, publication and access of public, obliging the public authority to pursue transparent procedures.

The legislation also meets the international standards set out by international bodies such as the United Nations Commission on International Trade Law, Organization for Economic Co-operation and Development, the European Bank for Reconstruction and Development, etc. In contrast with the previous law no. 9663, dated 18.12.2006 “On concessions” the new law is drafted in approximation with the EU legislation and with the assistance of OECD. It is also a law harmonized with the law “On public procurement” and there are no double procedures and standards in the administration of complaints.

Conclusions

In the infrastructure field, PPPs can improve the quality of the field if they are implemented with transparency and fairness. PPPs transfers the risk of performance to private partner. The usage of this form of cooperation among public and private partners is an encouragement innovation. PPP projects can deliver better value of money. Legislation of PPPs in Albania has known great improvement but there is still work to be done to strengthen fairness and facilitate procedures.

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DESIGN, ANALYSIS AND IMPLEMENTATION OF ELECTRONIC TEST FOR KNOWLEDGE EVALUATION IN THE COURSE OF INFORMATION TECHNOLOGIES FOR PHARMACEUTICAL STUDENTS

Hristo Manev,¹ Mancho Manev²

Abstract: The increased usage of information technologies in everyday life and especially in education leads to demands for new forms of teaching, studying and the appropriate examination and evaluation of acquired knowledge and skills of the students.

Modern electronic educational systems use only those technologies that improve the learning process and make it more effective. Interactive education provides an opportunity to develop skills for independent literature research and activation of cognitive activity.

In this work, it is shown how modern electronic education is implemented in the curriculum of English language pharmaceutical students at the Medical University – Plovdiv in the course of Information Technologies. It is developed with a methodological approach of a hybrid system, i.e. compulsory attendance at lectures in combination with two different types of conduction of the final test for comparison – a paper-based test and a remote web-based one. The results received from the parallel tests are processed and analyzed and the conclusions are used to enhance the quality of the developed test and the type of implementation. Moreover, the examined students fill in an anonymous poll to show the authors their thoughts for this type of hybrid educational system.

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Keywords: interactive learning, e-learning, educational technology, electronic test

Introduction

Modern web-based e-learning systems relate only to those information technologies that improve the learning process. The effectiveness of education depends on many factors. One of the most important of them is the involvement of the students in the related course activities. This involvement can be achieved by interactive courses.

Interactive education provides many opportunities to develop the skills of the students. On the one hand, this type of teaching gives the opportunity for the implementation of interesting educational materials in order to increase the motivation and the interest of the students. Also, another positive result is the so-called two-way interaction teacher – student. This type of education can be for the both sides of the educational system a very valuable feedback and a teamwork booster.

The teaching and learning of the university discipline: Information Technologies, is a complex activity and many factors determine the success of it. The nature and quality of instructional materials, the presentation of the content, the pedagogic skills of the teachers, the learning environment and the motivation of the students are all important parts of the teaching-learning process and must be kept in view of any effort to ensure the quality of modern university education.

Blended Teaching of IT at the Medical University – Plovdiv

The so-called Educational Technology is a very wide field. Therefore, we can find many definitions of it. The most popular are – Educational Technology is the usage of technology to improve education which is a systematic, iterative process for designing instruction which is used to improve the performance of the students; Educational Technology according to International Technology Education Association: Someone teaches with technology (uses technology as a tool); Concerned with the narrow spectrum of information and communication technologies; The fundamental goal of Educational Technology is to enhance the teaching and learning process.

Educational Technology has a dynamic character. The educational process starts with certain conditions. Permanent control of the lecturer is needed, stable reverse connections with the students and making competent decisions for managing the technological process. Furthermore, Educational Technology allows simultaneous usage of traditional and modern technologies. In the process of

¹ Professor Hristo Manev, PhD; Medical University – Plovdiv, Faculty of Public Health, hmanev@meduniversity-plovdiv.bg; ² Professor Mancho Manev, PhD; Plovdiv University Paisii Hilendarski, Faculty of Mathematics and Informatics, mmanev@uni-plovdiv.bg; and Medical University – Plovdiv, Faculty of Public Health, mmanev@meduniversity-plovdiv.bg;
learning Information Technologies, the students are incessantly proposing their issues, research questions and solving problems in order to impress their teachers (Kenderov, 2010).

The so-called blended courses integrate face-to-face and online learning. Some of them use the online environment for their content or lecture delivery and the classroom for active learning opportunities. Others use the face-to-face time for lectures and the online environment for discussions, assessments and other learning. Another approach is to use a combination of these two, namely to employ the so-called "flipped classroom." In this type of teaching-learning process, the lectures are delivered online for some of the classes and students use them to prepare for active learning in the classroom. The in-class activities involve peer learning in small group activities to engage the students in problem-solving.

Nowadays the interest in online tests as a students’ knowledge and skills evaluation has increased significantly. Some of the main reasons for this are: high efficiency of online tests, i.e. for a limited period of time the lecturers could assess a large number of students; opportunity for simultaneous testing of students from different specialties, courses and groups through various tests; the possibility of obtaining student’s assessment immediately after completing the test; the teacher’s ability to manage and expand the database of the tests’ questions and the evaluation criteria.

Model
Looking to the aims of teaching Mathematics and Information Technologies, it can be seen that the important objectives underlying the mathematics subject are critical thinking, analytical thinking, logical reasoning, decision-making, problem-solving. Such objectives are difficult to be achieved only through verbal methods that are usually used. Therefore, in this work, it is proposed a model for the realization of a hybrid educational site in Information Technologies for English language pharmaceutical students at the Medical University – Plovdiv, consisting of attendance hours for lectures and exercises, combined with the remote implementation of the test.

In most of the universities in Bulgaria, and abroad, for these purposes the open-source system Moodle is mainly used (Rice, 2006; Cole, 2007; Manev and Enkov, 2012). There are also many Bulgarian university projects which are integrated into the studying process (Manev and Golev, 2014; Rahnev et al., 2014).

Implementation
In this work, using the e-education system Moodle, a methodological approach of the hybrid system is developed, i.e. compulsory attendance at lectures in combination with two different types of conduction of the final test for comparison – a paper-based test and a remote web-based one.

The main part of this project is the development and implementation of an electronic test for knowledge evaluation in the course of Information Technologies for pharmaceutical students – one of the most used forms of knowledge verification of the trainees. This form is used not only to test knowledge evaluation of the students but also for training by exercising their skills. The advantage of web-based teaching is that it can be done asynchronously, i.e. the educational information is available to students on-line and they can read it at a convenient time. The problem occurs when the student is required to perform tasks and tests. Online courses have difficulties in controlling fraud on tests. The lecturer could set a specific day and time for the test activity to contribute for the objectivity of the evaluation. Even if the student checked its answers in a textbook or online, the teacher can limit the time. So, if there is not enough knowledge gained in their preparation the students are going to fail to end on time.

In the present work, an interactive test for the English language students studying the course "Information Technologies" at the Pharmaceutical Faculty of Medical University – Plovdiv is designed.

The creation of a test in the e-system Moodle requires parameterization to list the different options related to the purpose of the examination (Figure 1 and Figure 2).
When the test is created and configured it is necessary to create a database of questions that will be selected for the examination. Obviously, the larger database of questions makes the tests more variable and of course the evaluation of the students more accurate (Figure 3).
The tests are evaluated automatically and can be evaluated again if it is necessary. The questions can be open for the learners only for a certain period of time. After that, the students will not have access to the tests. After the completion of the tasks, the system allows comments or it can be shown the correct answers. The questions and the possible answers can be displayed in a different order to avoid cheating.

A great practical value has the submenu “Statistics.” It provides a statistical analysis of the test. A dropdown menu allows the teacher to select which attempts of the students to be involved in the calculation of the statistics. The lecturer has the right to choose whether to display information about all attempts or just the first attempt. The full text of the statistics report can be downloaded in various formats. The Moodle system also allows more detailed analysis of each question individually (Figure 4).
Results
For comparison, we implemented to the same group of 10 students the electronic test and a paper-based one for knowledge assessment. The results received from the parallel tests are processed and analyzed and the conclusions are used to enhance the quality of the developed test and the type of implementation. The evaluation is performed by a percentage scale (0-100%) corresponding to estimates by six-point scale (Weak (2) - Excellent (6)) (Figure 5).

Figure 5: Two types of testing

<table>
<thead>
<tr>
<th>Student</th>
<th>Paper-based test</th>
<th>Electronic test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Percentage</td>
<td>Assessment</td>
</tr>
<tr>
<td>Student №1</td>
<td>60.00</td>
<td>Very Good (4.50)</td>
</tr>
<tr>
<td>Student №2</td>
<td>60.00</td>
<td>Very Good (4.50)</td>
</tr>
<tr>
<td>Student №3</td>
<td>70.00</td>
<td>Excellent (5.50)</td>
</tr>
<tr>
<td>Student №4</td>
<td>80.00</td>
<td>Excellent (6.00)</td>
</tr>
<tr>
<td>Student №5</td>
<td>63.33</td>
<td>Very Good (4.50)</td>
</tr>
<tr>
<td>Student №6</td>
<td>63.33</td>
<td>Very Good (4.50)</td>
</tr>
<tr>
<td>Student №7</td>
<td>80.00</td>
<td>Excellent (6.00)</td>
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<tr>
<td>Student №8</td>
<td>80.00</td>
<td>Excellent (6.00)</td>
</tr>
<tr>
<td>Student №9</td>
<td>73.33</td>
<td>Excellent (5.50)</td>
</tr>
<tr>
<td>Student №10</td>
<td>73.33</td>
<td>Excellent (6.00)</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>70.33 – Excellent (5.50)</strong></td>
<td><strong>73.67 – Excellent (5.50)</strong></td>
</tr>
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Source: Authors

Conclusion
The successful integration of e-learning and the resultant good results and positive feedback from students are preconditions for the continuation of this form of teaching in the future. Moreover, the examined students fill in an anonymous poll to show the authors their thoughts for this type of hybrid educational system. Their responses will be taken into account in the future development of this type of education.

The relevance of e-learning environments today and the need of actualization of the educational courses are the main reasons for the usage and the integration of this form of teaching more and more. In this article, a model for an educational platform of a university discipline which can also be applied in other teaching courses is shown. The results of the conducted parallel two types of testing show us that e-learning is welcomed by the students nowadays.

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ETHICAL ASPECTS OF SOCIAL WORK IN MODERN SOCIETY

Hermína Mareková¹

Abstract: The basic principle for the exercise of professional social work is the respect for human rights and social justice. The social worker’s activity is associated with high expectations on the part of society, although the moral standards of society are typically on a lower level. The legislative environment or norms governing the decisions of social workers are determined by legislation as well as generally applicable ethical norms. In practice, this creates ethical dilemmas consisting in the acceptance of a hierarchy or priorities of individual norms, whereas the adopted and applied values and norms can be counterproductive. This situation may cause a conflict between professional ethics and valid social norms. The following article tackles the issues in social work arising from the stereotypes surviving in society and a lack of competence of many social workers.

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Keywords: ethics, human dignity, morality, social work, values

Introduction

The concept of ethics and its dimensions have probably been a subject of interest for each of us. These issues have been tackled in many different publications, as evidenced by the fact that upon entering the word ethics in the Google Scholar search engine, the number of results referring to this topic for the year 2016 is 133,000 in 0.08 seconds and the word morals yields 25,400 results in 0.06 seconds. Even in everyday life, people increasingly face a variety of serious ethical issues and dilemmas, and stand before a decision. They must often make decisions and every decision may have an ethical aspect with various consequences. We daily hear from the media that this or that contradicts medical, judicial or teaching ethics. It seems as if some professions were supposed to be more ethical than others. As if there could and should be a distinction between professional ethics and valid social norms. The truth is that a certain norm applies in public and another one at home, behind the closed doors of our apartments and houses. This is a Slovak reality surviving from the time of socialism. But this double standard of society, its schizophrenia, has very detrimental consequences in the long term, because this atmosphere is where a new generation socializes. We usually refer to ethics, to moral principles, and we can say for sure what is ethical and what is not, based on our values, valid norms of our society that we have acquired during our education, our socialization.

Socialization has for some time been considered a key factor in the functioning of society and an important attribute for achieving authentic being. In practice, this produces ethical dilemmas consisting in the acceptance of a hierarchy or priorities of individual norms, while the adopted and applied values and norms can be counterproductive. This condition may cause a dilemma between professional ethics and valid social norms.

These are the ethical dilemmas that, if we recognize them, still offer an opportunity to correct our behavior in a timely manner and prevent more serious damage. In this case, it can also be a discriminatory behaviour towards a person who is dependent on our help, so that we have a better argument than the one by Bertrand Russell (1956): "I cannot see how to refute the arguments for the subjectivity of ethical values, but I find myself incapable of believing that all that is wrong with wanton cruelty is that I don't like it." It is becoming ever more desirable for us to pay more attention to ethical dilemmas not only in the field of social work, but in other humanities as well.

Ethics Or Ethics In An Unethical World – Social Work

The word ethics comes from the Greek word ethos "character, moral nature." Philosophically, it is the discipline or teaching about responsible behavior within the human society (Petrušek et al., 1996, p. 269). There is an interesting term introduced by M. T. Cicero: philosophia moralis from Latin mos "custom, manner," an expression that replaced the term ethics in classical antiquity and scholastic philosophy. According to a sociological dictionary, the term morals means "settled patterns, behavior, generally accepted norms." In the same way the terms manners, customs are used. W. G. Sumner wrote in 1906 that, in his opinion, morals are formed from customs and traditions (volkways) and are based not only on generally accepted stabilized activities, but also on abstract moral principles. They

¹ Danubius University, Sládkovičovo, Slovakia, hermina.marekova@gmail.com
are subject to stronger social control (ibid, p. 653). According to other sources, ethics (Greek ethos "moral character") is the sum of all the principles upon which the correctness of acting is assessed (Jandourek, 2001). From the above definitions, the term ethical may not fully express the intended objective, responsible behaviour and habit (stereotype).

With some authors, such as Dupré (2007), we find ethics in conjunction with moral philosophy, which is divided into three areas. The most general one is meta-ethics which explores the origin or basis of morality and asks whether ethics is objective or subjective. The second one is normative ethics, which examines the norms, standards underlying the moral behavior, for example utilitarianism, based on the standard of benefit. The third area, according to him, is applied ethics, which applies a philosophical theory in practical, everyday issues, such as the question of just war, the attitude towards abortion or to animal abuse. In this area, we have seen different ethical attitudes. There is the absolutist stance, according to which deeds are either right or wrong, in all circumstances. The consequentialist argues that the correctness or incorrectness of acts can be assessed only by reference to their effectiveness (utilitarianism). The deontologist considers acts as intrinsically right or wrong, regardless of consequences. Their meaning is associated with the intention of the actor (Kantian ethics). The naturalist believes that ethical concepts can be analysed and identified with the help of science. The non-cognitivist says that morality is not a matter of knowledge, because it ignores facts (emotivism, prescriptivism). The objectivist says that moral values are part of the inventory of the universe, independently of all humans, and ethical concepts are metaphysically true. The subjectivist claims that value has no basis in the external reality. An example of subjectivism is relativism.

According to Hume (Hume's guillotine, Hume's Law), we believe, on the one hand, that we live in a material world that can be explained through science, in a world of facts, out of which value is excluded. On the other hand, we feel that in making moral judgment, e.g. that genocide is wrong, we declare something true about the world, regardless of how we feel about it (In Dupré, 2007).

According to some authors, our morals arise from our prejudices. The term prejudice comes from Latin praejudicium (pre-reasoning, antipathy). According to Giddens (2006), prejudices are our preformed opinions, inflexible, ossified evaluation, customary ideas of another person or group that are not based on experience. They are mostly adopted opinions that keep forming constantly and stubbornly, despite changes, and are maintained. Strictly set expectations and norms form the basis for discrimination (including the gender-based one).

**Culture – Values – Value Change**

Culture is a "sum of spiritual and material values created by humankind throughout its history" (Buchtelová et al., 1997, p. 526). Each society has its own culture and these cultures can be very different. Cultural values existing in our society may not apply in other cultures. However, due to constant interaction with social environment, they are subject to constant change.

An important, now increasingly topical issue, says Huntington (1996), is the question if the liberal values of the West are truly universal, or it is just our opinion. In sociology, the elements of culture are the norms and values existing in society. Values and value orientations are the ideas of people about what in society is regarded as good and desirable or, conversely, as bad and undesirable. From the perspective of sociology, the values and norms are very important elements of culture, because, for the functioning of society, it is necessary that its members adhere to certain regulations and norms (Mareková, 2013). The norms define a person's behavior in a certain situation. Without these social norms (which can be understood as conventions), collaboration in society is impossible. Non-compliance to norms results in unpredictable behavior of the members of society. This also prevents cooperation. Violation of a norm is always followed by a penalty.

Adoption of norms takes place during upbringing, which is called socialization in sociology. According to a psychological definition, it is the time of personal development (Hurrelmann, 1988). According to Durkheim (1984), a norm is an elementary component of social existence of humankind. On the one hand, there are the norms of society, on the other hand, the behavior and conduct of a member of a group that should correspond to valid norms of society as much as possible (Ondrejkoči 1998).

Andorka (2003) speaks about the five most important facts in connection with norms:
1. Norms in a society can be contradictory. For example, criminal law punishes an act, and the majority of citizens are morally opposed to the sanction (they disagree e.g. with sanctions for speeding). Contradictory norms can be adopted by different groups, for example religious or ethnic ones.

2. Norms are constantly changing during the development of society.

3. Various societies adopt different norms. (e.g. vendetta)

4. The fact that a particular society has accepted a norm, does not necessarily mean that that norm is profitable in terms of the existence and development of the particular society, such as the holy cow slaughter ban in Hinduism.

5. During the development of society, norms are subject to constant change, so it is very difficult to assess the behavior of a certain society in the past and consider it negative just because it contradicts the currently accepted norms in the society or collides with the criminal law.

The question arises whether there are also norms that are valid in every society, in every age. Certain moral values could be such (Andorka, 2003). It seems that certain taboos are generally accepted (incest, child abuse).

Empirical evidence shows that changes in our values scale are oriented towards materialism and individualism, while solidarity has fallen on a lower place, below materialism. This question was answered by Inglehart - Abramson (1995) in four points: According to them, the materialist is a human who puts material values on the first two places, while the post-materialists is someone who puts two post-materialist values of the first two places. According to Inglehart and Abramson (1995), the number of post-materialists has increased in every western country since the seventies. Not everyone agrees with their opinion and most sociologists hold the view that changes in values are cyclic and that a "hippie" society is followed by a "yuppie" one, which puts more emphasis on material values.

According to Hankiss (1983), a negative modernization took place in post-communist countries: in the case of individualization, society has progressed much faster, while in other indicators, such as work efficiency, independence and innovativeness, the post-communist countries have fallen behind other modern societies.

"Our ideals are constantly changing," wrote Fritz Bohnsack in 1996 and said that significant changes in the recognition of previously existing values have occurred in his country. According to him, a few decades ago the accepted, recognized, valid values and norms in society used to be qualities such as submission, discipline, performance of duties, reliability, openness, loyalty, punctuality, self-sacrifice for the good of society, and modesty. German sociology calls them the values of duty and acceptance. The new values are called the values of self-actualization. Such values include spontaneity, pleasure seeking, self-fulfilment, and immediate satisfaction of someone's needs. "Not everyone accepts it, but most of society lives according to it," says Bohnsack (1996). In general, there are certain values and norms that have been, are and perhaps will be valid in every society and they are called taboos. Taboos in most cultures include incest, child abuse and such. (Mareková, 2014).

Social Identity – Socialization

Identity comes from Latin identicus "identical." In general, it is the unity of inner, mental life and action – also called authentic existence. The term is used in various meanings. E. H. Erikson (1955) uses it as a concept of an essential feature of adolescence, which is associated with questions such as Who am I? Am I adult? A. H. Maslow (1954), a humanist psychologist, defines it as the ability to be what I really am, i.e. myself. It is the pursuit of self-actualization. In social psychology, identity is broadly understood as authentic being. Its opposite is an inauthentic being that is hypocrisy. In philosophical anthropology, identity is understood as "living in truth." In sociology, identity is discussed by R. G. Darendorf (1950) and E. Goffman (1959). (In: Petrusek – Vodáková, 1996, p. 414)

Socialization (from lat. socialis - sociable, allied, marital) is a complex process during which the human as a biological creature becomes, by means of social interaction and communication with other social beings, able to behave as a member of a group (ibid.). Socialization is a lifelong process, a lifelong interaction of the individual with their environment. The adoption of norms takes place during upbringing, which is termed socialization in sociology and represents acquiring the values and norms of a society.
According to a psychological definition, it is the time of personality development. Meeting norms happens often because people are afraid of sanctions, but it can also take place because these norms are identical with their value orientation (internalization), therefore they comply with them without any control or sanctions, or condemn the individual who does not respect them (Mareková, 2013). Socialization after Brimm (1966) is the process, in which an individual acquires such knowledge, skills and abilities that enable them to become a more or less useful member of various groups or society.

Awareness of the Self is a process that begins in early childhood. Within it, I differentiate myself from "the others." The development of our personality, ourselves, is a process that accompanies us since our birth, when we have no idea of society, and throughout our lives, as Parsons wrote in his publication back in 1956: " The birth of every new generation of infants is a recurrent barbarian invasion..., because the newborn does not have the slightest idea about the rules and norms of the society in which s/he was born."

Socialization has for a longer period been considered a key factor, a very important element of the functioning of society and an important attribute in achieving authentic being. The process of socialization was covered by Freud. According to him and his classical psychoanalysis, the essence of socialization is a suppression of social and biological instincts, of animal sexuality and aggression. In other words, a creation of impulse control.

According to Hartman, socialization is a process of acquiring the ability to adapt. English empirical philosophy (Locke, Hobbes), as well as Skinner, assumed that the human socializes solely on the basis of interaction with their social environment. According to social psychology, we socialize under environmental influences – by learning.

Modern theories talk about learning roles according to society's expectations. Of course, all of these factors are crucial for our behavior at a later stage, but, from the point of view of a social worker, they can also produce an unwanted behavior. Europe has always been more or less homogeneous and the principle of the nation state has been customary: Germany used to be inhabited by the Germans and England by the English. This has changed with the arrival of large numbers of people with completely different cultures. The skills acquired during socialization do not provide us a comfortable climate anymore and we are beginning to feel lost in our carefully constructed world. But then we form the ground for fear and for other attributes, such as prejudices, discrimination, aggression, and violence.

**Ethical Code – Values In A Valueless World**

Professional ethical codes contain sets of ethical rules that society expects from the workers in a profession and they should also include sets of rules and sanctions for those who do not meet these expectations. They are actually sets of rules about what is good and right and expected by society. Most professions nowadays have such a set of rules. Problems arise when the individual values contradict or some norms are no longer valid.

In the now obsolete Code of Ethics of Social Work from 1997, the Preamble of social work stated that "...the social workers are also guided by the norms they formulate themselves" That was a source of problems, because socialization and the accepted norms of individuals can be very different. Not to mention the fact that it contradicted the subsequently adopted international documents. The issue consisted in differences of formulating one's own values based on the accepted culture, socialization (upbringing), multicultural environment, etc. The question is whether we can create a "timeless" code of ethics, because the determinants defining our values and norms are constantly changing. The Code of Ethic of Social Work should be in line with the values of the European Union and the legislation, which is part of the Treaty of Amsterdam. A code of ethics can be formed only on the basis of respect for human rights and norms, social justice, international codes and anti-discrimination.

**Dilemmas In Social Work**

What is a dilemma? It is a "necessity of choosing between two mutually exclusive (often unfavorable) options," or, in logic, a syllogistic judgment with two implicative and one disjunctive premise" (Buchtelová et al., 2008. p. 215). These are often hidden problems, difficulties creating tension. Dilemma is such a need of choice, when we do not have sufficient information, or what we have is contradictory. Theoretically, these dilemmas have long been tackled in various postulates, but we must realize the importance, the necessity of resolving these problems in practice, the more so that
In social work, ethical dilemmas arise from the acceptance of a hierarchy or priorities of individual norms, while adopting and applying certain values and norms can be counterproductive. This condition may cause a dilemma concerning the relationship between professional ethics and valid social norms. The social worker must often make a decision, even in a situation where they do not have enough information, or the pieces of information come from various sources (e.g. the media) and are contradictory. When this is the case, information is untrustworthy and cooperation is difficult or even impossible. Dilemmas arise on the professional level (lack of competence), on a personal level (patterns, models) as well as in the social and cultural field (traditions, values, stereotypes). They can also occur in the field of politics.

According to Banks (2006), there is a difference between ethical issues and dilemmas. She thinks that an ethical dilemma arises when we must choose between equally unfavorable alternatives that are contradictory to our moral principles and it is not clear, which option is the right one, and regardless of our choice, it will leave us in anguish and remorse. According to her professional ethics, we must constantly re-evaluate.

An ethical dilemma arises when a social worker faces one or more contradictory values. The very first one is the dilemma of intervention or non-intervention. What takes precedence? Justice or equality, efficiency or competence, or the right to self-determination? Is good what society expects, or what we have learned during socialization? There is a very strong and complex pressure from society. Every action has a broader perspective, as in the case of an alcohol addict: assistance is needed by the whole family and there are both objective and subjective elements. Objectivity is necessary, lest social workers are not only amateurs, writes Max Weber (1970). An amateur differs from a professional only in that s/he is not sure about the firmly established working methods, and therefore mostly unable to control, assess or realize the significance of their ideas.

These tensions and dilemmas are being developed in various fields, such as professional and personal environments, social, political, cultural areas etc. According to some sociologists, for example Bauman (2000), they are “liquid modernities,” because they reinforce individualization. According to Giddens (1994, p. 5), the growing reflexivity results in a reduced respect for traditions and a growing importance of communication. He thinks that the more tradition weakens, the more one is forced, for various reasons, to make personal choices in one’s life (possible ethical dilemmas). There are big debates about the common values: if they are receding, or social solidarity is being reduced (Putnam, 2000).
The performance of social work is a long process with the human and is completely different from the direction of the society development, which is focused on results and, where possible, immediate ones. Among other dilemmas is the question of the worker's motivation in a society where this work is extremely undervalued, both financially and socially.

**Gender Sensitive And Gender Insensitive Social Work**

Even social work can be discriminatory, if it is carried out under these deterministic ideas. Non-stereotypical, gender sensitive social work can be promoted only on the basis of respect for human rights and norms, social justice and anti-discrimination (Mareková, 2013b).

**Conclusion**

"Imagine us living in a world where no one ever imposes anything, where there is peace and open possibilities for all," says Watkins (2000). We all long for the same, but we often expect solutions from others. We live in a time when our consumption of material goods far exceeds our real needs and, as Dorian Grey said, we need only unnecessary things. We are unable to set our priorities and give up some of the material achievements. We have rich choices at the disposal, but do we really need 35 programs in the washing machine, when we use only three of them, or a hundred TV channels, when we usually watch about five? And do we exploit the full potential of our "superphones"? Instead of true values, we seek trendy advances in science and technology, in accordance with society's expectations. We often spend a long time exploring various technical achievements, which limit our freedom and make us slaves of materialism. We balance between understanding how to secure freedom for people in decision-making and between the expectations of society in instances where social values and institutions are at risk. On the one hand, society is supposed to provide every human with achievable options and, on the other hand, the social worker does not have sufficient competence, time, personal capabilities or financial provision. Practical experience shows that during the performance of not only social work, but also various other professions, the existing international legislation on racism, discrimination and gender bias is violated on the part of social workers. This happens both because of unpreparedness (ignorance), but also because of the maintained stereotypes in society. We lack a unified vision and an ethical, normative and legislative uniformity, within which the work should be done, despite the determinants shown above.
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SOCIETY ANXIETY AND SELF-REPORTED TIME SPENT ONLINE IN A SAMPLE OF ALBANIAN UNIVERSITY STUDENTS

Erika Melonashi

Abstract: Online activity serves different purposes, one of them being communication and social interaction. Studies have demonstrated that individuals tend to display online behavioral patterns that are similar to their social groups; also there is some evidence that individuals who have interaction difficulties in real life (e.g., social anxiety) might engage more in online behavior. The purpose of the present study was to investigate the relationship between self-reported time spent online, descriptive social norms, and social anxiety symptoms in a sample of 356 Albanian University students. Participants were recruited online. Results showed a significant predictive model for self-reported time spent online, F(7,342)=48.99, p<.001, R²=.50. Age, gender, and the four social anxiety components were not significant predictors; only descriptive norms had a significant effect, β=.70, p<.001. Results are in line with the social normative approach to internet use and have several implications which are discussed in the paper.

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Keywords: Albania, social anxiety, online, students

Introduction
The widespread use of the internet has affected the dynamics of social relationships and communication patterns especially among youth. The excessive time spent online particularly during this developmental stage, represents a growing concern, both in terms of its impact on quality of life (interference with everyday functioning) and the greater risk for addiction. Hence it is important to investigate patterns of internet use, particularly in regard to the specific functions it fulfills during this developmental stage.

In the recent years, internet use in Albania has become quite widespread among different age groups. This phenomenon has been accompanied by growing concerns regarding negative consequences such as, gaming addiction, online sexual harassment, view of inappropriate content (for children) etc. (World Vision, 2014). Nonetheless, research on internet use patterns is still in its infancy as data comes mainly from organizations such as UNICEF and World Vision and focuses particularly on children and adolescents. So far, no research has been conducted among young adults, and also there has been no examination of theoretical constructs related to the specific behavior (in addition to frequency and prevalence data).

The present study aimed to assess the relationship between self-reported time spent online, social anxiety symptoms and descriptive norms among Albanian University students. Hence the study would determine whether a social normative approach or a stress-response/self-medication model, would better explain self-reported time spent online.

Literature Review
Internet use patterns are related to very diverse functions, including communication and social relationships, entertainment, stress management etc. According to a social normative approach of internet use, internet use patterns of youth are highly similar to their social groups, friends and peers (Chang, 2004; Zhou & Fang, 2015). Thus, internet use patterns among youth might be explicable through processes such as social learning/modelling and group belonging, as well as factors such as descriptive or injunctive norms for internet use (how widespread and acceptable the behavior is) (see Brechwald & Prinstein, 2011; Steinberg & Monahan, 2007).

Yet another line of research focuses on an alternative function of internet use, e.g., as a stress management or anxiety relieving tool (e.g., Koc & Gulyagci, 2013; Liberatore et al. 2011; Morrison & Gore, 2012). There is some evidence that individuals who have difficulties in forming relationships in real life might turn to the online medium as a safer environment to experiment, approach others, and build new social connections (Joinson, 2001; Weinstein et al. 2015). In this context, several studies have reported relationships between social anxiety symptoms and internet addictive behavior (Yen et al., 2007; Wei et al. 2012).

1 Faculty of Social Sciences and Education, European University of Tirana, erika.melonashi@uet.edu.al
Social anxiety is a psychological disorder characterized by constant anxiety/fear as well as avoidance of social interaction or performance situations; most important, the presence of anxiety and avoidance behaviors interfere with normal functioning of the person (American Psychiatric Association, 2013). Data from the United States have reported that most college students experience at least some of social anxiety symptoms, although they do not fulfill the necessary criteria for diagnosis of the disorder (Baum et al., 2001; Bryan, 2005). Indeed, young adulthood poses significant developmental challenges on the individual in terms of achievement, acceptance, belonging, intimacy etc. (Erikson, 1978). Moreover, several studies with college students have reported relationships between social anxiety symptoms and problematic internet use suggesting that the online medium might serve as a safe place to experiment, form new social relationships, and relieve stress (Alavi et al., 2010; Liu & Kuo, 2007; Montag et al., 2011).

To summarize, internet use patterns among youth might be explicable both in terms of social normative approaches (descriptive and injunctive social norms) and self-medication models (e.g., to manage social anxiety symptoms).

**Methodology**

**Participants**

Participants were 356 Albanian university students, 115 men and 241 women. Mean\(_{age}\)=24.7 years, SD=7.8 years. In terms of field of study, participants were classified as follows: 112 students from the Faculty of Law, 133 students from the Faculty of Economics & Information Technology and 111 students from the Faculty of Social Sciences.

**Procedure**

The study was conducted online as emails were sent to 500 email addresses of students randomly chosen from the institutional database. The content of the email explained the purpose of the study, ensured the anonymity and confidentiality of the respondents and provided the contact address of the researcher for further questions/clarifications. Students were asked to access the questionnaire through the link contained in the email (Google Docs Platform).

**Instruments**

The instrument was a self-report questionnaire with 3 main sections. The first section gathered information on demographics (gender, age, education profile). The second section included five questions referring to the time spent online (number of hours per day) of the participant, their best friend, the peer group, partner, and sibling. The response options were as follows: ‘1-2 hours’, ‘3-4 hours’, ‘5-6 hours’ and ‘more than 6 hours’. The four items referring to reports of best friend, peer group, partner and sibling were grouped into the variable ‘Descriptive norm for online behavior.’ The internal consistency for these items, Chronbach’s alpha held an acceptable value of \( \alpha = .73 \), allowing the use of these items as a subscale.

The third section of the questionnaire was the Liebowitz Social Anxiety Scale (Liebowitz, 1987), an instrument consisting of 24 items, 11 referring to Social interaction situations and 13 to Performance situations. This scale asks participants to answer the questions twice, once for anxiety levels in the specific situations and once for avoidance behavior in the same situations. Response options were from 0 (None) to 3 (Severe) for Anxiety, and from 0 (Never) to 3 (Usually) for Avoidance. The total score of the scale has a maximum of 144 points, and the categories are as follows: Up to a score of 30, social anxiety is unlikely; Up to a score of 60, it is probable; Up to 90 it is very probable, while higher than 90, highly probable. The internal consistency for Liebowitz scale as a whole was Chronbach’s \( \alpha = .94 \). The four subscales also had acceptable internal consistency as follows, Anxiety in social interaction \( \alpha = .86 \), Anxiety in performance situations, \( \alpha = .84 \), Avoidance of social interactions \( \alpha = .84 \), Avoidance of performance situations \( \alpha = .79 \).

The first and second sections of the instrument were constructed in Albanian, while the Liebowitz scale was translated from English. To ensure that the translation process was correct, the scale was translated by two independent translators and Albanian versions were compared by the researcher. In the few cases of word mismatch, the researcher (proficient in English), chose the ‘most appropriate’ item. This pre-final version was piloted with 5 students, to ensure the comprehensibility of the items. No major corrections were done after this stage.
**Results**

Descriptive analyses revealed that students reported a mean time spent online of 2 hours/day (M=2.00, SD =.89), whereas the mean time reported for others, i.e., descriptive norm, was M=2.40 hours/day, SD=.75. As regards social anxiety, 21.3% of the sample (76 participants) reported total scores up to 30, i.e., social anxiety was unlikely for almost 1/5 of the total sample. Additionally, 43.5% of the sample (155 participants) reported total scores up to 60, falling thus into the category of probable social anxiety. Finally, 30.1% (107 participants) reported scores up to 90, falling into the category of very probable social anxiety and only 5.1% (18 participants) reported the highest scores in the scale (i.e., social anxiety was highly probable in this fraction of the sample). Descriptive statistics for total scores as well as the specific dimensions are shown in Table 1.

Correlation analyses between the variables of interest revealed significant relationships only between time reported online and descriptive norms for online behavior, r=.70, p<.01. The four dimensions of social anxiety as well as the total score had no significant correlations to time spent online. An interesting finding involved correlations between descriptive norms and three of the dimensions of social anxiety, respectively with Fear of social interaction, r=.12, p<.05. Avoidance of social interaction, r=-.16, p<.01, and Avoidance of performance, r=-.11, p<.05. Table 2 shows correlations between the variables of interest.

<p>| Table 1: Descriptive Statistics for Social Anxiety and the specific dimensions |
|------------------------------------------|---------|----------------|----------------|----------------|----------------|</p>
<table>
<thead>
<tr>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Score Social Anxiety</td>
<td>356</td>
<td>.00</td>
<td>133.00</td>
<td>50.6938</td>
</tr>
<tr>
<td>Fear of Social Interaction (Fear SI)</td>
<td>356</td>
<td>.00</td>
<td>33.00</td>
<td>11.3427</td>
</tr>
<tr>
<td>Fear of Performance (Fear PER)</td>
<td>356</td>
<td>.00</td>
<td>34.00</td>
<td>14.7809</td>
</tr>
<tr>
<td>Avoidance of social interaction (Avoid SI)</td>
<td>356</td>
<td>.00</td>
<td>31.00</td>
<td>10.8343</td>
</tr>
<tr>
<td>Avoidance of Performance (Avoid PER)</td>
<td>356</td>
<td>.00</td>
<td>36.00</td>
<td>13.7360</td>
</tr>
</tbody>
</table>

*Source: Author*

| Table 2: Correlations between the variables of the study |
|-------------------|----------|----------|----------|----------|----------|
| Time online       | Pearson Correlation | Time online |
| Sig. (2-tailed)   | N        | Fear SI  | Fear PER | Avoid SI | Avoid PER | Social norms |
| 1                 | 352      | - .034  | .042     | - .079   | - .005    | .698**     |
| .522              | 352      | .435     | .138     | .922     | .000      |
| .352              | 352      | 352      | 352      | 352      | 352       |
| Fear SI           | Pearson Correlation | Fear SI |
| Sig. (2-tailed)   | N        |         |         |         |         |         |
| -.034            | 352      | .817**  | .697**   | .615**   | -.121**   |
| .522             | 356      | .000     | .000     | .000     | .022      |
| .352             | 356      | 356      | 356      | 356      | 356       |
| Fear PER          | Pearson Correlation | Fear PER |
| Sig. (2-tailed)   | N        |         |         |         |         |         |
| .042             | 352      | .817**  | .543**   | .691**   | -.031     |
| .435             | 356      | .000     | .000     | .000     | .561      |
| .352             | 356      | 356      | 356      | 356      | 356       |
| Avoid SI         | Pearson Correlation | Avoid SI |
| Sig. (2-tailed)   | N        |         |         |         |         |         |
| -.079            | 352      | .697**  | .543**   | .731**   | -.162**   |
| .138             | 356      | .000     | .000     | .000     | .002      |
| .352             | 356      | 356      | 356      | 356      | 356       |
| Avoid PER        | Pearson Correlation | Avoid PER |
| Sig. (2-tailed)   | N        |         |         |         |         |         |
| -.005            | 352      | .615**  | .691**   | .731**   | -.110**   |
| .922             | 356      | .000     | .000     | .000     | .038      |
| .352             | 356      | 356      | 356      | 356      | 356       |
| Social norms     | Pearson Correlation | Social norms |
| Sig. (2-tailed)   | N        |         |         |         |         |         |
| .698**           | 352      | -.121** | -.031   | -.162**  | -.110**   |
| .000             | 356      | .561     | .002    | .038     | 1         |
| .352             | 356      | 356      | 356      | 356      | 356       |

*Correlation is significant at the 0.05 level (2-tailed); **. Correlation is significant at the 0.01 level (2-tailed).*

*Source: Author*
Subsequently, a regression analysis was conducted with \textit{time spent online} as the dependent variable, and gender, age, descriptive norms and the four dimensions of social anxiety as independent variables. Results showed a significant predictive model for self-reported time spent online, $F(7, 342) = 48.99$, $p<.001$, $R^2 = .50$. However, age, gender, and the four social anxiety components were not significant predictors; only the variable descriptive norms contributed significantly to the model, $\beta = .70$, $p<.001$.

\textbf{Discussion and Conclusions}

The present study aimed to assess the relationships between self-reported time spent online, social anxiety and descriptive social norms. Results demonstrated no significant relationships between social anxiety (as a total and also specific subscales) and self-reported time spent online. The only significant influence on time spent online, was that of descriptive social norms.

These results are in line with a social influence approach to explaining online behavior; indeed, participants reported that the online behaviors of their partners, peers, friends, siblings were highly similar to theirs. These results are in line with studies on adolescent internet use (e.g., Chang, 2004; Zhou & Fang, 2015) suggesting that similar to that developmental stage, social influence in young adulthood might still be highly relevant in understanding online behavior.

Conversely, these findings might also highlight once more the positive function of the online medium as facilitator of social interaction and relationship maintenance (Young, 2015; Zhou & Fang, 2015). Indeed, a very interesting finding was the negative relationship between descriptive social norms and three of the dimensions of social anxiety. More specifically participants who reported a greater involvement in online behavior of their social groups also reported lower levels of fear or avoidance of social interaction as well as less performance avoidance. This finding is in line with research suggesting the positive social supportive effects of online communication; for instance, Wangberg et al. (2007) have reported relationships between internet use and social support (social provision) and also subjective health. Nonetheless, the present study did not investigate the purpose/function of being online, (i.e., communication, work, information seeking etc.), an aspect which is very important to consider in future research (see Pontes, Szabo, & Griffiths, 2015).

Another important aspect refers to excessive or problematic internet use, which certainly cannot be assessed through time spent online only (Lehenbaue-Baum & Fohringer, 2015). Indeed, several studies have found relationships between internet addiction and social anxiety, suggesting that the relationship might become evident at more severe levels of problematic behavior (Alavi et al., 2010; Montag et al., 2011). Further research is needed to examine whether this is actually the case among Albanian youth, using measures of internet addiction apart from social anxiety measures.

Nonetheless, the present study also provides some other findings worth mentioning, especially in terms of social anxiety. For instance, descriptive analyses indicated that only 1/5 of the sample fell into the category of 'unlikely social anxiety,' while the rest ranged from 'probable' to 'highly probable social anxiety.' Although the sample is too small and limited to conclude on prevalence rates, this data suggests the need for further research on social anxiety especially among Albanian youth. The socio-economic and political transition of Albania in the last 27 years, as well as poverty, crime, corruption, job insecurity, the dissolution of the traditional family, the instability of values and social norms, are only some of the macro-level factors, which might suggest the relevance of investigating further disorders such as social anxiety. In support of this claim, Hofmann, Asnaani, and Hinton (2011) have suggested that the cultural context is very important in understanding a disorder such as social anxiety and have also reported significant differences in rates of the disorder across countries. Hence future research with more extensive and representative samples might be needed to examine this aspect also in Albania.

To conclude, the present study suggests that perceived social norms are relevant in understanding internet use behavior (time spent online) among Albanian students. Social anxiety with its two components Fear and Avoidance, was not related to self-reported time spent online; also, other factors such as age and gender were irrelevant. Despite the several limitations, the findings of the present study have important implications in terms of future research within this field in Albania.
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References


CURRENT CONCEPTUAL APPROACHES FOR ASSESSMENT OF THE PROCESS OF AGEING AND OLD AGE

Vanina Mihaylova,1 Dimitar Shopov,2 Iliya Bivolarski,3 Adolf Alakidi,4 Kristina Kilova5

Abstract: Ageing should be considered not only as an increase in the number of elderly and old people in their absolute and relative numbers, but also as a unity of the transformations of the lifecycle, with an emphasis on: later retirement, prolonged period of good-quality life, an active approach towards the process of retirement and differentiation of the category of “fourth age”. The general preparation for old age has earned a new appeal in the contemporary societies. Motivation of the old people for activity – both physical and intellectual – is of great importance for the better survival of the old age and long life in good health, supported by realized well-being and feeling of joy from life. In this aspect the study of both risk and protective factors for human health (in a salutogenetic perspective) becomes increasingly fundamental. The issue of population at an advanced age has definitely been considered as an independent subject since the beginning of the 21st century. Moreover, the society perceives it as an essential basis for further progress and flourishing of the mankind. In this sense the demographic strategies treating the problem need to address it in a new positive way, with different and positive attitude, accepting the population-related failures and anxiety and turning them into challenges and advantages.

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UDC Classification: 614.1

Keywords: healthy ageing, well-being, illness, disability, models of ageing, salutogenetic

“We live as long as God decides. But there is a significant difference whether we spend our old age miserably or well and meaningfully; a good physician can definitely contribute to this.”

Goethe

Introduction

With these words Goethe, in the beginning of 19th century concedes to the physicians the main responsibility for solving the problems of ageing and old age. He had not presumed that this burden would be assumed by the entire society. In the past century the average expectation of life almost doubled and the number of old people sharply increased.

The first signals of ageing of the population date back from the 1960s. The global society is already older than ever before in human history. Europe is the region in the world with the oldest population. At the same time it is assumed that research in the field of ageing on this continent has considerably fallen behind in comparison with the USA.

Ageing of the population on the Old Continent can be attributed mainly to two major demographic tendencies – decrease in birth-rate and increase life expectancy. This process creates a fundamental problem of complex nature – social, economic, psychological, medical, etc. Experts from the World Health Organization have established the that the stages typical of the second half of the human life are: medium age (maturity) – 45-59 years of age; advanced age – 60-74; old age – 75-89; long-living persons (macrobios) – 90 and over.

In many countries at least 10 % of the population belongs to the group of people over the age of 65 (Bassuk et al, 1999). In the following decades the developed countries will likely witness a sharp increase in the actual and relative numbers of old people, while doubling the number of those over 65, and probably tripling (possibly even quadrupling) the number of people over the age of 85. World Trade Organisation and the World Bank include ageing of the population among the future problems of highest priorities for the developing countries (Kumar and Steinmann, 1998). Currently about one fourth of the population in our country is over 60, and the fraction of society over the age of 65 is bigger than 15 %.

1 Faculty of Public Health, Medical University Sofia, Medical University Plovdiv, Bulgaria, vanina_delfi@abv.bg
2 Faculty of Public Health, Medical University, Plovdiv, Bulgaria, shopov_d@abv.bg
3 Department of General and Clinical Pathology and Forensic Medicine, Medicine Faculty, Medical University, Plovdiv, Bulgaria, iliya_bivolarski@abv.bg
4 Medical Student in 6th year, Medicine Faculty, Medical University Sofia, Bulgaria, delfi921@abv.bg
5 Medical University – Plovdiv, Bulgaria, Faculty of Public Health, k_kilova@abv.bg
Psycho-emotional well-being for healthy ageing. General provisions

The main societal challenges since the end of XX century have been maintenance of health and a good quality of life of the ageing population. For 60-year—old people, it could be expected that at least one fourth of their remaining years will be spent with a disability, including of psychogenic nature. According to Bretschneider and McCoy (1987), Isaacs (1992), Shah (1998), the age at the beginning of the deteriorating health could be increased faster than the rate of extension of human life due to the “compression of the sick-rate”, i.e. a shorter period of illness and disability, reduction of untimely death and good health almost until death.

The long-term tradition in medical ethics confirms that the real objective of medicine is to contribute to the increase in patients’ well-being. The psycho-emotional well-being and the possibility of overall healthy life are influenced by a relatively limited number of incurable conditions whose incidence is associated with ageing. An elderly person is no longer able to overcome their withdrawal from their habitual functions in their former social environment. Only a fast return to the typical social environment could prevent the unfavorable course of events. It should be noted that the main objective of medical treatment in old age is not necessarily the elimination of a disease, non-progression is often deemed sufficient. Other factors might prove to be more beneficial, such as maintenance of the habitual home environment, social relations and contacts, the life outside institutions; the perspectives for the future. This is so because health in old age can no longer be defined as a lack of any disturbances (of physical, psychological or social nature), but as an individual’s potential to manage and to live with such disturbances.

In the contemporary dynamic world an individual, especially an elderly one, faces extremely difficult situations in life. The intensity of the experience opposite to well-being – the spiritual discomfort – is explained by Higgins et al. (1987) through their theory of discrepancies in the self-consciousness and the ego, differentiating conflicts in three varieties. In this way, the feeling of being rejected, which often and even inevitably accompanies old age according to Maslow (2001), is the key to many other events such as intrusive desire for gaining back love, development of defence mechanism, accumulation of hostility and other negative motivating conditions. In this sense the human ability for building “new structures” is of great importance and becomes a prerequisite for imitativeness and originality of one’s image. The popular so-called “repertory grids” (Popova, (1993), creating readiness to search for an adequate response and adaptation mechanisms to stressful situations, and establishment of which is unique to the individual, appear to be of utmost importance, and at the same time the effectors of the increase in psycho-emotional well-being.

The concept of “old age” and its successful reception

If we make an attempt to summarize the viewpoint of leading authors with respect to the definition of the concept of old age, it is basically reduced to the following: an individual is as old as is his adaptation ability, i.e. the adaptive potential and speed of adaptation towards certain situations and their changes (Fink, 1987), (Schutz, 1980). Ageing cannot be interpreted as an illness. If the functional parameters of the thirty-year-old people are conditionally indicated with the initial value of 100 %, then within the framework of the reverse process, i.e. of regression or attenuating functions, the different values are reduced, affecting the heart, blood circulation, respiratory system, secretory system, etc. And as long as this regression is measured in physiological parameters, it can clinically remain unrevealed during the overall process of ageing. On the other hand, the reduced adaptation abilities lead to decreased resilience. In this sense we can talk about intrinsic predisposition to diseases leading to higher susceptibility to diseases (Bock, 1989).

This expected increase in the “predisposition” to diseases may provoke different reactions in the individual so that the health, well-being and overall capability could be preserved until reaching advanced age.

Preconditions for “successful reception” can be:

- Prophylactic medical checks
- Prevention of risk factors
- Personal hygiene and maintenance of the muscle tone
- Rational nutrition
- Optimal clothing, especially in transitional seasons, for prevention of adverse effects of atmospheric changes and temperature fluctuations
- suitable home environment
- Maintenance of interpersonal contacts
- Physical and mental independence
- Established structured daily regime, in which activities and rests alternate at reasonable intervals.

Therefore the environment and lifestyle contribute to a large extent to healthy ageing and are prerequisites for the psycho-emotional well-being, the main determinant for the content living in the third stage of life. The ability of the individual to make changes in this direction is determined by the social and cultural context of their life, including personal choices, access, availability, information and income. Environmental factors, such as housing and air and water quality, which are fundamental for health, are not always satisfactory or acceptable.

Healthy ageing includes social, as well as physical and psycho-emotional well-being. Decisive factors are the social framework and policy which enable elderly individuals to realize their potential and achieve optimal health.

Application of scientifically substantiated approaches for infiltration in the personal theory of the elderly individual's inner worlds is envisaged with a view to achieve efficiency given the struggle of risk factors, as well as ratification and development of protective personal models of salutogenic nature (Mihaylova and Lyochkova, 2012).

**Deficit models of ageing and their overcoming**

Sociological surveys show prevalence of various specific negative age-related stereotypes such as (Schutz, 1987), (Smith, 1994):

- Advanced age is inversely proportional to the working capacity/capability
- Old people do not manage strain well
- Elderly individuals have been burdened with enough work, strain and hardship already; they should be allowed to just enjoy their life.

These so called deficit models of ageing describe the public status of the elderly people with the key phrases: deprived of role functions, and reduction of the ability for establishing new social relations, connections and contacts. In this way the situation of the older generation is presented in a distorted manner. This feeling of being damned has a negative impact on their behavior. According to this conception differing from the contemporary understanding, the elderly people are directed towards incorrect and inactive behaviour, even though they are able to perform many versatile and meaningful activities. The extremely drastic definition of the third stage of life by using the term “retirement” is nonsensical since it leads the elderly individuals to inactivity and condemns them to permanent free time. As a rule, life after retirement passes without any social structure because the society has not defined the role of the elderly person (Dunn et al., 1999). A similar risk exists mostly with reference to people of lower social status. This eventuality has been very successfully described by the American author Mulford in his book “Lit up by death” in 1938: “The capability of the old person decreases only because of the fact that he has been told that it should decrease with ageing” (Schutz, 1989).

It is ascertained that in the economically underdeveloped countries the elderly remain economically and socially productive even after retirement, for a long period of time (Krassen Covan, 2003), (Popova, 1993). According to Pichora-Fuller (2003), prevention of the psycho-emotional decline and promotion of the functional independence of elderly people is the key objective of modern geriatrics. This opinion is based on the circumstance that the interval of increased life span is divided into “active continuity” and “dependent continuity of life.” The concept is entangled with the vision of the above-quoted compression of sick-rate ensuring healthy ageing. With some justification, Evans (2002) supports the opinion that preventive strategies aimed at extension of the active part of life at the expense of reduction of the period of functional dependency before death is one of the most
fundamental objectives of the modern medicine and psychology.
Along with observed biological modifications and the increased susceptibility to diseases and psychiatric disorders, there has not been proven a general decrease in the mental capacity in the elderly (Bassuk et al., 1999), (Glass et al., 1999). Most affected and slowed down are the quick readjustment and reaction in resolving complex and combinational tasks, in situations requiring fast involvement of the analytical systems and concentration. However, the intellectual qualities requiring update of available and accumulated experience and knowledge are constantly preserved, independent and unaffected by the old age (Bickel, 1998), (Fortinsky et al., 2003).

It should be taken into consideration that the majority of people over 60 years of age passively accept the proposal for early retirement. They are not prepared to oppose, although they are complete masters of the potential of their capability, but lack information about the particular tasks and activities which could fill up their daily life. Insurmountable feeling of emptiness occurs, leading to depression, often followed by alcoholism or “escape to sickness” (Engelhard, 1986). Gerontological studies show that in the post-professional period only a well-structured daily routine guarantees social contacts and involvement. Free time, though not filled with duties, should be actively distributed and used with careful consideration in order to avoid boredom or dissatisfaction. It can be surely stated that efficiency can be preserved in the old age if the elderly people are motivated and cooperate for this. It should be kept in mind that the strongest motivation in human behavior is not the reasonable contemplations but the socially substantiated impulses (Clark et al., 1997), (Freund and Riediger, 2001).

Reasonably ageing people start looking for new roles and tasks which could completely satisfy their need for both mental and physical activity even before retirement. The assistance of new role functions in this search is a priority of the contemporary social policy.

Two dimensions of old age
Old age as a chance
From the point of health promotion, old age, even if it is accompanied by a disease or disability, should be regarded as a chance. Based on the possibility for comparatively optimal utilization of the available capacity for work, the following key phrase may be considered valid for the seventh decade of human life: “I should always consider the things I can still do and not the things I cannot do any more.”

The above mentioned old age stereotypes also appear in case of chronic diseases. They affect mostly people who have in the course of their lives identified themselves with their professions, their personal successes and careers, with responsibility and power, i.e. qualities which fade away pretty fast upon retirement (Bassuk et al., 1999), (Engelhard, 1986). If favorable preconditions are set, the elderly individual remains independent and competent, i.e. manages their life and does not need care and service. But if they feel stifled by problems of any type – financial, social, housing, cultural or health-related, even the most insignificant event may lead to deterioration of their well-being; they feel (and according to the cognitive theory are) ill (Thomae, 1971), (Young, 2004). These short notes should confirm the unsoundness of the existing biased statements that old age presupposes obstinacy, rigidity, restricted mobility, unwillingness for establishing social contacts, deep absent-mindedness, non-commitment and inactivity. They should be replaced by categories such as unchanged capacity for work and readiness for acquisition of knowledge, independence, experience and competence. Elderly people are free from the pressure of doing a certain, possibly unwanted activity and have obligations which are without deadlines; they possess free time, i.e. advantages which can be related to the concept of advanced age (Schutz, 1987), (Tokarski and Schmitz-Scherzer, 1987).

Health value
Sociological surveys show that values such as subjective feeling of good health, satisfaction with life, independence, freedom, meaningful role in the society, family, and other are outlined as important (Parker et al., 2001). At the same time, the impact of social environment on health is also taken into consideration, for example income, sex, age, education and profession. The lifestyle is connected with the chances in life which provoke a desire for equalization of the health chances.

The cultural and personal specifications related to health are also considered. Studies indicate that
health is not always the most important goal in life for people, including the elderly. Health norms and needs often give way to other goals in life, such as personal happiness, favorable living conditions, even the ability to travel, experience adventures, etc. (Ruffing-Rahal and Wallace, 2000). Despite that, in most European countries health and its maintenance stand high on the scale of the value systems of individuals, including those over the age of sixty, while disease prevention occupies a middle level. On the other hand, one’s own behavior with regard to health and also the ability to correct harmful behavioral deviations, is very low especially in the elderly. It is pointed out that the attitude towards health in the advanced age should not be expressed as permanent anxiety with regards to one’s own health and well-being. In correspondence with the concept of salutogenesis, health does not exist in itself and there are differences in its manifestation during certain time intervals (Mihaylova and Lyochkova, 2012).

The main social threat of old age is related to the breakup of the family and transition to an independent and insolated way of life. The return to the patriarchal relations typical of the 19th century, and in our country until the first half of the 20th century is impossible. The efforts are directed towards the increase and diversification of the forms of communication between the generations and finding new models of co-existence in contemporary architectural solutions –flats designated for that purpose or other family residences. Groups and associations for old people who put to front their priorities and values – self-protection and solidarity – have lately been formed. The category of the so called “young elderly person” is outlined as a unit of observation. Moreover, it is supposed that they dispose of multiple competences which can be used meaningfully and efficiently even in this inactive period of life. In this way the desire of most elderly people to bear personal responsibility for their vital activity is achieved. Mutual assistance is also covered – this is the basis for development of initiatives, both professional and social, at an advanced age.

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SAFETY MANAGEMENT AS A SUPPORT ACTIVITY IN THE LOCAL SELF-GOVERNMENT

Ján Mišík,1 Jozef Kubás2

Abstract: A prerequisite for performance of self-government and its integral components is the government’s ability to adequately execute self-governance, which is essential for its efficiency and thus, the meaning of its existence. In villages, in addition to the main activities, a number of supporting activities are carried out to ensure smooth functioning of the core business. Among the supporting activities for municipalities is safety management. The current management guidelines and processes of many municipalities cover components of safety management, but not in a systematic approach. The adoption of an 'official' process of safety management realizes the need for a critical review of their existing practices and its process in the field of security. This contribution deals with the issue of safety management and the responsible roles for creating a safety management system of a village. The purpose of such a system is to ensure the safety of all operations involved in achieving village objectives and to prevent security threats to life, property, and the environment. This contribution mainly focuses on the safety sector of municipalities, which forms the core of the safety management system of a village.

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Keywords: efficiency of local self-government, safety management

Introduction

There are currently several non-military security risks that exist worldwide and each is capable of causing serious harm. These risks affect every reference point within a state and villages within a state need protection. Local authorities have an important role in protecting life, health, property, rights, and freedoms of citizens of villages and towns.

Preventing security threats to life, property, the environment and ensuring safety all rounds to achieve government objectives center on two primary activities:

- Protection of persons and property in emergency situations
- Additional strategies to maintain the security of individuals, property, and the village environment

In small villages, where the issue of safety is less extensive, both sets of activities are the responsibility of either the Mayor within the municipal council or the commander of the voluntary fire brigade of the village (where established).

In larger municipalities, this issue is much more complex requiring more organizations and officials. The primary and irreplaceable role, however, still involves the Mayor and some members of the (city) council who deal with security in creating and commissioning the municipal council.

A large part of village security is administered by the crisis management community, which has a primary aim of preventing and resolving emergency situations. For this group, responding to major emergencies (natural disasters, accidents, disasters, public health threats, and second degree and terrorist attacks) while ensuring citizens' constitutional rights to life, health, property, and the environment, imposes ever increasing demands.

In addition to the components of crisis management community, many safety problems are usually allocated to municipal police, who deal with crisis situations and any other types of security that cannot be easily resolved. Moreover, the crisis management organizations and municipal police are not always clear on their respective responsibilities, and therefore, this study focuses on reviewing this issue to seek possible ways of:

- safety management including areas other than crisis management, and
- solutions and cooperation between the components.

Methods

Used methods were analysis, synthesis, comparison, induction, deduction and logical thinking, the main source of information was drawn from of available professional literature and to use the acquired knowledge during the study of the given topic.

1 Faculty of Security Engineering, University of Žilina, Slovakia, jan.misik@fbi.uniza.sk
2 Faculty of Security Engineering, University of Žilina, Slovakia, jozef.kubas@fbi.uniza.sk
Results

In Slovakia villages, a large number of main and supporting activities, in practical terms, is carried out by the authorities in control of the village to achieve administrative objectives. The main activities are determined by the purpose for which the municipality is formed as an organization.

To improve competence, the main activities for the village include:

- Management - planning, organizing, staffing, and monitoring
- Planning, budgeting, and design
- Asset management (asset and municipal facilities)
- General administration
- Services
- Business and investment activity
- Procurement, marketing management
- Transportation
- Other main activities

In a village, a number of supporting activities are performed to ensure proper functioning of the main activities listed above. These include the following particular areas:

- The safety and security of persons, property, and the environment
- Crisis management
- Human resource management
- Quality management
- Information, technology, and telecommunications.
- Operation, maintenance, and servicing of structures, and technological equipment
- Energy security
- Emergency services and other activities
- Other support activities

The safety of the village involves all activities aimed at protecting the interests of all subjects and the village itself. The overall safety includes safety of the village outside the period of crisis management as well as preventing and managing crises.

Both of these profiles contain different areas of security that ultimately create the conditions for the overall safety of the village. These individual safety areas can be grouped into security subsectors for the village (Mišík, 2016).

Safety of the Village outside the Period of Crisis Management

The subsector of safety for the village

When outside the term of crisis management is part of the security for the village that consists of areas needing continuous and improved monitoring on a daily basis. Figure 1 shows the security for the village when outside the period of crisis management.

<table>
<thead>
<tr>
<th>The safety of persons and property</th>
<th>The safety of the environment</th>
<th>Security of business</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Physical security (of persons and property)</td>
<td>• General protection of nature</td>
<td>• Economic security</td>
</tr>
<tr>
<td>• Occupational safety and health</td>
<td>• Special environmental protection</td>
<td>• Financial Security</td>
</tr>
<tr>
<td>• Operational safety</td>
<td>• Protection of cultural monuments</td>
<td>• Safety of production</td>
</tr>
<tr>
<td>• Information safety</td>
<td></td>
<td>• Project safety</td>
</tr>
<tr>
<td>• Computer security</td>
<td></td>
<td>• Protection against fraud and abuse</td>
</tr>
<tr>
<td>• Security &amp; Protection Rules</td>
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</tr>
</tbody>
</table>

Source: Authors

The starting point for physical security is with the rights of inhabitants of the village in requesting cooperation to protect their persons, their families, and property located in the village.

An abnormally critical component of security is the physical safety of public property used for village activities. The municipal property should be cultivated, recovered, and its overall policy values
maintained unabated. Municipal property can be used for general purposes, the municipalities’ self-governance performance, and business.

Where the municipality uses their property for business purposes, business security is pertinent. Business security involves the village authorities (even where only marginal), for example, the economic committee of the municipal council and the Department of Finance and Accounting.

The safety and health security area at work stem from the competence of departments and municipalities protecting the health conditions and healthy way of life and work for village inhabitants. It also applies to the municipality as an employer. Some municipalities establish a commission for occupational health and safety and fire protection.

Safety of operation in the village includes security of business continuity, especially with utilities and services (municipal waste management, adherence to cleanliness in the village, management, and maintenance of public green areas and public lighting, water supply, and similar services). For operational safety, the management and cleaning of local roads, sidewalks, and public spaces, for example, snow shoveling, are also included. An operational safety issue in the village involves professional technical services and components of crisis management of the village.

Information safety in the village consists of securing information systems of public administration and of important data (e.g., personal data protection and protection of taxation privacy). The village leads the register and performs verification of documents and signatures on all documents, and decides in matters of local taxes and charges, and whether to manage them.

The community processes personal data. The village uses various software tools in which, for example, are kept records of residents, a permanent list of voters, registration of taxpayers, accounting, local taxes and fees, public property, personnel and payroll, and similar data.

Information safety in a village is related to computer security since information and communication technologies that allow electronic records, store, search, process, transmit, and disseminate information are often used in the municipalities.

Safety and protection of internal order of a village are the responsibility of the municipality to provide for regulation of activity, the implementation of which is prohibited or restricted for a given moment or in a certain place. Safety and internal order are solved through regulations by the village Mayor of the municipal council. The advisory organization is the Legislative Committee of the village where established.

Area of environmental safety of a village stems from the obligation to protect the environment of the village. The village provides the protection of cultural heritage. The village has to shape all the conditions necessary for the conservation, protection, restoration, and use of monuments in the municipality. The Monuments Fund is an important part of the cultural heritage, and the village provides maintenance and administers cultural monuments, historic sites, and monuments of the village.

The situation in many municipalities is one where the economic potential of municipalities lags behind, compared to the actual requirements of its development. Under this influence, existing towns and villages have pressures that limit the number of members in the municipal police force, even when there are protracted radical views on its abolition. Therefore, it is imperative that the extensive opportunities for the development of municipal police are depleted, and it is necessary to find new intense forms in their work to ensure their sustainable mission (Belan, 2015).

Crisis Management in the Village

Crisis management is another significant social concern. Municipalities should provide the necessary immediate assistance to the population in case of an emergency. The village contains the crisis management organization. Organizational units of the municipality in crisis management focus on addressing safety and security threats in the period of threat or periods of action for major events against life, health or property. In these periods their activity mainly focuses on solving crisis management in the case of a fire, flood, major industrial accidents, or other similar emergencies.

The village in its territory:

a) establishes the crisis staff
b) coordinates the activities businesses and legal entities in civil emergency planning
c) implements measures to deal with crisis situations

d) carries out civil emergency planning

e) oversees other activities

Table 2 shows the organizational units of crisis management at the local level. Table 2: Organizational units of crisis management on the local level

<table>
<thead>
<tr>
<th>Governing organs</th>
<th>Efficient elements of rescue systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crisis staffs municipalities</td>
<td>Fire service</td>
</tr>
<tr>
<td>Business subject (crisis staff, emergency crews)</td>
<td>Civil protection</td>
</tr>
<tr>
<td></td>
<td>Medical first aid</td>
</tr>
</tbody>
</table>

Source: Authors

This study assumed all aspects of security of the village were integrated into one system, which would have a structure for centralized management, and facilitate the management of the security in an efficient and effective manner (Mišík, Štofko, 2016). Security is a matter for the whole organization. Thus, it should be centrally managed. An organization’s management must decide how it wants to deal with a security or safety management system that will be implemented in the organization and how it will assess the state of security and shape its future development. The overall management of larger, more complex organizations improves with the continuous integration of a safety management system (Sennewald, 2003). An Integrated Safety Management System (ISMS) is a single cohesive system for centralizing management of all security structures and processes to meet the security objectives of the organization and satisfaction of all interested parties (Štofková, 2015).

Conclusion

The security sector of the village consists of several different areas of safety with two main subsectors: 1) the safety of the village when outside the period of crisis management, and 2) crisis prevention and management.

The safety of the village when outside the period of crisis management is usually allocated to the municipal police, who are not always able to deal with all types of security. Crisis management components of municipalities are aimed at preventing and dealing with emergencies.

This system combines all components related to the safety organization for easier management and operation. It is not a common connection of separate systems, but rather their integration, with the mutual connection so that their structure and processes are continuously managed and carried out without duplication.

An introduction of an ISMS to the municipality will allow for efficient operation of security personnel and the use of local sources, as well as the achievement of safety targets for municipalities in various areas of the security sector. This system can assign the responsibility for various areas of the security sector and will adhere to the norms and rules of safety. It would coordinate activities of the various security forces of municipalities, establish internal safety standards in all areas of activity, and provide continuous management of security risks, as well as a comprehensive system of protection to safeguard the security and protection of life, health, property, the environment, and other important municipalities. As well, it would reduce security incidents and support internal and external communications about security issues.

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References


Abstract: When considering the various areas of computer mathematics, especially geometry sticks out, where the problem analysis clearly and fully illustrates the computer. The discipline called "Computer Geometry" (F. Preparato, M. Sheymos) worthily appreciated by modern scientists. However, the practice of training in the higher education institutions (especially training of future teachers), does not provide studying of the Computer Geometry as an academic subject. Perspectives and methodology of Computer Geometry are developed by detailed study of specific problems, and the selection of the content of such course should be conducted on the basis of certain principles, all of which in total have to reflect the prospects of formation of the identity of the trainee as the subject of education adequately.

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Keywords: education, computer mathematics, computer geometry, specialty, content, informatics, training, principles.

Introduction

Education Reform in the current socio-economic conditions has specific requirements for teacher training. Modern teacher of Mathematics and Computer Science is required to possess not only the mathematical material and traditional teaching methods but also new, including information technology training. New forms and methods of training of highly qualified specialists who are able to use the computer in teaching of various disciplines competently are under active search in recent years.

One of the most effective means of developing the competencies of future teachers is the introduction into the educational process of various special courses. However, literature analysis shows that at pedagogical high schools the system of special courses on Mathematics and, in particular on Geometry by using computers has not developed yet.

The content of education in pedagogical institutions is intended to ensure a high mathematical and professional training of teachers. The main content of education is supplemented by various special courses.

Research analysis

Algorithmic study of these and other problems had appeared in the scientific literature in the last century, and their intensity has increased in the past two decades. However, a systematic study of geometric algorithms has been made only recently and this discipline, named by F. Preparato and M. Sheymos "Computer Geometry" worthily appreciated by modern scientists. (Pervin, 1992)

Perspectives and methodology of Computer Geometry are developed by the detailed study of specific problems. One of the main characteristics of this discipline is to realize that the classic characteristics of geometric objects often do not have an impact on designing of efficient algorithms. To overcome this drawback, it is necessary to find useful concepts and set their properties to facilitate the computer efficiency. In short, the computer geometry must convert the classic discipline into its computer form – where it is necessary.

Methods of Computer Geometry are based on the works of great scientists (K. Gauss, I. Newton, A. Cauchy, Sh. Hermit, B.G. Galerkin, A.N. Krylov, N.I. Lobachevskii, P.L. Chebyshev, L. Euler, and etc.), and also substantial contribution to the development of Computer Geometry was made by American scientists as F. Preparato and M. Sheymos, who managed to unite, broaden and deepen existing knowledge of this science. (Pervin, 1992).

1 Ph.D., L.N.Gumilyov Eurasian National university, Faculty of information technologies, Informatics department, akan-mubarak@mail.ru
2 Ph.D., University of Economics in Bratislava, Faculty of Economic Informatics, Department of Applied Informatics, Jaroslav Kultan, jkultan@gmail.com
3 Candidate of Pedagogic Sciences, Ph.D. L.N. Gumilyov Eurasian National university, Faculty of information technologies, Informatics department, ainash_5@mail.ru
4 PhD student, PhD, L.N.Gumilyov Eurasian National university, Faculty of information technologies, Informatics department, r.mira@mail.ru
Impact of research

Computer Geometry is a young and rapidly developing field of applied mathematics. Its uprising was caused primarily by the invention and widespread introduction of personal computers into our lives, an essential element of which is a flat screen, which provides feedback to the user.

With the advent of personal computers, there was an opportunity to work with a flat electronic image by controlling it "directly" (in real time) by a sufficiently powerful computing device. In its turn, this led to significant changes in the areas of human knowledge, which anyway connected with geometry and visual (usually flat) representation of graphical objects - for example, in the drawing, design, construction, various modelling (both technical and art), medical diagnostics, design practice, and so on.

Currently, the using of personal computers in all these areas is not a surprise, although 30 years ago many of them worked without any computing devices. However, the last-user is not always aware of the fact that behind those programs that allow him to work with the screen image lays a rather complicated modern mathematics. In the first place, it is a differential geometry, and that is a differential geometry, which is the foundation and source of many important ideas for the modern Computer Geometry.

Many exhibitions are regularly held worldwide, for example, the SIGGRAPH, the pictures drawn by the computer. Development of fractals would be impossible without computers with the appropriate graphical display means. Multimedia has led to the emergence of new sources of information, which combine the static and video images, text, and sound. The latest operating systems work in graphical mode and initially implemented the methods of computer graphics.

Further, we consider the publications, the authors of which invest particular sense in the content of Computer Geometry.

The training aid of E.E. Sirotina (Nikulin, 2003) thoroughly investigates the mathematical foundations of computer graphics. Therewith, it is revealed the structure of such concepts as: the concept of homogeneous coordinates, geometric transformations on a plane, a parametric equation of the line in a plane, point-like normal equation of the straight line in a plane, the determinant equation of a line in a plane, the intersections of straight lines and line segments in a line, geometric transformations in three-dimensional space, rotary movement toward an arbitrary vector, linear interpolation and twinning, the parametric equation of the line in three-dimensional space, the parametric equation of a plane in three-dimensional space, the plane equation in point like normal form, determinant equation of the plane, the intersection of a line and a plane in three-dimensional space, and others.

Many books on Computer Graphics deeply explore narrowly specialized areas such as the development of subroutine libraries for the implementation of the method of backward ray or high-speed methods for displaying three-dimensional scenes that are used in computer games, or low-level programming of video adapters. Thus, for example, for students who are just beginning to investigate this area, often suffer from lack of general information, which allows to navigate in the rapidly expanding field of computer graphics.

The texts of lectures, authored by A. Kazantsev (Kuk and Beyz, 1990), are a tutorial for beginners to learn computer graphics that is the material aimed at compensating of above-mentioned gap. Also, there is information necessary for the development of three-dimensional applications of computer graphics. The textbook is based on a special course of lectures read by the author for four years at the Kazan State University, on the Faculty of Computational Mathematics and Cybernetics, while maintaining a close connection with the best traditions of classical Russian education.

The work of Kostnikov (2011), shows the role of geometric transformations in the systems of computer graphics. The regularities and features of application of shift transformations, rotation, scaling, reflection, and the central projection in two-dimensional and three-dimensional computer graphics are described there. The lecture notes are designed for students of specialist programmes, bachelor’s and master’s degrees in technical specialties.

"Training not only in mathematics but also by mathematics" is the leading idea of the academic and methodological complex on mathematics, aimed at strengthening the common cultural sounding of geometrical education and increasing its relevance to the formation of the personality of the future
specialist.

The content of the material is aimed at developing students' ability to observe, to compare, to generalize, to find simple patterns, allowing them to learn different methods of reasoning, logic thinking, developing divergent thinking as an essential component of mental activity, geometric culture and allows you to expand ideas about the world by means of mathematics.

The aim of work "Computer Graphics" by Porev (2002) is to develop the aid of computer graphics for students who also study programming. The programming facilitates the perception of computer information technology, it allows insight into the world of computers, to get answers to many questions such as "why so."

The main feature of the course is that it is useful to construct a computer graphics course from the viewpoint of programmers. For a better perception of the course, it is desirable at least to be able to program on computer language C ++ or C. The material represented in this book considerably corresponds to a course of computer graphics that was read by the author at the Kiev Technical Institute for the last several years. The experience of the author as one of developers and programmers of a geographic information system "OKO" was useful for writing the book. This manual is an attempt of the author to generalize some aspects of the current state of computer graphics, to write about them using simple and clear language as much as possible, accurately and clearly explain an essence of things. It is primarily for those who want to create something of his own and get satisfaction from the creative process. Computer graphics gives you endless scope for creativity, it excites the human imagination which is one of the factors of its popularity.

Work of Sosnin (2008) is a part of the electronic educational complex on discipline "Computer Graphics," including the curriculum, laboratory practice, guidelines for coursework, methodical guidelines on practical training, methodical guidelines for self-work, testing and assessment materials "Computer graphics. Bank of tests", visual aid "Computer graphics. Presentation materials". The mathematical foundations of computer graphics are considering there. Geometric transformations of points, straight lines, two-dimensional and three-dimensional transformations of projections are given. The computational models of solving geometric problems are also presented. Designed for students of the following specialties: "Vocational training (on branches)," "Education and Pedagogy," "Automated Information Processing and Management," "Software of computer facilities and the automated systems," "Computer Science and Engineering." The content of school subjects EUMK focused on promoting and supporting the emotional and intellectual development of students; to create conditions for the demonstration of self-dependence, initiative, creative abilities of students.

Book named "Computer Graphics" Porev (2002) considers the types of computer graphics, software of computer graphics, geometric modeling. Basic concepts of geometric modeling. Affine transformation, geometric models of flat objects, methods (models) of describing a straight line, the mutual arrangement of graphic elements on a plane, equations of the beam of lines and the bisector of the angle, curves of the second order. Splines. Bezier curves and etc. The material presented in the textbook purposefully creates all kinds of learning activities of students. This is facilitated by: a logically built course content, a variety of methods of educational activity of students, educational tasks directed to carry out different types of actions by students. During the course students acquire: mathematical knowledge, abilities, and skills, and they will learn how to use them to describe the regularities, processes, phenomena, assessment of quantitative and spatial relations; will seize abilities: to build reasonings; to reason and adjust statements to differentiate reasonable and unreasonable judgments; to reveal regularities; to establish causes and effect relationships; to perform the analysis of various mathematical objects, allocating their essential and insignificant signs that will provide them successful continuation of mathematical education.

The main features of the content of the course "Computer geometry and graphics" (Golubenko, 2009) are: integrative presentation of knowledge; targeted skills development during the mastering subject knowledge and skills. The paper deals with a wide range of issues in the field of computer graphics: the basic concepts are defined, a row of classical algorithms is considered, the review of the modern hardware and software facilities of computer graphics is given.
Continuity of study

Broad integration of knowledge in which connections of a different level (metadisciplinary, intersubject and intrasubject) allow to reach the main objective - to show students a wide aggregate picture by means of science, and direct learning. The course organically combines work on perception of classical algorithms, the modern hardware and software facilities of computer graphics. Also designed for the students of technical specialties.

Nikulin (2003) gives the most complete presentation of geometric and algorithmic fundamentals of modern computer graphics: mathematical models of graphic elements on a plane and in space, the fundamental laws of geometric optics and the algorithms based on them for the construction of optical effects, the methods of geometric transformation, analysis and synthesis of models of lines, surfaces and volumes, geometric visualization tasks - a complex of algorithms for 2d- and 3d-clippings, block diagrams of algorithms and examples of their implementation. It is useful for the students of the higher education institutions and specialists studying computer graphics and who are engaged in the development of new algorithms and applied graphical programs.

N.K. Kukov’s study guide deals with mathematically rigorous stated all the relevant information from differential geometry and topology, the basic concepts and tools of computer geometry, the mathematical description of some important algorithms of geometrical modeling and automatic designing are given there. The latest results of achievements in the field of computer processing of modern digital image – the splice of projectively converted images are also described. It is written for students of higher educational institutions of technical direction. The author proceeds from the fact that the foundations of geometric modeling are differential geometry and topology, and the working materials are different curves and surfaces. At the same time, geometric modeling also develops its own methods.

The common feature of all system of textbooks is that the same educational content may be in the form of visual and / or verbal (or other) images in the form of theory, as a collection of facts and other. A variety of presentation of educational content allows you to activate different types of thinking - visual-active, eye-mindedness, verbal and figurative, verbal and logical (theoretical); different types of perception and processing of information like kinesthetic and visual, and as a whole creates prerequisites for the individualization of training and retention of learning. One and the same object (phenomenon) is treated with the great possible number of parties. Knowing about it is naturally fixed in the student's mind as with the other study material and a personal experience. Knowledge becomes valuable, gains the personal importance and practical sense. It gives a chance to each student to show the strengths and to develop insufficiently created skills.

As Kuk and Beyz (1990) consider the computing an exact science, and the systematic examination of all aspects, including such areas as database development, system testing and the development of software with the need to use mathematical models. From this perspective, many training programs in computing at universities and institutes provide special courses that acquaint students with the relevant mathematical structures and methods.

Teacher training program doesn't provide studying of computer geometry as an academic subject, though it is a very interesting area of geometry, therefore, it would be reasonable to introduce it in a variable part of the training program.

Conclusion

Summing up the result we can say that the selection of educational material, its restructuring should be conducted on the basis of certain principles (criteria), which together should adequately reflect the prospects of forming of the identity of the trainee as the subject of education, social actions and educational and productive activities on the basis of pedagogical forecasting data. From this point of view, we can offer the following principles in the training content forming:

- correspondence of training content to the requirements of modern production and socio-economic forecasting of the region;

- the accounting of the substantial and procedural parties of training (when developing the content of a training material it is necessary to take into account the regularities, methods, the principles of training; it is necessary to reflect in programs and textbooks the ways of conveying and learning, also
learning levels along with the content);
- a unified approach to designing of the content of education (theoretical aspect, subject, training material, pedagogical activity, the identity of the students).

References
ETHICAL CONCERNS REGARDING MALE CIRCUMCISION CULTURE: A SELECTED ETHNICAL GROUP

Cabangile N. Ngwane

Abstract: Traditional cultural practices reflect values and beliefs of members of a community. Culture is an umbrella term, which explains common things people share such as language, customs, beliefs and the way of life. This paper seeks to look at male circumcision culture of a certain indigenous group in South Africa. Male circumcision is associated with ethnic marks, virility, masculinity, rite of passage to manhood however, there are many ethical concerns centering on male circumcision. Hence, this paper seeks to explore the ethical concerns surrounding male circumcision culture of a selected ethnic group in order to contribute to ethical execution of the practice. Little has been done on ethical issues surrounding male circumcision. The fallacy surrounding this phenomenon needs further investigation. The paper intends to contribute to the debate on male circumcision as a way of mitigating HIV/AIDS infections. The Social Norm Theory has been used to explain the phenomenon under study. The constructivist research paradigm enabled the interviewing of participants from the target population, as the study is inductive in nature. The key finding was that they do male circumcision mostly in an unethical way that it also affects women and children. They also do it based on the misconception and the fallacy that they will not get HIV/AIDS.

UDC Classification: 314.39; DOI: http://dx.doi.org/10.12955/cbup.v5.101

Keywords: Male circumcision, culture, fallacy and ethical concerns.

Introduction

This paper is about ethical concerns centering on the male circumcision culture of a certain ethnic group in South Africa. It is vital to note that male circumcision is associated with ethnic marks, virility, masculinity, rite of passage to manhood. This paper seeks to explore the ethical concerns surrounding male circumcision culture of a selected ethnic group in order to contribute to ethical execution of the ritual. The philosophy underpinning the study is the constructivism research paradigm that informs qualitative research. In order to collect data in the field interviews were conducted at Mpolweni informal settlement in the Reservoir Hills. The Social Norm Theory was used to explain the phenomenon under study better.

![Male circumcision model](source)

Source: Author

Constructivism research paradigm

The worldview underpinning the study is the constructivism research paradigm. According to this paradigm “the nature of social constructions requires individual constructions to take place through the interaction between the researcher and participants” as (Mackenzie & Knipe, 2006) asserts. I chose

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1 Faculty of Arts and Design, Durban University of Technology, cabangile12@hotmail.com
this paradigm because it is a philosophy to qualitative research and I wanted to “utilize open-ended questions to allow participants to share their views” as Creswell (2014) confirms. The case study was conducted in the Reservoir Hills informal settlements focusing at Mpolweni as a target population. I interviewed 12 participants (2 mothers, 3 fathers and 7 initiates). I conducted interviews because I depended on the views of the participants regarding the male circumcision phenomenon. A thematic analysis was used. Research ethical rules were adhered to including seeking participant consent, avoiding plagiarism, fabrication and falsification of data, etc. Consequently, the results are valid, credit and trustworthy as they are based on theoretical and empirical data.

Results
In addressing the objective of the research, it was discovered that custodians of circumcision do not only perform it unethically; but they also break the law. They violate the standard principles of surgery by circumcising babies without their consent and without medical justification. They harass women based on the myth of cleansing, which is sexual harassment and women abuse. They also believe that they do not contract HIV/AIDS because of circumcision. Consequently, when they get sick because of AIDS they attribute their sickness to witchcraft. All males do circumcision because they are afraid of the stigma as they will be perceived as boys (not as men) for the rest of their lives. They believe that they will gain respect if they undergo this process and become the real men. The government needs to engage various stakeholders so that they could work together through the participatory mode in order to avoid unethical practices and complications. The awareness campaign is necessary to educate community members about the advantages and disadvantages of the routine circumcision.

Discussion
It is important to remember that the paper sought to explore the ethical concerns surrounding male circumcision culture of a selected ethnic group in order to contribute to the ethical execution of the practice. The major ethical concern regarding male circumcision is circumcision of babies that violates standard principles of surgery. This is performed with no medical indication and reason. According to the standard surgery principle, no operation should be done when there is no disease. In addition, an operation needs to be done if it can be substantiated that its risk cannot be equated to the risk of the disease. Furthermore, Hutson (2003) concurs by positing that even if patients have diseases, dangerous procedures can seldom be justified if the risks are higher than the disease. The routine circumcision is done when there is no complication or disease; therefore, its risks are not balanced against the disease risks. Szabo and Short (2000) further assert that the cost-benefit analysis approach renders routine circumcision unnecessary, as it is not justified by the medical indications. Participants made it clear that they will not allow medical practitioners to undermine their culture by posing some unnecessary threats and warnings. It is clear that the people feel strong about their culture and customs. They may feel strong about their culture but routine circumcision goes against the standard principles of surgery and when complications prevail in a process, they consult the medical practitioners. It will be crucial to run an awareness campaign that would not criticise their practice.

There have been some cases of men who experienced surgical complications from childhood because of the circumcision resulting in inadequate sexual function. Stein (2008) confirms this by saying that circumcision reduces enjoyment in lovemaking. Moreover, Laumann et al. (1997) contend that a serious complication is when the tip of the penis is cut accidentally or excessive cutting of the penile shaft skin causing deformity. Such people end up having gender issues because of losing part of their penis. This could be avoided by abolishing the practice. This angered participants. They felt that this undermines their capability. They perceived them as the people who have no potential and who are careless. The medical practitioners need to work with traditional people to avoid victimisation of initiates. Apportioning blame will not bring the solution. Collaboration will help. The people are protective of their culture as the social norm theory explains

The male circumcision practice affects women in different unethical ways. The practice is associated with the cleansing myth that affects women adversely. Maluleke (2012) confirms that civil society organisations in KwaZulu-Natal, Limpopo and the Eastern Cape are unhappy about this cleansing of newly circumcised initiates. In addition, Gwandure (2011) explains that the cleansing ritual occurs when the initiates have to get a woman or even a widow to gang rape as a cleaning procedure. The participants do not like to talk much about circumcision in general because of a warning that women
should not hear anything about this ritual. They did not want to confirm or refute this myth. The Zulu speakers strongly believe in Ubuntu and this myth is absolutely against Ubuntu. Moreover, it violates the law, which means it is the criminal act. Furthermore, it is highly unethical. It also violates the United Nations Declaration Charter that promotes equal human rights and human dignity. The Social Norm theory states that those who break social norms face consequences, those who commit this abusive act against women should face punishment. This myth needs to be investigated and be exposed.

There is a fallacy that male circumcision protects circumcised men from contracting the HIV. However, the Doctors opposing male circumcision (2008) confirm that there is a likelihood that circumcision has a potential of decreasing female-to-male HIV transmission. As a result, medical male circumcision has become part of comprehensive strategies to prevent the HIV infection. Furthermore, Talbott (2007) explains that studies conducted in Africa (South Africa, Uganda and Kenya) discovered that non-circumcised men contract the virus more quickly than circumcised ones. The studies further reveal that it could be because the circumcised men abstain for a certain period after their circumcision. It was sad to discover that participants in the field had a strong misconception that they would not get the virus because of the circumcision or their partners have been circumcised. Consequently, when they get sick because of the virus they always blame witchcraft. They do not see themselves having the virus. They refuse to consume any form of medication such as anti-retroviral or tuberculosis tablets.

There is belief that the male circumcision is likely to reduce HIV infection by the use of female-to-male heterosexual transmission method. Glick (2005) maintains that the male-to-female transmission risk is extremely higher than of female-to-male transmission. Glick further explains that the means of partial prevention is a futile exercise as it prevents men at the expense of women. There is no indication that the male circumcision could protect women from the HIV infection. Moreover, Spearman (2006) concurs by asserting that circumcised males protect themselves from HIV while putting their partners at risk. However, Doctors opposing male circumcision (2008) contend that the circumcised men may still contract the virus and pass it on to their sexual partners. The participants stated that their partners will not get the HIV because they will not get it. This confirms their ignorance, fallacy and misconception. This confirms the Social Norm Theory as it contends that they perform the male circumcision practice because it is a cultural norm and run away from a stigma. They are also afraid of the costs of deviant behavior. Therefore, this means that the male circumcision ritual protects men, but not women. It is unethical to protect a certain group at the expense of another. Although the men are not 100% immune.

Performing circumcision at any age should be done safely in order for it to be ethical. Safe circumcision is expensive. Rennie et al. (2007) maintain that fee estimates differ, but the cost could prevent this practice to those who are poor in developing countries. To avoid this problem, it could be a good idea to perform this ritual in clinical settings. In addition, Cassell et al. (2006) explain that the less privileged groups could only access cheaper circumcision that exposes them to greater complication and risks as well as the risk of HIV infection. This forces them to go to self-appointed circumcisers who render dubious services at cheaper prices. Furthermore, some circumcisers commercialize the ritual by charging exorbitant prices. This side-lines the poverty-stricken group as it cannot afford the ritual. The participants explained that even clinics charge fees. They mentioned that if it is done in clinics it would not serve the purpose because they learn various manhood practices at the initiation school. If they could not go to initiation school, they will be insulted and they will be viewed as boys forever. Their peers will undermine them. This confirms the Social Norm Theory as it says that they fear the stigma and they want to be relevant.

Social norm theory
The value of circumcision is based on culture. The primary purpose of male circumcision is a social reason rather than a medical one. The cultural norm supporting male circumcision has an impact on how parents decide on the phenomenon. Waldeck (2003) asserts that the dynamics of circumcision may not be able to reduce its rate dramatically with no legal interventions. Perceiving circumcision as good or bad should be left for parents to decide. Parents circumcise their children because of cultural norms rather than medical reasons. Furthermore, Waldeck (2003) explains that norms regulate behavior because of associated costs of failure to adhere. As a result, people who do not comply could
experience the self-imposed guilt. In addition, parents have their children circumcised so that they do what their peers do because non-circumcision is a stigma. Most importantly, social norms have costs for deviant behavior. Moreover, social norms affect the way the people think, understand and process information. Consequently, educating the people about the advantages and disadvantages of circumcision may not lead to the decline of circumcision. If one could keep warning the parents about circumcision, they might resent the information. They may despise a person who challenges their ancestral culture. They may ignore the warning and costs.

**Conclusion**

The paper intended to investigate how a certain ethnic group in South Africa circumcises boys. To conduct the research interviews had been conducted in the Mpolweni informal settlement in the Reservoir Hills suburb. The study discovered various unethical practices that occur during the process. The misconception and fallacy have been addressed.

**Acknowledgements**

My greatest gratitude goes to the National Research Foundation for its continuous support.

**References**


ETHICAL SUPERVISION AND MENTORING OF STUDENTS DURING THE WORK-INTEGRATED LEARNING PROGRAMME

Cabangile N. Ngwane1

Abstract: The study investigates ethical supervision and mentoring during work-integrated learning (WIL) placement as WIL has emerged as a new venture in higher education. Work-integrated learning has emerged as a higher education endeavour that has created a new role for senior leadership and management. The study aims to investigate the ethical supervision and mentoring of students during the work-integrated learning programme in order to contribute to the effectiveness of the programme and improve student employability. More work has been done on work-integrated learning however, little has been done on the ethical supervision and mentoring of students during WIL. The study contributes to the debate of WIL implementation. The study revealed that there is a lack of adequate training for supervisors, which sometimes results in students running errands. The positivist research paradigm underpinning the study led to the use of a survey research design and questionnaires. During the research process, research ethical rules had been adhered to in order to ensure reliability of findings. A socio-cultural theory has been employed.

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Keywords: Supervision, Mentoring, Employability and Work Integrated Learning.

Introduction

Work-integrated learning has emerged as a higher education endeavour that has created a new role for senior leadership and management. WIL encompasses other aspects including supervision and mentoring. Supervision addresses the aspects of support and integration. The supervisory process places emphasis on the relationship between students and supervisors. On the other hand, the idea of mentoring is about the development of a relationship, focussing on longer term and well-defined academic and social achievement. Both mentors and students should gain intellectual, emotional and personal achievement from the experience. The study aims to investigate the ethical supervision and mentoring of students during in the work-integrated learning programme in order to contribute to the effectiveness of the programme and to improve student employability. More has been done on work-integrated learning however, little has been done on the ethical supervision and mentoring of students during WIL. The study contributes to the debate of WIL implementation. The positivist research paradigm underpinning the study led to the use of a survey research design.

Positivist research paradigm

The philosophy underpinning the study is positivism that explains that there is a single reality (Mackenzie and Knipe, 2006), which could be explained better by employing the quantitative approach. This approach resulted in the use of the survey in one programme at the Durban University of Technology (Faculty of Arts of Design) in South Africa. In order to collect data, a Likert scale questionnaire had been used. The intent of following this route of enquiry was to test the theory objectively in order to get reliable results. Thirty respondents had been selected randomly from the target population to ensure population representation. From the WIL coordinator perspective, this phenomenon could be explained better. The research ethical rules including avoiding plagiarism, fabrication and falsification of data, seeking consent, etc. have been adhered to in order to achieve reliable results.

Results

It has been discovered that WIL presents many learning opportunities when supervisors and mentors have been adequately trained to execute their roles during a WIL placement. However, the research revealed that there are no comprehensive supervisor/mentor development programmes in many universities, particularly the university under study. Thus, universities need to develop a comprehensive development programme for both academic and industry supervisors/mentors to ensure ethical supervision and mentoring of students. Consequently, there is a shortage of mentors, a lack of mentoring capacity and uncertainty in working with young mentees.

Moreover, universities do need analysis for both students and supervisors/mentors so that all stakeholders will perform well in their roles during placement. Institutions and employers do not

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1 Faculty of Arts and Design, Durban University of Technology, cabangile12@hotmail.com
understand that they have a reciprocal relationship regarding student placement. Employers and institutions need to understand their reciprocal relationship as they need each other to improve student employability. Departments and Programmes that do not have effective WIL should implement it for the sake of students as it has been discovered that some Programmes do not implement WIL at all. All stakeholders need to help students to bridge a wide gap between theory and practice through ethical execution of WIL to enhance students’ employability. Students should not be used for errands in organisations as this impacts on their morale as it has been revealed that students end up doing irrelevant tasks. Monitoring and evaluation are crucial during placement to ensure ethical supervision and mentoring of students. Universities need to open a platform where students, employers and other stakeholders provide feedback to enhance the curriculum and student employability. University leadership at all levels need to look into ethical and effective implementation of WIL throughout the institution.

Discussion

Supervision is about execution of determined educational goals. Supervision is a responsibility of institutions and employers during WIL placements. In addition, during the WIL placement students require both academic and industrial supervisors. About 95% of respondents agreed with this because these supervisors play different vital roles on students’ career. Weible (2010) concurs by asserting that academic supervisors set learning objectives by ensuring improved communication between students and employers for feedback reasons. Schilling and Klamma (2010) concur by stating that academic supervisors are responsible for the development of self-learning skills, conflict identification and resolution skills, as well as assessing and monitoring student performance at the workplace. Additionally, an institution prepares students, facilitates integration of learning, and monitors work integrated placements and experiences.

In order to ensure that students’ supervision during placement is ethical, employers and industry supervisors should play their roles effectively. Tynjala (2009) supports this by elucidating that the industry supervisors orientate students into the organisation by stating the learning objectives (the students have to achieve), identifying skills students need, and arranging the required training. The industry supervisor must be someone who is available to students with relevant expertise. The student may rotate through various units in the organisation to acquire broad-based experience however, there should be one supervisor to oversee. Therefore, the industry supervisor needs to be a person with strong leadership and good communication skills and patience. It is essential that these stakeholders empower students in various ways as their roles have been stated. All stakeholders contribute tremendously towards students’ employability and growth, so is WIL. It is vital to execute WIL ethically and efficiently with a high degree of commitment from all relevant stakeholders.

The organisation has to provide relevant work and on-site supervision. On the other hand, the students need to exploit learning opportunities both the organisation and the supervisor provide. Furthermore, Maphosa and Ndaba (2012) elucidates that the students should be professional in terms of timely task completion and submission as well as proper dress code. Some of the respondents (58%) explained that there are cases where they only or mostly do duties that are not relevant to their career. Keating (2006) explains that organisations tend to be reluctant to give students proper tasks because students are inexperienced and they may mess up. This could ruin their relationship with their clients. Some respondents stated that no one visits them in the field from the institution. They explained that they have one day allocated for WIL in a week, which is Wednesday. It is either you do your WIL or spend your time on other things that seem important and pressing to you. The respondents explained that they get to be advised to look for WIL in schools as many graduates are employed at TVET colleges; yet, they are not trained to be teachers. It turned out that was an exaggeration because only less than five graduates from the Programme had been employed at TVET colleges. Employers do not want to accept them for one day in a week. Consequently, their employment rate is extremely low on the course they are qualified for. They resort to enrolling for the Post Graduate Certificate in Education (PGCE) and become Language teachers. This is highly unethical and does not reflect student centeredness. Students enroll for a course they are passionate about. Channelling them towards other career paths is unfair.

Institutions are responsible for monitoring WIL placement to ensure that all stakeholders perform their roles efficiently. Monitoring could be done through site visits, email, phone calls, and chat rooms. The
three-legged relationship (student, university supervisor and industry supervisor) requires efficient monitoring in order to ensure ethical supervision. Tynjala (2009), Maphosa and Ndaba (2012) Weible (2010) elude to the fact that in most cases both academic and industry supervisors are poorly and not prepared for their roles; and 94% of the respondents agreed to this point. Since these students do not have proper WIL they cannot have someone to monitor their WIL. The Programme needs to implement WIL first if it cares about these students’ career, and then ensure proper monitoring of WIL because the respondents revealed the ineffectiveness of the WIL.

Both the institution supervisors and industry supervisors’ evaluation of students during WIL placement is critical to identify strengths and weaknesses. Moreover, Keating (2006) posits that evaluation helps avoid problems related to WIL placements such as misunderstanding of job roles, miscommunication, lack of objectives and goals. Supervisors evaluate the achievement of learning goals, skill and job knowledge, development, dependability, punctuality, attendance, human relations, attitude and capability. The empirical data correlates with theoretical data as 100% of respondents agreed that both supervisors evaluate the achievement of the above mentioned skills.

Both employers and students have a responsibility of giving feedback to the institution whether the programmes and practices are relevant and current or not, in order to enhance the curriculum. This requires effective communication throughout WIL placement. Ideally this is a standard practice; however, the Programme under study will not enjoy this benefit due to the lack of effective WIL. This will result in chopping and changing the curriculum because there is no one monitoring and evaluating the WIL which will lead to the feedback.

Mentoring places greater emphasis on personal development and growth of students. Mentoring involves assisting and supporting students to navigate through their career and find their niche. During this process, they need a space to grow and come up with new ideas and new ways of executing tasks. To achieve this, they must be thrown into the deep while surrounded by mentors to provide safety nets when they drown. Chiappetta-Swanson and Watt (2011) contend that mentoring is the transmission of knowledge and any other form of support given to recipients related to professional development. It encompasses informal communication between a mentor and a mentee (protégé). Maphosa and Ndaba (2012) further explain that a mentor and a mentee engage in an on-going relationship based on mutual agreement. More than 80% of respondents agreed that mentoring leads to personal and professional development hence, specified curriculum requirements should inform it. The Socio-cultural theory concurs as it believes in student development in every aspect. The respondents also mentioned that mentoring is far better than supervision as it provides a semi-formal mode of learning. Supervision and mentoring characteristics should be merged and implemented for the effectiveness of WIL.

A mentor could be either from the academic institution or industry. Duckett (2004) maintains that mentoring helps students to gain independence, confidence and time management competencies. In addition, a mentor helps students plan their career goals and networking in the field of interest and exchange of ideas. This broadens the horizons of students. However, there are some challenges centering on mentoring including the shortage of mentors, a lack of mentoring capacity and uncertainty in working with different mentees and younger generations. The respondents (79%) agreed with the literature that both supervisors do not get proper training. As a result they lack skills of supervision, mentoring, assessing and resolving conflicts which arise during the process of supervision and mentoring. Both the theory and respondents concur with the literature that WIL, supervision and mentoring have a broadening effect on students. Finally, the literature and respondents (73%) agree that both supervision and mentoring enhance students’ learning experience during WIL placement. Students gain various skills and competencies that prepare them for employment. If supervision and mentoring during placement could be ethical and effective students’ employment chances will be high. Programmes that implement WIL effectively and efficiently in the same institution have a high degree of student employment as opposed to this one under study. Some students from those Programmes get jobs during WIL placement. The theory has been used in the subsequent section for better explanation.

**Socio-cultural theory**

Socio-cultural theory is highly concerned about student development. Hutchins (1993) purports that the use of socio-cultural theory for professional education could be substantiated by work place learning. In addition, Spouse (2000) agrees by saying that this theory helps to bridge theory and
practice in the supervisory relationship. Therefore, in order for learning to succeed it is necessary to enforce effective social interactions between a supervisor/mentor and a student through language development and by empowering students to merge theoretical material with practical experience. Chisholm et al. (2009) further contend that WIL is based on the theory of experiential learning. Thus, true education occurs when students solve problematic situation in real life and authentic environments.

Figure 1: Ethical supervision and mentoring model

<table>
<thead>
<tr>
<th>Work integrated learning</th>
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<tr>
<td>Development programmes</td>
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<td>Ethical supervision and mentoring</td>
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<td>Need analysis for mentorship provision</td>
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<td>Reciprocal relationship</td>
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<td>Bridge a gap between theory and practice</td>
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<td>Improve student employability</td>
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Source: Author

Conclusion
The work integrated learning improves employability of graduates and it entails supervision and mentoring. However, the survey revealed that the programme lacks efficiency due to the lack of proper training of the supervisors and mentors. Involved stakeholders need to improve their practice to ensure ethical supervision and mentoring

References


A COMPARISON BETWEEN UNDERGRADUATE POLYTECHNIC AND MEDICAL EDUCATION SYSTEMS IN ROMANIA

Liana Dehelean,¹ Ana Maria Romosan,² Petru Papazian,³ Mircea Babaita ⁴

Abstract: Background: While medical and polytechnic education systems seem dissimilar in approach, they both share a certain level of difficulty. After graduating, polytechnic students find easy employment in national or multinational companies, whereas medical students are presented with more job opportunities abroad. The purpose of the study was to compare students’ satisfaction with training and career preferences from a technical and a medical perspective. The methods were as follows: the study participants were divided into two samples (polytechnic and medical undergraduates) and asked to fill in a satisfaction questionnaire regarding their professional training. In addition, they were invited to express options about the intended future career. Results: We found no differences between the two samples regarding the participants’ satisfaction with teaching staff and labs. Polytechnic students have more Ph.D. opportunities while medical students were more involved with participation in conferences. Satisfaction with lectures and practical projects was significantly higher among medical students. Conclusions: Both polytechnic and medical students rate their training as satisfying, and half of them consider leaving the country.

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Keywords: undergraduate education; medical; polytechnic; working opportunities; emigration;

Introduction

The Romanian higher education system relies basically on lectures, optional lectures, and practical work (laboratory, practical projects, and practice in a professional setting). Electronic learning is available through e-lectures and educational software. Transfers between different university centers are possible. Research teams are encouraged to include students. As nowadays, performance indicators in higher education rely predominantly on research outcomes, education comes into second place. Concomitantly, a growing pressure is exerted on the higher education system from the environment (Van Vught & Westerheijden, 1994) represented by companies, governments, and students (Ramsden, 1998).

Assessing the quality of undergraduate education implies analyzing both objective and subjective data. The objective outcomes are represented by students’ achievements at local, national, or international assessments (Kellaghan & Greaney, 2001). When evaluating students, one has to keep in mind a complex of factors connected to “what” and “how” to assess (Epstein, 2007). Literature data show that the way the students perceive how they are evaluated influences their learning strategy (Struyven, et al., 2005). According to Lizzio, students’ perceptions of their teaching environment are stronger predictors of learning outcomes at university than prior achievement at school (Lizzio et al., 2002). Resistance to shift from passive to active learning depends on class size, student population and dominant attitudes (Seymour, 2001). In this respect, subjective factors such as students’ perceptions about their professional training may help improve the teaching-learning process.

Medical and polytechnic education systems share a certain level of difficulty imposing high standards for graduating. Although they appear to be different in the content of curricula, both focus on theoretical and practical knowledge. Medical education involves a more humanistic approach. Empathy, defined as the ability to sympathize with, and provide support to another person, has been shown to be correlated with students’ clinical competencies (Hojat et al., 2002). Moreover, in medical students, knowledge and skills must be supported by the comprehension of what others expect from physicians and how they will react to their words and actions (Becker et al., 2009). The aim of the present study is to compare students’ satisfaction with training and career preferences from a technical and a medical perspective.

¹ Conf.dr. Dehelean Liana, University of Medicine & Pharmacy Timisoara, Romania, Neurosciences-Psychiatry Department, lianadehel@umft.ro
² PhD candidate Romosan Ana Maria, University of Medicine & Pharmacy Timisoara, Romania, Neurosciences-Psychiatry Department, ana.romosan@gmail.com
³ Sl.dr.ing. Papazian Petru, Politehnica University of Timisoara, Faculty of Electronics & Telecommunications, Applied Electronics Department, petru.papazian@upt.ro
⁴ Conf.dr.ing. Babaita Mircea, Politehnica University of Timisoara, Faculty of Electronics & Telecommunications, Applied Electronics Department, mircea.babaita@upt.ro
Method
The study participants were medical and polytechnic students at Timisoara University of Medicine and Pharmacy and at Timisoara Polytechnic University respectively. The study was conducted by the Neuroscience/Psychiatric Department of Timisoara University of Medicine and Pharmacy in partnership with the Electronics and Telecommunication Engineering Department of the Polytechnic University of Timisoara. The students were invited to fill in a satisfaction questionnaire referring to their professional training. In addition, they were asked to express intentions about future career. The subjects were informed about the purpose of the study and the confidentiality of collected data. The questionnaire contains basic socio-demographic information (gender, age, year and type of training), closed-ended questions (yes/no opportunity type, or 1 to 5 satisfaction type). The yes/no questions referred to the opportunity to participate at optional lectures, national and international conferences, case presentations (for medical students) or practical projects (for polytechnic students), doctoral (Ph.D.) programs, or transfer between different university centers. The questions rated from 1 (poor satisfaction), to 5 (highest satisfaction) concerned the students’ satisfaction with lectures, teaching staff (professors), and practical activity (in hospitals or laboratories, accordingly). The sources of professional information were also asked (provided by professor, self-research or both). Regarding their financial situation, students were asked to choose what best reflects their subjective perception (good, average, and very good). Additional questions referred to the intended career (academic or not), country of practice (home or abroad), and work setting (hospital, ambulatory or both in medical students, multinational corporation or small private business in polytechnic students). Personal options, comments or explanations were permitted through open ended questions.

Results
The study included 75 medical and 73 polytechnic students. In the medical students’ sample, women were predominant (78.6%). By contrast, in the polytechnic students’ sample, 61.6% of the students were men. The mean age was 24.3 years (SD = 1.47) in the medical students’ sample, and 20.9 years (SD = 1.64) in the polytechnic students’ sample.

Medical students were significantly more satisfied with the quality of the lectures than polytechnic students (U = 2238, Z = -2.01, p = 0.04). No significant differences were found concerning satisfaction with the teaching staff/professors, (U = 2405, Z = -1.35, p = 0.17), the majority of the students declaring their satisfaction and partial satisfaction. There were no significant differences between students in respect with their practical activity in hospitals or laboratories (U = 2362, Z = -1.49, p = 0.13) as observed in Table 1.

Table 2 shows the students’ satisfaction with: optional lectures (ol); conference attendance (c); case presentations (cp) for medical students or practical projects (pp) for polytechnic students; transfer (t) between different university centers; and inclusion in Ph.D. programs (Ph.D.).

Participation to optional lectures (U = 1554, Z = -5.24, p = 0.0001), case presentations (U = 1382.5, Z= -6.48, p = 0.0001), and conferences (U = 2313, Z = -2.11, p = 0.03) is significantly higher in medical students. This result may be explained by the increased need of medical students to meet the demands of a challenging profession based on efficacy and accountability. According to Billings-Gagliardi & Mazor medical students’ decision to attend non-required lectures depends on several factors such as previous experiences with the lecturer, predictions, learning preferences, learning needs at that particular time, but is mostly influenced by the need of maximizing learning (Billings-Gagliardi & Mazor, 2007). A study conducted by Patel and collaborators reports that students from medical schools with a higher-intensity training curriculum reported higher satisfaction than students from medical school with a lower-intensity curriculum (Patel et al., 2009).

None of the medical students expressed an option to enroll in Ph.D. programs, while 35.6% of the polytechnic students wish to undergo doctoral studies. This may be a consequence of the fact that the polytechnic education system offers more time to spend in research activities.

We found significant differences between the two samples regarding transfers between different university centers. Polytechnic students were significantly more interested in expanding their knowledge within other higher education centers (U = 1870, Z = -4.61, p = 0.0001).
Table 1: Sample distribution according to satisfaction with lectures, professors, and hospital activity/laboratory

<table>
<thead>
<tr>
<th>Satisfaction with the lectures (l) / professor (p) / hospital activity/ laboratory (h/l)</th>
<th>Medical Students</th>
<th>Polytechnic students</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>%</td>
</tr>
<tr>
<td>Level 1 (l)</td>
<td>1</td>
<td>1.3</td>
</tr>
<tr>
<td>Level 2 (l)</td>
<td>8</td>
<td>10.7</td>
</tr>
<tr>
<td>Level 3 (l)</td>
<td>28</td>
<td>37.3</td>
</tr>
<tr>
<td>Level 4 (l)</td>
<td>27</td>
<td>36.0</td>
</tr>
<tr>
<td>Level 5 (l)</td>
<td>11</td>
<td>14.7</td>
</tr>
<tr>
<td>Level 1 (p)</td>
<td>1</td>
<td>1.3</td>
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<tr>
<td>Level 2 (p)</td>
<td>4</td>
<td>5.3</td>
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<tr>
<td>Level 3 (p)</td>
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<td>Level 4 (p)</td>
<td>29</td>
<td>38.7</td>
</tr>
<tr>
<td>Level 5 (p)</td>
<td>14</td>
<td>18.7</td>
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<tr>
<td>Level 1 (h/l)</td>
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<td>2.7</td>
</tr>
<tr>
<td>Level 2 (h/l)</td>
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<tr>
<td>Level 3 (h/l)</td>
<td>25</td>
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<td>Level 4 (h/l)</td>
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<td>26.7</td>
</tr>
<tr>
<td>Level 5 (h/l)</td>
<td>19</td>
<td>25.3</td>
</tr>
</tbody>
</table>

Source: Dehelean Liana, Romosan Ana Maria, Papazian Petru, Babaita Mircea

Table 2: Sample distribution according to satisfaction with optional lectures, conferences, case presentations/practical projects, rotations, and PhD

<table>
<thead>
<tr>
<th>Satisfied with optional lectures (ol) / conferences (c) / case presentations (cp) or practical projects (pp) / transfers (t) / PhD program (PhD)</th>
<th>Medical Students</th>
<th>Polytechnic students</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>%</td>
</tr>
<tr>
<td>Yes (ol)</td>
<td>54</td>
<td>72.0</td>
</tr>
<tr>
<td>No (ol)</td>
<td>21</td>
<td>28.0</td>
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<tr>
<td>Yes (c)</td>
<td>26</td>
<td>34.7</td>
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<tr>
<td>No (c)</td>
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<tr>
<td>Yes (cp/pp)</td>
<td>70</td>
<td>93.3</td>
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<tr>
<td>No (cp/pp)</td>
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<tr>
<td>Yes (t)</td>
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<td>6.7</td>
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<tr>
<td>No (t)</td>
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<td>0.00</td>
</tr>
<tr>
<td>No (PhD)</td>
<td>75</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: Dehelean Liana, Romosan Ana Maria, Papazian Petru, Babaita Mircea

Table 3: Sample distribution according to the source of information

<table>
<thead>
<tr>
<th>Source of professional information</th>
<th>Medical Students</th>
<th>Polytechnic students</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>%</td>
</tr>
<tr>
<td>Teaching staff</td>
<td>54</td>
<td>72.0</td>
</tr>
<tr>
<td>Teaching staff and self-research</td>
<td>18</td>
<td>24.0</td>
</tr>
<tr>
<td>Self-research (internet, books)</td>
<td>3</td>
<td>4.4</td>
</tr>
</tbody>
</table>

Source: Dehelean Liana, Romosan Ana Maria, Papazian Petru, Babaita Mircea

There were no significant differences between medical and polytechnic students (U=2712; Z= -0.12; p=0.9) concerning their source of professional information (Table 3). In both samples information is provided mainly by the teaching staff. This finding may reflect an education system relying mostly on conventional lecture-based curricula and using a teacher centered model. On the other hand, self-research through textbooks, internet, or podcasts, has its own downsides, mainly the impossibility for the student to ask questions and of the teacher to receive verbal and non-verbal feedback. This may result in less engagement and lower motivation for study (Schreiber, Fukuta, & Gordon, 2010). In addition to this, the values and experience of the teaching staff may influence students acting as models or reflective practitioners (Harden & Crosby, 2000).
Regarding the postgraduate career, the students had to choose between a medical and/or an academic based one. Students could express preferences for hospital work and ambulatory work alone, or a combination of both. Medical students favored hospital practice alone (37.2%) or a combination of hospital and ambulatory practice (36.0%). In what concerns the polytechnic students, the majority of them favor working in a multinational corporation (76.7%), 13.7% favor small private companies and 5.5% were indifferent. Choosing a hospital or mixed hospital and ambulatory based practice may reflect a proactive attitude towards work, or some financial concerns. In polytechnic students, the choice of working in a multinational corporation reflects more clearly the financial incentives.

Only 8% of the medical students envisage a strictly university career, while 12% wish to have a combined medical (hospital and ambulatory) and university career. Among the polytechnic students, 4.1% wish to follow a strict university career. An academic career may be favored for its prestige. While the medical students included in the study are more interested in the academic career, they expressed no desire to enroll in a Ph.D. program. A possible explanation may be the fact that medical students are confronted after graduating with another 4 years of residency to be allowed to practice, and this may gain priority over doctoral studies.

In respect to the financial situation, there were no statistically significant differences \((U = 2689, Z = -0.333, p = 0.73)\) between medical and polytechnic students (Table 4). The majority of the subjects, regardless of their specialty, rate their financial status as “average.”

We found no statistically significant differences regarding emigration plans between the students from the two samples, while a greater number of medical students intend to practice abroad (Table 5). After graduating, polytechnic students find easy employment in national or multinational companies, whereas medical students are presented with more job opportunities abroad.

### Conclusions and limitations

Medical students are significantly more satisfied with lectures, either optional or non-optional and practical project. While the medical training system encourages students to attend conferences, the polytechnic one offers more Ph.D. opportunities and student exchanges between universities. Both polytechnic and medical students rate their training as satisfying. However, more efforts should be envisaged from the teaching staff to encourage self-learning.

Half of medical and polytechnic students consider leaving the country as an option, with no significant differences between the two samples regarding the intention to work abroad.

The present study was conducted in Timisoara University Center, and does not intend to generalize the results for all the country.

### References


NEURO LINGUISTIC PROGRAMMING AND DIFFERENTIATED TRAINING

Constantin Petrovici,¹ Tudor Stanciu²

Abstract: This article analyses the different modalities of applying the theory of learning styles in the teaching-learning-assessment process.

On the assumption that the mode of receiving information influences how we learn, the researchers Richard Bandler and John Grinder created the Neuro linguistic programming theory. Learning that considers the neuro-linguistic paradigm is an inclusive learning type, which harmonizes the individual needs of the learner with concrete ways to meet those needs. This type of differentiated training represents a tool which allows teachers to achieve the best possible correspondence between their teaching strategies and individual learning styles.

To support our arguments, we created an example of teaching activities using the Neuro linguistic paradigm in mathematics lessons. This example illustrates how each student can be directed in the process of solving tasks useful in the issue demonstration, tasks which are appropriate to his learning style.

UDC Classification: 37; DOI: http://dx.doi.org/10.12955/cbup.v5.1020

Keywords: Neuro linguistic programming, visual dominance, listening dominance, kinesthetic dominance

Introduction

Neuro linguistic programming is exploring how we communicate, think and produce changes. This type of exploration enhances skills related to learning, communication, confidence, motivation, and one’s personal level of success.

This paradigm was created around 1976 by Richard Bandler (a mathematician and student in gestalt therapy) and John Grinder (a linguist) who set out to discover the structure of human excellence (Grinder, 1976)

The main foundations of neuro linguistic programming come from a collection of theories and practices such as Albert Bandura's social-cognitive learning theory (Bandura, 1986), a theory of thought belonging to Gregory Bateson (Bateson, 1972) on the logical levels of learning and a unified field theory, the theory of Miller, Galanter & Pribram (Miller, 1960) on the final orientation of human actions, Noam Chomsky’s transformational grammar (Chomsky, 1965), the concept of “time binding” by Alfred Korzybski (Korzybski, 1933), Glaser's field's radical constructivism (Glaser's, 1996), William James’ theory (James, 1950) concerning sensory representations as foundations for the theory of information processing and the fundamental orientation of human action towards goals (Miller, 1960).

The strategy of Richard Bandler and John Grinder (Bandler, 1976, Grinder, 1976) was to focus on finding answers to the question of how people work. The researchers noted that language (both its discursive level, through which we address others, and its inner form, which is a comprehensive summary of all our experiences) is the support of communication and highlights that thinking patterns determine how we react in a certain context, depending on the culture to which we belong, the education offered in the family and in school.

They revealed the following types: with visual dominance – prefers visual information: graphs, tables, figures, charts and other graphical representations of what is exposed through words; with listening dominance – prefers heard information: lectures, audio tapes, discussions; and with kinaesthetic dominance - prefers exercise and practical connection to reality through experience, examples or simulation. It should be noted that each of us has a unique perceptual style, consisting of a combination of preferences: visual, auditory, and kinaesthetic (VAKOG) (Stanciu, 2012).

VAKOG and Learning

The representational systems we tend to use most frequently are: Visual (V) seeing, Auditory (A) hearing, Kinaesthetic (K) feeling, and we also use our Olfactory (O) – Smell and Gustatory (G) - Taste Visual representation is used outdoors for research and information about the

¹ Faculty of Psychology and Educational Sciences, The “Alexandru Ioan Cuza” University of Iasi, Romania, Str. Toma Codru nr. 3, 700554, Iași, jud. Iași, România iasi_itudsta@yahoo.com
² The “Gheorghe Asachi” Technical University of Iasi, Romania, drtudsta@gmail.com
outside world in images, and inside to view our thoughts. Similarly, the kinaesthetic representation system is used for listening to the voices from outside or inside. The kinaesthetic component is used externally to perceive pressure, temperature, humidity and balance, and balance our internal emotional states, beliefs, etc. In Western cultures visual (V) representation systems (65%), listening (A) (30 %) and kinaesthetic (K) (5%) are primary systems. The senses of smell (O) and taste (G) are less prominent and are often included in the kinaesthetic representation system.

Teachers should encourage students to develop the ability to elaborate and use certain words, gestures, emotions, and sounds in order to facilitate learning in agreement with one or more perceptual styles. In the literature, these are also called anchors or mnemonic techniques.

**Applying the theory of learning styles in teaching-learning-assessment process**

Many researchers have tried to apply the theory of learning styles in the teaching–learning-assessment process. Among them, Dr. Rita Dunn and Dr. Kenneth Dunn (Dunn, 1978) believe there are ways to rebuild the instructive educational approach so as to be useful to every student, regardless of their learning style.

Their so-called "Contract Activity Packages" are educational plans that use: 1) a clear statement of the learning need; 2) multisensory resources (auditory, visual, tactile, kinaesthetic); 3) activities through which the newly mastered information can be used creatively; 4) the sharing of creative projects within small groups; 5) at least three small-group techniques; 6) a pre-test, a self-test, and a post-test.

Marilee Sprenger (Sprenger, 2003) also believes that the VAKOG approach generates useful methods of the teaching-learning—assessment process. She details various ways of teaching – visual, auditory, or tactile/kinaesthetic. Methods for the visual learning style include ensuring that students can see written words, use pictures, and draw time lines for events. Methods for the auditory learning style include repeating words aloud, small-group discussions, debates, listening to books on tape, oral reports, and oral interpretation. Methods for the kinaesthetic learning style include hands-on activities (experiments, demonstrations), projects, frequent breaks to allow movement, visual aids, role play, and field trips.

**The representations that students give of mathematical language, operations and problem solving strategies.**

Therefore, since problem solving strategies differ depending on the pedagogical profile, mathematics teachers must provide: for the visual learning type, a spatial representation of the problem, entailing all the items referred to the utterance; for the listening learning type, a reflection of the problem that can concatenate successive actions; and for the kinaesthetic learning type, an overall successive reconstruction of the problem. Among the strategies of visual learners, we can mention analogy, the spatial reorganization of the problem, the search for regularities and because they are more interested in the situation than in the players, they create representations of all data before they start solving. The strategies for the listening learning type comprise iterative processes, they resort to the decomposition of the problem into chains of simple problems or they think of numerical relationships, and because they have knowledge of the problem gradually their reason unfolds progressively. Strategies for a kinaesthetic learning type include approaching the whole as a part, they treat the issue on the whole, "feeling it," rediscovering the ideas progressively after each reading and analysis of the problem text, identifying specific tasks that can be performed in their attempts.

**Methodological route of training methods differentiated by learning style**

In their activities, teachers should tailor the teaching-learning-evaluating strategies they use to the students’ individual learning style.

The methodological route for each specific training method used in lessons with a mathematical content is different depending on the particularities of individual students to whom it is addressed. In the context of the exposure method, the teacher has to organize their discourse, so they are well received by each student regardless of their learning style. This means that the ideas must be accompanied by drawings, slides, images from a book or displayed on the projector, and they must make graphs, charts, tables which are useful to visual learners. It is important that the main ideas are expressed clearly, possibly accompanied by quotations or excerpts from readings taken by others, to capture the auditory learners’ attention. They should also plan a moment for the kinaesthetic learners,
which involves the exercise of practical skills such as editing a text for note taking, building or construction of conceptual schemes, "spidergrams" and frame patterns (templates) in order to highlight certain ideas.

We constantly asked for feedback from students with auditory learning skills, so they can express points of view, arguing or questioning the opinions of others during the discussion. We can ask the students with a kinaesthetic dominance to answer using practical experiences and descriptions of past tasks, to use role play and enact a situation related to the lesson topic and use this as a basis for discussion or we can assign a sequence of the discussion to these students and ask them to chair the discussion and thus ensure equal participation of all students.

In the context of the exercise method, the teacher must organize the training method, so they are well received by each student regardless of their learning style. This means that students with a visual dominance are encouraged to observe the teacher’s demonstration first so as to see links, to practice and understand what to do, and image-based instructions should be made available where necessary. Students with a listening dominance can be asked about the connection between theory and practice in the exercise given or can be encouraged to talk about the task with the teacher or a classmate. Students with a kinaesthetic dominance can be encouraged to "help" or to work together with others, to practice, to make mistakes and try again.

In the context of the demonstration method, the teacher should organize the exchange of ideas, so they are well received by each student regardless of their learning style. This involves the use of posters, schemes to illustrate what needs to be demonstrated, using colored overhead sheets to allow students to see clearly the dominant visual assumptions and what needs to be demonstrated. In addition, students with a listening dominance should be encouraged to ask questions and discuss the demonstration, explaining each point of view in minute detail, and each sequence of the demonstration must be presented orally. Students with a kinaesthetic dominance should be involved in different ways, for example they can be assistants, they can search for examples to support the demonstration or procedure, they can write on the blackboard while the teacher explains.

The teacher should organize the exchange of ideas, so they are well received by each student regardless of their learning style. This includes supporting visual learners to express their ideas about the solution to the problem, using the color scheme to indicate connections between knowledge which favors the resolution approach, writing down useful ideas for solving the problematic situation by using crayons, "spidergrams," images and symbols. Auditory learners can be stimulated to describe in their own words the ideas they have on solving the problem, talk and exchange ideas with other students. The students with a kinaesthetic dominance can compile a list of actions necessary to approach the resolution and rank these according to their degree of priority actions; can write on the board or flipchart ideas generated by other students using different colors.

Assessment must also be organized in a variety of ways. Homework can be assigned to address simultaneously the students with a visual dominance (the text must use different fonts, different styles, images, symbols, diagrams, "spidergrams"), with a listening dominance (text reading of problems for home and discussing the task set) or with a kinaesthetic dominance (include practical tasks that require the development of activities / investigations that have written elements, but the emphasis is not on writing as such, but on the description of what they have done or discovered).

Assessment of worksheets is an evaluative method common to mathematics lessons. These must be designed to address both visual dominance (layout is very important, important elements of the text should be highlighted and underlined or written in bold, especially the important points and key points in the text of the problem), listening dominance (worksheets can have gaps so that students have to listen to a presentation by the teacher to understand the missing elements, there must be discussions on charts to understand their content and requirements better) or kinaesthetic dominance (worksheets can have empty spaces, so that students need to hear a presentation by the teacher and then complete the missing elements) (Stanciu, 2006).

Assessment of project work is a technique which has its strong points in the field of evaluation of the students with different learning styles. In a project conducted by a team, the students with a visual dominance can be encouraged to use various processes related to the visual scoring of project ideas or to build a new image of the project conducted by the students with a kinaesthetic dominance, the
students with a listening dominance can be employed in the early phases of the project, in which they are required to answer questions related to the given task, to talk about the theme in larger groups with each other or with the teacher, to record information on tape and the students with a kinaesthetic dominance may be involved in carrying out practical activities that require teamwork and skills management or to make a PowerPoint presentation of the final project.

Evaluation by testing can be organized so as to simultaneously address students with a visual dominance (using symbols attached to tasks or questions), students with a listening dominance (it would be preferable to use a "Amanuensis", i.e. a person who asks questions and records the responses as they were given by students in their own words) or students with a kinaesthetic dominance (by formulating questions that must be of a practical nature). The objective items must contain graphics / pictures to expand written information (visual dominance), to encourage students to silently repeat questions (listening dominance) and incorporate practical activities, such as a task or demonstration of certain skills (kinaesthetic dominance) (Andersen, 2008). The half-objective or subjective items must include graphics in the worksheet to turn it into a "chart" filled with blanks (visual dominance), to encourage students to silently repeat various aspects of the requirement or formulating a response (listening dominance), but also to allow students to relate to their past experiences (kinaesthetic dominance) (Radu, 1978).

**An example of teaching activities using the neuro linguistic paradigm in mathematics lessons**

An example of using neuro linguistic training in mathematics lessons teaching is the next sequence illustrating the “problematization” methodological route, in a consolidation lesson for multiplication in the fifth grade.

At the stage of organizing the problem situation the teacher shows an 8x8 chessboard with identical squares and eight castles, leaving the children to examine board and game pieces, the students with a visual dominance are allowed to identify the game pieces and how they operate, the students with a listening dominance are asked to comment on what they think will happen when the game pieces are positioned on the board and how they can be moved them so as not to attack, the students with a kinaesthetic dominance will be guided to move the pieces on their own, so as to comply with the conditions of the problem. Also, the problem is stated, which is the subject of the teaching sequence that we want to illustrate (Consider a checkerboard (8x8) and 8 castles. In how many different ways can we place 8 castles, so the attack becomes impossible?) (Havarneanu, 2009).

At the stage generically called "perception," the students should observe the elements of the problem. It involves a chessboard and 8 identical castles.

At the stage generically called "analysis," students must recall the particularities of movements can shift when attacking two castles. Now it is important that the students notice that the castles are the same color and so identical configurations can be created, and therefore recurring cases should be eliminated. For example, the two diagrams are the same as shifts have the same shape and color (Figure 1).

**Figure 1: 8x8 chessboard diagrams according to VAKOG style of learning**

<p>| | | | | | | | |</p>
<table>
<thead>
<tr>
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<td>8</td>
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<td>4</td>
<td>2</td>
<td>7</td>
<td>5</td>
<td>6</td>
<td>1</td>
</tr>
</tbody>
</table>

Source: Havarneanu

Students with a kinaesthetic dominance write the schemes proposed by the teacher on the blackboard; these are useful in solving the problem. Students with a visual dominance observe the proposed
schemes and pupils with a listening dominance comment on the ideas on the schemes presented by the teacher.

At the stage generically called "processing," we considering the number of distinct positions that each turn can do. For the first castle 8 lines and 8 columns are available, that means 8x8 positions. For the second round, there are 7 lines and 7 columns (we excluded those occupied by the first turn), so 7x7 positions. To continue the reasoning, we obtain that for the eighth castle there are one row and one column, so 1x1 positions.

At the stage generically called "selection" it is found that the first castle has 8x8 positions available, but no matter which of the eight castles is chosen as the "first round" it implies that the 8x8: 8 is the real number of distinct positions. By repeating an analogous reasoning, we obtain that the second castle has only 7x7: 7 distinct positions and so the last castle has only 1x1: 1 distinct positions.

In the stage generically called "application," the problem is solved completely and the operations discussed above will be updated.

For each of the 8 different positions of the first castle we build the scheme (Figure 1).

<table>
<thead>
<tr>
<th>Figure 2: Possible distinct positions of the castles</th>
</tr>
</thead>
<tbody>
<tr>
<td>castle 1:</td>
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<tr>
<td>castle 2:</td>
</tr>
<tr>
<td>castle 3:</td>
</tr>
<tr>
<td>castle 4:</td>
</tr>
<tr>
<td>castle 5:</td>
</tr>
<tr>
<td>castle 6:</td>
</tr>
<tr>
<td>castle 7:</td>
</tr>
<tr>
<td>castle 8:</td>
</tr>
</tbody>
</table>

Source: Havareanu

At this stage, students with a kinaesthetic dominance write on the blackboard the schemes proposed by the teacher, which are useful in problem solving and students with a visual dominance observe these schemes, while students with a listening dominance remark ideas related to the same schemes, and
interpret the previous scheme to be read as follows: for the first position of castle 1 we can form seven distinct positions for castle 2, which correspond to six different positions of castle 3 and so on. Thus, for each of the eight castles which are first placed, we could create a scheme of the type previously generated. That means we must perform multiplication. So, the answer to the problem is 

$$8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 = 8!$$ (Figure 2)

At the stage generically called "systematization and setting new knowledge gained by solving a task," children are asked to solve the same type of problem with 4x4 checkerboard squares and with 6x6 squares.

**Conclusion**

Learning that considers the neuro linguistic paradigm is an inclusive learning type, which harmonizes the individual needs of the learner with concrete ways to meet those needs, representing a tool to allow teachers to achieve the best possible correspondence between their teaching strategies and the individual learning styles. In their activities, teachers should tailor the teaching-learning-evaluation strategies used to the students’ individual learning styles, and throughout the methodological route of each training method specific to lessons with a mathematical content, to differentiate sequences that directly address different learning styles, depending on their dominance (visual, listening/auditory or kinaesthetic). This type of training has the advantage of enhancing mental activity both in the cognitive system (sensation, perception, representation, thinking, memory, imagination) and of the affective and volitional ones, thus significantly improving learning outcomes.

**References**


QUALITY OF THE EDUCATIONAL SERVICE – PERCEPTIONS AND EXPECTATIONS OF THE TEACHERS IN HIGH SCHOOLS FROM SUCEAVA COUNTY, ROMANIA

Laura-Mirela Pintilie

Abstract: The goal of this study was to determine the main variables that are part of the management strategies for quality assurance in higher education. The study was conducted in 2016 on a representative sample of secondary schools in Suceava County, Romania. The research methodology has mixed quantitative analysis of collected data using a questionnaire applied to teachers from seven schools in the Suceava County (268 respondents) and qualitative analysis of public documents referring to performances in the secondary education system. To achieve the questionnaire, an adaptation of the SERVQUAL method was used, specific for the services domain. It was aimed at establishing the differences between perceptions and expectations of teachers on human and material resources necessary to ensure the quality of services in education. The results were correlated with data on students' performances in high school and/or professional school. Changing the mentality of the teachers, self-assessment and objective assessment of the work performed and working conditions can lead to increased quality of educational services with direct effects in improving school performance of direct beneficiaries of education, the students.

JEL Classification Numbers: I 20; DOI: http://dx.doi.org/10.12955/cbup.v5.1021

Keywords: education, strategy, quality

Introduction

In education, compared to the industrial or economic sectors, main studies on the concept of scientific management are just at the beginning, both in theory and especially in practice. Advanced economies, in Europe and worldwide, have proven increased interest in this direction, studies on the management of the education system existing since 1980. In Romania, the scientific approach to the educational management affirms since the 1990s, namely after the 1989 revolution that led to the change of the political regime. A representative definition is the one given by Toca (2008) who considers that management education is consisting in “studying the processes and relationships that manifest within educational institutions during the educational process, in order to discover the laws that generate the educational management and to develop management methods and techniques based on them, which are done to ensure increases of efficiency of this process”. In another work, targeting the quality management in a school organization, the same author states that "Education quality management should focus on processes and not on people" quality being both the "responsibility of the supplier and of the recipient; a mental attitude, a way of life of each and of all vocational schools" (Toca, 2010).

The research performed in this study was based on the interest of identifying specific variables of educational management and of quality management in high schools and/or vocational schools in Romania, given the particularities of systemic, social, economic and educational nature which the education system in this country is confronted with.

Research Methodology

The purpose of this research was a quantitative analysis, through the use of a questionnaire, of perceptions and expectations of teachers from 7 secondary and vocational type of schools, in Suceava County, regarding the available resources needed to provide quality educational services.

The research problem materialized in determining the main variables that are part of management strategies for quality assurance in the pre-university education in Romania. Quantitative analysis of data obtained by the questionnaire was completed by qualitative analysis conducted previously on the basis of reports and documents specific to the educational field, regarding the results obtained at a baccalaureate level by the graduates from high school but also on the school dropout rate at pre-university secondary education.

1 Alexandru Ioan Cuza” University of Iasi, laurapintilie2003@yahoo.com
Objectives and hypothesis of the research

The overall objective of the research was to identify the strategic components needed for the management of secondary schools/technical-vocational schools in Romania in order to obtain optimum operation and performance across the organization.

The general hypothesis of the research says that in the SERVQUAL version there is enough information to perform a quantitative analysis of educational services from the perspective of service providers (teachers) who expressed their expectations and perceptions with respect to important characteristics of strategic and operational management from the school organization.

The study was based on several objectives and specific assumptions that are mentioned below.

Specific Objective 1 of the Research: carrying out the questionnaire’s items from the perspective of compatibility with the SERVQUAL characteristics and attributes: tangible elements, reliability, responsiveness, trust, empathy.

Hypothesis 1: The items in the questionnaire express characteristics and attributes of the five dimensions indicating the quality of a school organization: tangible elements, reliability, responsiveness, trust, empathy.

Specific Objective 2 of the Research: Identification of the main variables underlying the development of management strategies for quality assurance in pre-university education, in high school / vocational school in Suceava County.

Hypothesis 2: The questionnaire in the SERVQUAL version highlights in a large extent, the main variables needed to establish management strategies for quality assurance in pre-university education in high school / vocational school in Suceava County.

Literature review

In the context of socio-economic life, along with many other services addressing individuals to meet the needs, "educational services" are characterized by a number of characteristics that describe the specific of the activities in this sector. In Romania education is an administrative public service type performed at the national level, being provided to the whole community both by public and private institutions (Androniceanu, 1999). In specialized literature (Chitu, Ioana Bianca, Brătucu Gabriel Ispas, Ana, op.cit., P.10-11, Gafencu Zait, Adriana (1996), Ioncică, Maria, Op. Cit, p.17, apud (Bedrule-Grigoruta, 2007)) common features were identified for all categories of services.

In this context, this study shows an alternative to assess the quality of education by adopting a representative method for measuring and assessing the quality of public service, the SERVQUAL method. The method was improved from its first presentation in 1988 right by its creators (Parasuram, 1988) and adapted to the specificities of the analyzed public services. The SERVQUAL method is used to determine the difference between the perceptions and expectations of a service beneficiary, in this case it is about the educational service. This method allows not only the evaluation of its services but also identifying the areas for improvement by comparing the activity that can be achieved with other organizations in the sector (Amia, 2011). Regardless of the public service performed, the recipient’s perception regarding the quality of the products that are more important as the "perceived quality is not the same with objective quality" (Zeithaml, 1987). In a school organization teachers who work are the interface between the direct beneficiaries (students), the indirect ones (parents, community) and the provider of educational services, namely a school unit represented by the bodies of their leadership: the teachers’ board of directors and the school managers.

A measurement of the difference between teacher’s perceptions and expectations regarding the quality of educational services is a first step to identify strategic issues that will improve the quality of educational services. "The objective quality " is difficult to describe in terms of educational services in Romania because there are insufficient performance indicators and the existing ones are not clearly and concisely formulated and are irrelevant to the education system as a whole (Pintilie, 2016).

In the initial version of the SERVQUAL method, the authors identified five categories by which the 10 dimensions of quality public service are described, each with different weights in determining the size of the quality of that service: tangible elements (11%), reliability (32%), responsiveness (22%), trust (19%), empathy (16%) (Badulescu, 2008). The main goal of a strategy is to ensure the competitive advantage for the organization where it is implemented.
Developing the strategy is based on a careful analysis of the quality of the delivered product or service but also on physical resources, material and human resources which are used and which interact with the organization to achieve its objectives. The five dimensions of quality, proposed by the SERVQUAL method are present in all self-assessments and assessments that are targeting the quality produced by an organization, implicitly by a school organization, even if the mentioned shares are different in relation to the original model.

"Quality is the degree of excellence achieved and the control of variables in achieving this excellence in fulfilling consumer desires" (Zeithaml, 1990 apud (Steward)). The SERVQUAL method combines all the elements in the construction of a strategy: resources, objectives, needs to be addressed by the targeted public service, and the main purpose being to improve its quality.

The following table shows the quality grid in the SERVQUAL version.

<table>
<thead>
<tr>
<th>The difference between expectations and perceptions</th>
<th>Service Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative values</td>
<td>Better service than was expected</td>
</tr>
<tr>
<td>Positive values</td>
<td>Service quality weaker than was</td>
</tr>
<tr>
<td></td>
<td>expected</td>
</tr>
</tbody>
</table>

Source: Parasuranam (1988)

The Parasuranam’s model (Parasuranam, 1988), refers to the relationship between consumers and service providers through assessing this relationship in terms of perceived quality of service recipients compared with their expectations. In this study, the teachers who work in the system were placed in the role of beneficiaries while the service provider role was taken over by the management team as well as by the managers responsible for the good development and for the quality of educational services provided by the school organization.

In education which is a public system, the intervention of managers in terms of financial rewards is limited (employee remuneration is determined centrally by specific legislation). The manager can provide support only to sustain the employee in obtaining allowances expressed as a percentage from the base salary (tutoring, gradation of merit, Ph.D., occasional awards offered by the community).

In this research, targeting pre-university education, the SERVQUAL version was adapted by collecting perceptions and expectations of teachers regarding financial, material and human resources that are needed in the education system to optimize results. Identification of the share of these resources is the premise of establishing the management strategy that can provide competitive advantage of a school organization according to the specifics of that organization. Providing resources is the task of the manager who can guide the organization's strategy for meeting the needs expressed by teachers in the organization.

**Research Variables**

In this study have been highlighted variables that represent characteristics of educational services of a school unit. They are: endowment for theoretical and practical training, attractively presented curriculum and adequate training of students, alternative methods of training and personal development activities, student centred activities, school management improving, activities to improve quality of educational services, transparency in communication and decisions, professionalism of teacher’s motivation, effective marketing, valuing teachers, and situational / participative leadership.

**Methods used for research**

The method used to collect and interpret data is an adaptation of the SERVQUAL method given the usefulness of carrying out a quantitative analysis in this study. For the educational field the gap between perceived quality and objective quality is given by the typology of the interviewed: manager, teacher, parent, student. But, as Zeithaml (1987) said: "The perceived quality is not the equivalent of the objective quality."
The perceived quality cannot be measured by highly accurate technical or physical standards, it is rather an assessment or judgment of a product formed from both the intrinsic attributes (e.g. physical) and extrinsic attributes (ex. price, brand name) that are not part of the physical product (Zeithaml, 1987). In the case of the resulting product of the education system the “perceived quality” is subjectively influenced by the ability of direct and indirect beneficiaries of self-assessment, namely to assess. The intrinsic characteristics are important only for vocational schools (e.g. Sports schools, military, etc.) instead the extrinsic characteristics are of another nature than the products of the industrial and economic fields. In this context, rather elusive of always changing educational policy, in expressing objectivity it is difficult to quantify quality even using a recording device such as quantitative questionnaire. The SERVQUAL version records not only perceptions regarding quality but also the expectations and in these circumstances objectivity in the assessment if it is necessary if completing the questionnaire is done responsibly and carefully. The SERVQUAL original version (1994-1995) set ten dimensions of service quality, subsequently grouped into five categories: tangible elements, reliability, responsiveness, trust, empathy (Badulescu, 2008). For this research, an adaptation of the original five categories of the SERVQUAL model was used. The data required for testing and the confirmation of the made assumptions were collected from high schools and vocational schools from Suceava County.

**Sampling**

The study was conducted during June - August 2016 and was based on statistics provided by the School Inspectorate of Suceava County, for the school year 2015-2016. 44 high schools and / or professional schools were registered in Suceava County. The total number of students enrolled in these educational institutions was 22,064 students, of which 12,565 (56.94%) are enrolled with a theoretical profile, remaining 9,499 (43.05%) registered in vocational and technical education. There were recorded 2,150 teachers of whom 1,496 (69%) women (Source: NIS public information email data 14th of July 2016).

The stratified sampling option was used because the distribution of pre-specified characteristics of the sample is similar to that found in the population. The purpose of this stratification was to provide a representation as high as can be, given the homogeneity of subsets but also the heterogeneity of them (Babbie, 2010). Three layers which conform to the internal homogeneity criterion as well as to lack of homogeneity in relation to other layers have been selected: 1. School Unit profile: theoretical, technological, mixed; 2. Framing in the physical geographical map of Suceava County; 3. baccalaureate exam results, July 2016. Setting the sample, in relation to the total community at the level of the Suceava county, it was carried out in a first stage, taking into account the sampling criteria. The following table provides representative data for this situation.

<table>
<thead>
<tr>
<th>School Unit Type</th>
<th>Number of School Units</th>
<th>Share</th>
<th>Number of School Units selected for the sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theoretical high school</td>
<td>14</td>
<td>31.8%</td>
<td>2</td>
</tr>
<tr>
<td>Technological high school/professional school</td>
<td>14</td>
<td>31.8%</td>
<td>2</td>
</tr>
<tr>
<td>Mixed high school</td>
<td>16</td>
<td>36.4%</td>
<td>3</td>
</tr>
<tr>
<td>School Units Total:</td>
<td>44</td>
<td>15%</td>
<td>Total units in the sample: 7</td>
</tr>
</tbody>
</table>

Source: Author

In order to respect the geographical criterion in the selection of the sample we considered the widest geographic coverage area by selecting high schools that would be in different places in the county. Unfortunately, the receptivity of some of the school’s directors was very low which prevented us to perform the survey in the initial version.
Another aspect in order to ensure the best possible representativeness of the sample selected was linked to results obtained at a baccalaureate exam in July 2016, given the need to start the research as soon as possible. The following table includes statistics that describe the situation of these high schools, in terms of results from the baccalaureate exam.

### Table 3: The Results of the baccalaureate exam session June-July 2016, for the sampled schools

<table>
<thead>
<tr>
<th>Nr.crt.</th>
<th>Town</th>
<th>High school type</th>
<th>Graduation rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Campulung Moldovenesc</td>
<td>Technological</td>
<td>73%</td>
</tr>
<tr>
<td>2.</td>
<td>Dolhasca</td>
<td>mixed</td>
<td>44%</td>
</tr>
<tr>
<td>3.</td>
<td>Falticeni</td>
<td>mixed</td>
<td>52%</td>
</tr>
<tr>
<td>4.</td>
<td>Falticeni</td>
<td>mixed</td>
<td>63%</td>
</tr>
<tr>
<td>5.</td>
<td>Suceava</td>
<td>theoretical</td>
<td>99%</td>
</tr>
<tr>
<td>6.</td>
<td>Suceava</td>
<td>mixed</td>
<td>87%</td>
</tr>
<tr>
<td>7.</td>
<td>Vatra Dornei</td>
<td>theoretical</td>
<td>71%</td>
</tr>
</tbody>
</table>

Source: Author

The sample size for teachers in those schools, given that 57% of high school students were enrolled in a theoretical profile, the remaining 43% being enrolled in secondary education and / or vocational education, revealed \( n = 313 \) questionnaires to be applied.

### Results and Interpretations

A first result of this study is the questionnaire designed in a way that adapts a model used in public services, SERVQUAL, to the public education service. In the following table are mentioned the similarities and differences between the two types of questionnaires.

### Table 4: ServQual version adapted for educational services

<table>
<thead>
<tr>
<th>Classic ServQual version</th>
<th>ServQual research version adapted</th>
<th>Motivation for the modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>22 questions for each section addressed to the “expectations” and the other to the “perceptions” of service quality</td>
<td>26 questions addressing the same questions as in the classic version</td>
<td>- complexity of specific activities of service education - big number of education stakeholders - heterogeneity of direct and indirect beneficiaries.</td>
</tr>
<tr>
<td>The respondents are beneficiaries of public service</td>
<td>The respondents are teachers who work in the school, at a level of high schools / vocational schools</td>
<td>the need to consider teachers not only as “educational service providers” but also “indirect beneficiaries” of educational services</td>
</tr>
<tr>
<td>Five categories with different shares to characterize public service: - Tangible elements: 11% - Reliability: 32% - Responsiveness: 22% - Assurance: 19% - Empathy: 16%</td>
<td>Five categories to characterize educational service with shares other than the specific version of the classic SERVQUAL: - Tangible elements: 23% - Reliability: 27% - Responsiveness: 15% - Assurance: 23% - Empathy: 12%</td>
<td>- This survey collects data on how teachers relate to the quality of the educational services so we kept the five categories of SERVQUAL, the classic version, - the specific of the activities in the field of education determined me to change my share of questions characterizing the five SERVQUAL categories, the focus being placed on tangible elements, namely human and material resources in the school organization.</td>
</tr>
</tbody>
</table>

Source: Author

The questionnaire was applied in 7 schools, from which 2 of which were theoretic high schools, one a technological high school and 4 mixed (with both profiles). Were distributed 333 questionnaires, 290 questionnaires were successfully collected. Out of these, 268 were correctly filled out with the rest being canceled (double or partially completed responses).
The questionnaire was structured in two parts. In the first part collected socio-demographic data was collected concerning the age in the educational activity, the level of professional qualification and academic degree of the participants. In this regard there were high percentages of respondents corresponding to full time job (85%), qualified (99%) and seniority more than 20 years (42%) in the education system, so with training and appropriate professional experience job.

Thus, we can say that the views expressed in the questionnaire reflects an objective position on the quality of educational services, regarding the quality standards of the sampled schools and is less influenced by the specific subjectivity of any investigation.

The second part of the questionnaire was structured as two sets of identical questions (26) aiming to record responses, first in terms of "perceptions," then in terms of "expectations" that teachers have on the resources necessary to ensure educational quality of the school organization which they belong. A Likert scale was chosen for assessing the responses, five values corresponding to the numbers: 1 (very little), 2 (to a lesser extent), 3 (neutral, neither large nor small), 4 (a large extent), 5 (in very large extent). On this scale, the recorded answers, regardless of the set of questions "perceptions" or "expectations" were placed in the numerical values 4 and 5. The diagram below shows these results.

Recorded data shows that, for each item, the percentage of responses for the "expectations" is greater than the responses for the "perceptions," the difference between them having positive values that indicates a weaker qualitative service than expected, according to the SERVQUAL model.

However, these differences are up 10% so it can be considered that, in terms of service quality in high schools and / or professional schools from the study area, are provided the human and material resources enabling the development of a quality education process very closed to real standards.

Since the point of views of the teachers highlights this aspect, in the study an indicator was watched for showing quality "products," these are students leaving the secondary education system. From this point of view there appear to be discrepancies reported by both school attendance but also on the results of the national baccalaureate exam. For the Suceava County School Inspectorate, a decrease of the dropout rate, from 0.34% in the 2014-2015 school year to 0.27% in the 2015-2016 school year was found out. Among the 324 students who quit school courses in the 2015-2016 school year, 94 were those from classes IX-XII (Diaconu, 2017).

Regarding the performance of high school students at the baccalaureate exam session June-July 2016, the percentage of registered graduate of Suceava County on this exam was 71.19%. This percentage, however, is not conclusive because, in parallel, a more serious problem currently facing secondary education system is the non-inclusion and / or absenteeism from this exam.

According to statistics from Bursa Online, only 71.23% of classes XII and XIII who graduated in 2015-2016, were enrolled for the baccalaureate exam in 2016. Thus, the problem of school activities centered on the individual student progress is a current one, which must fall within the concerns of future managers aiming at institutional development, obtaining competitive advantage and ensuring quality education.

After applying the questionnaire and result interpretation, we selected those variables, characteristic of the quality dimensions that are basic elements of management strategies specific to an educational institution: endowment for the theoretical and practical, curriculum attractively presented and adequate training of students, alternative methods of training and personal development activities, student centred activities, school management improvement activities, quality of education improvement, transparency in communication and decisions, professionalism of teachers, teacher motivation, effective marketing, valorisation of teaching staff, and situational/participative leadership.

**Research limits**

The study has shown the reluctance of teaching staff relatively to the carrying out of a study that aims to identify management strategies for quality assurance in Pre-university School. In some schools, even the unit manager restricted the access, in other schools, teachers have expressed disinterest to participate in such a study. Moreover, the superficiality with which some teachers have read the introductory part of the questionnaire, where the requirements and the manner of filling in were presented, maybe specified. This has resulted in a series of questionnaires which were canceled either because they had double answers, or because they had unanswered items.
Conclusions

In conclusion, taking into consideration the very high percentages corresponding to full time respondents qualified and with over 15 years of experience in the education system, it can be stated that with appropriate job training and professional experience, the opinions expressed in the survey reflects an objective position on quality of educational services, related to the quality standards of the sampled schools and which is less influenced by the specific subjectivity of any investigation. The first research hypothesis was made in connection with the structure of the questionnaire. The large number of respondents who selected "a large extent" and "a very large extent" on the Likert scale with five values, confirms the first hypothesis outlined in this study. The second research hypothesis, concerning the selection of the SERVQUAL version as an optimal method for collecting the data needed for the study was partially confirmed during this investigation. Through the questionnaire applied in the adapted version were highlighted additional variables that characterize the processes undertaken in a school organization. All the variables included in this study were selected as “important” or “very important” to be part of a management strategy for the quality assurance in pre-university education. At the same time, the differences with the positive values between teachers’ expectations and perceptions have shown a lower quality of educational services than the desired one, so a need to improve these services was perceived. By using an interview guide with the managers of the school units in the sample, the quantitative analysis of the variables in this study will be carried out in the future. Thus, the main variables to be included in the management strategies aimed at ensuring the quality of the educational services in the high schools in Suceava County will be identified.

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DOES EMOTIONAL MATURITY HELP TO EXPRESS MORAL BELIEFS? EVALUATING ‘MORAL GAMES FOR TEACHING BIOETHICS’ AMONGST ROMANIAN AND POLISH STUDENTS

Cristina Iulia Ghenu, Laura Brad, Bartosz Płotka

Abstract: The recent development of biotechnology generated a new set of individual and public moral dilemmas gathered under the name of bioethics or biopolitics. These issues are specific because they merge – as nothing else before – moral, private and political spheres. Thus, public awareness of these cases and of any elements that can influence personal bioethical decisions must be stimulated. One of such methods is the academic teaching of bioethics. Since Darryl R.J. Macer defined the latter as “the love of life, reflecting the hope that bioethics may value life in a process involving emotions and rationality” we found interesting to investigate the role of emotional maturity (EM) in solving bioethical dilemmas. The study involved 103 Polish and Romanian students asked first to fill the Friedman’s emotional maturity form and then solve chosen exercises based on UNESCO’s Moral Games for Teaching Bioethics. The results indicate that a high level of emotional maturity correlates positively with the students’ ability to express their moral beliefs for Romanians and negatively for Poles; therefore, the results indicate there is a need to modernize the actual standards for teaching bioethics by enriching them with either emotional or rational components according to the cultural premises.

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Keywords: emotional maturity, moral beliefs, education, bioethics, biopolitics, Romania, Poland

Introduction

The recent development of biotechnology generated a new set of individual and public moral dilemmas gathered under the name of bioethics. Because of their contentious and conflict-generating nature they have been politicized which, paradoxically, did not bring solutions to these cases but extended their reach and diffused them throughout societies. Since then, they have become ubiquitous thus having an opinion about them became the inherent element of worldview and conscious democratic participation in a public sphere. In addition, the bioethical (or biopolitical) issues are very specific because they merge – as nothing else before – moral, private and political dimensions. This is why public awareness of these cases and of other elements that can influence personal bioethical decisions must be stimulated by social campaigns, public debates, promoting scientific discoveries and education. The latter requires special attention since it is the most engaging and direct method of transferring bioethical knowledge. However, as some discoveries, such as Roache and Clark’s (2009) work demonstrate, bioethics involves not only the usual knowledge (rationality) but also intuitions (emotions). This is why we investigate the possible connections between them by answering the research question: how does the level of emotional maturity (EM) correlate with the ability to express moral beliefs (also called bioethics or B)? Based on the literature review and our initial observations we propose and verify the following hypothesis: people with a higher level of emotional maturity express their moral beliefs significantly more clearly than people with a low level of emotional maturity. For the study’s purposes, we investigated 53 Romanian and 50 Polish students (n=103) by asking them first to fill the Friedman’s emotional maturity questionnaire and then to solve chosen exercises based on UNESCO’s Moral Games for Teaching Bioethics. Our results indicate that only Romanian students with high emotional maturity expressed moral beliefs significantly more clearly, while the results for the Polish sample indicate the opposite. Therefore, since bioethics requires both intuitive and rational explanations, our findings indicate there is a need to modernize the actual standards for teaching bioethics by emphasizing the development of emotional component in bioethical reasoning, but only if cultural differences are taken into account.

Theoretical Background

In this study, we use the newest discoveries of management, human resources, moral philosophy and political science to address the general question: does increasing the public awareness of bioethical issues through education require modernization?

After participating in a number of classes, conferences and seminars on bioethics we have two reasons to believe the answer is positive. First, we discern that many bioethical debates fail in reaching any consensus because the participants suffer from Dworkin’s (1986) “semantic sting.”

1 Bucharest University of Economic Studies, Faculty of Management, Bucharest, Romania, cristina.ghenu@man.ase.ro
2 Bucharest University of Economic Studies, Faculty of Finance, Bucharest, Romania, laura.brad@fin.ase.ro
3 Nicolaus Copernicus University, Faculty of Political Science and International Studies, Poland, bplotka.umk@gmail.com
They are usually unable to identify the source of disagreement, precisely express their own beliefs and arguments, or even to say what in fact is bioethics. Second, the teaching of bioethics depends mainly on presenting facts and trying to approach them in the most rational way possible, while many debates as well as scholars, such as Kass (1997) or Fukuyama (2002), show that disputants base arguments more often on their moral intuitions than knowledge. If we connect these observations and accept Darryl R.J. Macer’s (2008) definition of bioethics – coined as “the love of life” which reflects the expectation that bioethics value life in a way involving rationality and emotions – instead of any normative approach trying to settle what is right in bioethical cases, then we can easily discern that the most important ability in bioethical disputes is to precisely identify and clarify our own moral beliefs, but also facilitates mutual understanding. One thing we cannot omit in Macer’s definition is the role of emotions which significantly influences our choices and convictions. Taking it into account, we propose the following logical reasoning: if emotions influence moral hence bioethical beliefs, the disposition of developed emotions and the ability to recognize them influence the ability to precisely identify and clarify these beliefs. Since Salovey and Mayer (1990) denoted emotional intelligence (EI) as the ability to recognize and modify one’s emotions in order to achieve intellectual and emotional growth, acknowledging their definition allows us to perceive EI not as a disposition but as an ability. Based on the same idea, Athota et al. (2009) investigated the role of EI in moral reasoning. Although the authors confirmed such a link might exist, they focused mainly on the connection between moral reasoning and personality traits such as: agreeableness, openness, extraversion, neuroticism and conscientiousness. Thus, estimating the correlation between EI and identification of one’s moral beliefs based on their study is not sufficient. The same problem concerns the work of Kornilova and Chigrinova, (2014) who also tried to investigate the title connection but their results regarding the clarification of moral beliefs overlap with types of personality and stages of moral development. Other interesting studies were proposed by Parsa (2015) and Fernandez-Berrocal and Extremera. (2005) whose results suggest that moral decision-making might be dependent on the emotions and EI. However, their investigations do not tell us to what extent EI level can impact the clarification of one’s moral beliefs thus the quality of moral decisions. We believe the inability of the aforementioned authors to investigate the direct connection between EI and good clarification of moral beliefs is conceptual. It was caused by a fallacy of choosing a narrow concept – emotional intelligence – which stands solely for the ability to recognize one’s emotions. The solution to the above theoretical problems seems to be focusing on the more general concept which is emotional maturity. This is motivated by the fact that one can have well-developed EI but be emotionally infantile, while the other cannot be emotionally mature without having developed EI. Hence, we recognize EM as the proper factor to correlate with the clarity of moral beliefs and discern a difference between EI and EM – the former is an ability while the latter is a disposition. Based on these observations we support such approach which takes into account EM, as did Arbune et al. (2014), Mărghitan and Crașovan. (2014), Crașovan and Ioviță (2013) and Moldovan (2014) in their studies including the role and meaning of emotions.

Summarizing, all the aforementioned studies have a similar message: they indicate that EI and EM might play a significant role in moral decision-making. Their disadvantages however, are: choosing ‘moral exercises’ not necessarily corresponding to EI’s and EM’s basic assumption of connecting rationality with emotions and not realizing the task of measuring the actual impact of EM level on the ability to clearly express moral beliefs.

Research Methodology

The research aims to provide evidence on the correlation between emotional maturity level and the ability to express moral beliefs – we call this variable bioethics (B) – for both Romanian and Polish students. In order to conduct the analysis, we used quantitative analysis based on a questionnaire consisting of two parts. The first part of the questionnaire is best described by Crașovan (2013) who considers EM as the element that refers to the Superego strength and Ego objectification, comprising 25 questions of “yes” and “no.” While Superego qualities are related to emotional security, a realistic perception about one’s self, others and the world, emotional imbalance is caused by Ego weakness, emotional instability and is accompanied by a series of infantile, childish psycho-affective reactions. Each answer of a question has its own score, the final score being obtained by using arithmetic. We used the same scale as proposed by the author in order to quantify the effects of our results.

The second part was built using Moral Games for Teaching Bioethics that provides a number of participatory games in order to teach moral decision-making and expressing moral beliefs (Macer, 2008). Macer did not indicate any method that could be useful for evaluating the Moral Games for Teaching Bioethics, or teaching bioethics in general, in the emotional context. This is why we reconstructed and expanded the set of most
typical bioethical statements concerning issues such as abortion, euthanasia, human enhancement, organ transplantation, in vitro fertilization, stem cell research, animal rights and general legal and ethical standpoints. The variants “Strongly agree,” “Agree,” “I have no opinion,” “Disagree,” “Strongly disagree” were offered for encircling to each 50 proposed statements concerning moral beliefs. A weight was assigned for each question. For 21 statements a point was assigned and for the others five. These were solely working weights which meant that the numbers 1 and 5 were assigned to define moral beliefs in higher or a lower degree. One can then use other weights, such as A and B, though we used numeric ones to be able to quantify the results.

Since the dependent variable in our study was the ability to clearly express moral beliefs (B) we were not investigating the bioethical worldviews per se, but their intensity. To understand that, we propose to look at the analogy between “to strongly agree vs. to strongly disagree” and “to love with passion vs. to hate with passion”. Both love and hatred are qualities like agreeing and disagreeing while passion is their strength indicator. We are interested not into the qualities, but into their intensity.

Students from The Bucharest University of Economic Studies (Romania) and Nicolaus Copernicus University (Poland) filled the questionnaire. The Romanian respondents came from the Faculty of Management, The Faculty of Marketing and the Faculty of Finance, Insurance, Banks and Stock Exchange. The Polish respondents came from the Faculty of Political Science and International Studies. Since they all studied social sciences including management, finance, marketing, political science, internal security and journalism, hence there was a higher probability that they had classes from bioethics. The groups within disciplines were selected randomly. The initial sample consisted of 70 Romanian and 70 Polish students. In order to have a homogenous sample we have excluded the students who took classes, courses and workshops on bioethics or attended bioethical debates. The justification resides on quantifying if knowledge is above or below the emotional level. The exclusion was made on the basis of four questions in the questionnaire about prior contact with bioethics. If just one answer was positive, a questionnaire was eliminated from the further analysis. The final sample comprised 53 Romanian and 50 Polish students.

In order to attain our purpose of research we computed the scores of the questionnaire, we organized the collected data and performed its statistical analysis. The results for the emotional maturity level were related with Craşovan (2013): 0-9.99 (infantile), 10-11.99 (childish emotional reactions), 12-13.99 (psycho-affective reactions), 14-15.99 (slight emotional immaturity), 16-17.99 (tendency for imbalance), 18-19.99 (slight emotional maturity), 20-21.99 (corresponding maturity), 22-23.99 (good maturity), over 24 (perfect emotional maturity). The results for the ability to clearly express moral beliefs ranged between 0-4. To see if there is an influence of emotional maturity on bioethics score, a regression model was applied. The dependent variable was the bioethics score, while the independent variables were the emotional maturity score together with age and gender. The estimations were conducted in SPSS software. Additional analysis was conducted by providing the influence of gender on both emotional maturity and bioethics score. Considering these aspects, the hypotheses on which the research was conducted were: H1: The higher the degree of emotional maturity is, the higher the clarification of moral beliefs is. H2: Women have higher emotional maturity than men.

**Results**

The first step was to present the descriptive statistic of the two samples, 53 Romanian students and 50 Polish students. The descriptive statistic is going to be provided for all the variables included in the analysis (Table 1).

<table>
<thead>
<tr>
<th>Table 1: Descriptive statistic of gender respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
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<tr>
<td>------------</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

Source: Author

From Table 1 it can be seen that the size of the two samples is approximately the same consisting of 53 Romanian students and 50 Polish students. Also, the gender distribution is similar, with the Romanian sample
being formed of 16 males and 37 women and the Polish sample consisting of 15 males and 35 women. Hence, the composition of the sample is approximately computed as 30% male and 70% women.

<table>
<thead>
<tr>
<th>Gender</th>
<th>Romanian sample</th>
<th>Polish sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Percent</td>
</tr>
<tr>
<td>19</td>
<td>3</td>
<td>5.7</td>
</tr>
<tr>
<td>20</td>
<td>35</td>
<td>66.0</td>
</tr>
<tr>
<td>21</td>
<td>10</td>
<td>18.9</td>
</tr>
<tr>
<td>22</td>
<td>3</td>
<td>5.7</td>
</tr>
<tr>
<td>23</td>
<td>2</td>
<td>3.8</td>
</tr>
<tr>
<td>Total</td>
<td>53</td>
<td>100</td>
</tr>
</tbody>
</table>

From Table 2 we observed most Romanian students are aged between 20-21 years old, while most Polish students are divided into groups of 19 and 22 years old. Romanian students came from a second year bachelor degree program, while Polish ones came both from bachelor and master degree programs. We consider this structure can influence both EM and B scores. We assume that an increase in age results in an increase in B score. If we consider the average value of this indicator then the average value of Romanian students is 20.36 years old, while the average value of Polish students is 20.68 years old.
The third variable on which we performed the descriptive statistic was EM. For Romanian students, the min. score was 14.56 and the max. was 23.72. The mean is 18.79 and the median value is 18.81 (with standard deviation of 2.01). For the Polish sample, the min. value was 13.24 and the max. value was 23.32, while the mean of the sample was 18.72 and the median 19.26 (with standard deviation of 2.4) (Figure 1).

The last variable that was analyzed was the ability to clearly express moral beliefs (B score). The min. value for Romanian sample was 0.928 and the max. value was 3.102. The mean was 1.67, the median was 1.60 (with standard deviation of 0.48). For the Polish sample, the min. value was 0.45 and the max. value 2.72. The mean of the sample was 1.46, the median was 1.40 (with standard deviation of 0.49) (Figure 2).

Based on the analysis we conducted, it seems Romanian students have higher EM level and higher B score than Polish students, even though the mean age of Romanians is lower than the one of the Poles. In order to observe if there is a correlation between EM and B level, we conducted a regression analysis, assuming a linear correlation. Additionally, we add gender and age to see if they have an influence on B level (Table 3).

<table>
<thead>
<tr>
<th>Table 3: The influence of independent variables on bioethics level both for Romanian and Polish students</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Independent variable</strong></td>
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<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Constant</td>
</tr>
<tr>
<td>Age</td>
</tr>
<tr>
<td>Gender</td>
</tr>
<tr>
<td>Emotional Maturity</td>
</tr>
<tr>
<td>R squared</td>
</tr>
<tr>
<td>F test</td>
</tr>
<tr>
<td>Source: Author</td>
</tr>
</tbody>
</table>

Based on Table 3, several conclusions can be extracted. Before interpreting the results, we have to emphasize that the model includes qualitative data that was quantified as quantitative. Thus, a part of the information is lost as quantitative information cannot encounter all qualitative features that both B and EM have. Moreover, considering that the analysis conducted is quantitative and on a small sample, we are rather interested in the sign of the correlation than their significance level. The results presented in Tab. 3 reveal a different behavior and attitude for Romanian and Polish students. Considering the age variable, it seems Romanian students decrease their B score as their age increases, while the Polish B score increases with age. On the other hand, we can observe an opposite relationship when gender is taken into consideration. Thus, Romanian women seem to have higher B than Romanian men, while for Polish women this indicator is smaller than the one Polish men have. Surprisingly, EM is related in different terms with B level. While for Romanians there is a positive correlation, meaning an increase in the EM level generates an increase in B level, for Poles, a negative correlation can be observed. Regarding the statistical significance of the generated relations, the models could be considered valid if we assume a risk of 16.6% of rejecting the null hypothesis that all coefficients are not different from zero. We can assume this as the number of observation included into the analysis is small, so our coefficients can be biased. Thus, the created model can be considered as valid. If we assume the classical approach of statistically significant, we emphasize that gender influence is relevant at a 5% significance level. Moreover, for EM the relevance of the relationship is found statistically significant for the Polish sample when a risk of 17.7% is taken into account.

<table>
<thead>
<tr>
<th>Table 4: The influence of gender on bioethics level both for Romanian and Polish students</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Independent variable</strong></td>
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<tr>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Constant</td>
</tr>
<tr>
<td>Age</td>
</tr>
<tr>
<td>EM</td>
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<tr>
<td>R squared</td>
</tr>
<tr>
<td>F test</td>
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<tr>
<td>Source: Author</td>
</tr>
</tbody>
</table>

768
As the results are referring to the entire sample, we considered it is interesting to see if the correlation in terms of significance is similar for women and men, Romanians and Polish, or if the gender has an influence on the overall results. Thus, regression was re-estimated considering the respondents’ gender (Table 4).

From Table 4, it can be seen that the overall influence of age on B score is based on the women’s influence, so gender affects the general results. In both Romanian and Polish samples women outnumber men twice. On the other hand, it can be observed, for both men and Romanian women there is a positive relationship between EM and B score, meaning that higher is EM, the higher is B. In comparison, Poland registers a negative relationship between EM and B for both men and women. In terms of statistical significance, the models are not valid due to the lower dimension of the sample taken into account. If we take a look, at the value of the coefficients, even though they are not statistically significant, we can assume that women impact on B is higher than the one of men. The results could also reveal women have higher EM than men. In order to see if women have indeed higher EM, we computed the mean values, the minimum and the maximum values and we provided them in a comparison analysis. Results are presented in Table 5.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Romanian Emotional Maturity score</th>
<th>Polish Emotional maturity score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Overall</td>
<td>Women</td>
</tr>
<tr>
<td>Mean</td>
<td>18.79</td>
<td>18.76</td>
</tr>
<tr>
<td>Median</td>
<td>18.81</td>
<td>18.80</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>2.01</td>
<td>2.15</td>
</tr>
<tr>
<td>Maximum</td>
<td>23.72</td>
<td>23.72</td>
</tr>
</tbody>
</table>

Source: Author

From Table 5, it can be seen the minimum EM score is smaller for Romanian women compared with Romanian men, while in Poland the relationship is different as the minimum EM score is found for Polish men not women. In terms of maximum value, it is achieved both in Romania and Poland by women. Regarding mean and median, we observed the values are smaller for women than men, but we have to take into consideration the size of women sample is twice the size of the men’s. When standard deviation is analyzed, we observe women have lower standard deviation than men. Based on these computations we can assume women’s data are clustered closely around the mean.

**Discussion**

The results reveal different correlations for both countries but are complementary to the studies of other authors, such as Pfeffer (1990) and WHO (2004), arguing that Romanians become aware of their sexuality relatively early. The authors however, did not try to explain this phenomena in emotions or morality related terms. Another possible explanation for the age-bioethics disproportionality can be pointed out by Pfeffer (1990) and Stephenson et al. (1992), the higher social permissiveness towards bioethical issues in Romania than in Poland which is best reflected by the situation described by Pfeffer (1990), that after the National Salvation Front’s legalization of contraception and abortion Romanian hospitals were sieged by women. One of the hospitals in Bucharest was visited by 200 women demanding an abortion in a four-hour period. On the contrary, such thing never happened in Poland. Also, Polish students, due to more conservative environment, are being taught about their sexuality later. Hence, we can conclude that their emotional reaction is triggered just while Romanian students enter in the next (rational) stage of bioethical considerations.

The overall influence of age on B score is based on the women’s influence, so it can be assumed that gender affects the general results, especially because in both Romanian and Polish samples women outnumbered men. This does not mean however, that the women’s result took dominance which was reflected by the fact that Romanian women seem to have higher bioethical values than men, while for the Polish women this indicator is significantly smaller than the one that men have. This result, or at least its second part, contradicts the presuppositions of gender and feminist discourses that bioethical cases concern women in higher degree than men and reveal a gap in bioethical studies which usually neglect e.g., men’s role in family planning. It also let us presuppose that these and other general concepts, such as health, are not gender (Płotka, 2015) but culture-related. The latter assumption is also supported by the fact that for both men and women in Romania there is a positive EM-B relationship, meaning that a higher EM score generated a higher B score. In comparison with this, in Poland there is a negative EM-B relationship (the higher EM is, the lower B
becomes) also for both men and women. Eventually, these results demonstrate the H2, that women have higher emotional maturity than men, but falsify its assumed meaning that this very fact makes women’s impact on B score bigger.

What is surprising in the context of this study’s pre-initial question “does increasing the public awareness of bioethical issues through education require modernization?” and the first hypothesis (H1) of this study is the result that EM is differently related to bioethical score level amongst Romanian and Polish students.

While for Romanians there is a positive correlation between EM and B level, meaning that an increase in the EM level generates an increase in B level, for Poles a negative correlation can be observed, meaning that higher is the EM level, the lower is the B level. In other words, emphasizing the role of emotions for teaching bioethics in Romania could improve students’ comprehension and awareness while in Poland it could result in the opposite effect. In the context of evaluating Macer’s Moral Games for Teaching Bioethics it shows that its educational impact may differ according to the social and cultural environment in which it was used. In much broader sense, this study deploys an argument against Beauchamp and Childress (2001) idea of global bioethics and any bioethics unification projects as its derivatives, while the argument resides within the statement that the first hypothesis of this research is validated only for the Romanian sample.

There are limitations to this study that need to be challenged. The first one is the small sample size which is also a reason for the low statistical significance of the obtained results. Another limitation is the reductive nature of quantifying the qualitative data. Another element is political culture. Despite that Polish and Romanian cultures seem to be similar, they may differ in substantive aspects. That creates a field for conducting broader interdisciplinary studies. Nevertheless, based on this study we discern a need for further intercultural research with the emphasis on the qualitative differences in understanding bioethics and its problems; and for interdisciplinary studies involving bigger samples of respondents and more advanced methodology.

Acknowledgements

Hereby we would like to thank students from the Faculty of Management, the Faculty of Marketing and the Faculty of Finance, Insurance, Banks and Stock Exchange, Bucharest University of Economic Studies (Romania) and students from the Faculty of Political Science and International Studies, Nicolaus Copernicus University (Poland), for taking a part in our study.

References


EFFECTIVE TECHNOLOGIES AND TOOLS FOR IMPROVING PROFESSIONALS’ AND USERS’ COMMUNICATION IN DISABILITY SETTINGS

Encarnación Postigo Pinazo¹

Abstract: Communication with individuals who suffer from a severe intellectual disability is a challenging task for professionals. Technological aids have often been put forward as useful tools. However, most well-known programs are usually designed for disabled people who can perform a certain number of tasks and have some skills for communication. Subjects with severe intellectual disability are seldom the target of research and the training of professionals working with them is hardly properly matched. To fill this gap a group of researchers of the ongoing European project EC+ gather to created friendly communication tools with scientific information and multimodal resources to offer professionals and future professionals (university students) tools, materials, and strategies to communicate with users by means of mobile applications using agile technologies, which will improve communication and hence the quality of staff performance and will reduce stressful situations for both groups, the disabled and workers. The tools were assessed by trainees and professionals in the field of healthcare, education, and community interpreting. The present article focuses on the first and second stages of the EC+ project, which aims to engage professionals and students in seminars, online courses and the completion of questionnaires based on their experience, suggestions, and needs. Research shows that the object of the project is really substantial and hence suggests a further improvement for the work of professionals and therefore is extremely beneficial for the intellectual disabled community. Precise scientific training in several syndromes that hinder communication skills, multimodal tools and the provision of friendly agile technologies draws a promising scenario in this particular field. The results of the questionnaires sent by trainees after the following courses show that they have considerably improved their professional skills and gained self-confidence.

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Keywords: Severe, intellectual disability, communication, training, professionals, skills

Introduction
The Enhancing Communication+ project was outlined within one of the of the horizontal priorities of the Erasmus Plus European Scheme:

“Social inclusion: priority will be given to actions that promote in particular through innovative integrated approaches balance and non discrimination in education, training and youth activities. The Programme will support projects that aim to: 1) foster the development of social, civic, intercultural competences, media literacy and critical thinking also combating discrimination, segregation, racism, bullying and violence; 2) enhance the access, participation and learning performance of disadvantaged learners, reducing disparities in learning outcomes. Erasmus+ Guide (2017)”

EC+ addresses the needs of the most disadvantaged learners due to severe intellectual disabilities and fosters ways to empower satisfactory communication both for subjects suffering from syndromes that hinder communication skills and for professionals working with them. Recent research literature such as Light and McNaughton (2014) states that few communication studies are devoted to those who have the most severe communication disabilities and most of the work has been focused on those who, although suffering from any disability, still can handle certain communicative skills. The main outcome will be a mobile application to facilitate this communication. For a satisfactory design of the application are vital not only the collaboration of specialized researchers but also the opinion of professionals within a multidisciplinary scope for our work. This paper will focus on the collaboration of both groups within training activities and the elaboration and optimization of the application.

First stage of research
Interdisciplinary approach

Our work is based on the collaboration of three main fields or discipline, Medicine, Psychology and Communication in the field of Community Interpreting. Voice interpreters for the intellectually disabled are rarely found within the framework of social policies (Roisiko & Vesala, 2016), professionals (caretakers, nurses, doctors, assistants etc) working with people with severe intellectual disability experience stress since they have not been trained thoroughly with strategies when communication becomes a complex task.

¹ Department of Translation and Interpreting, University of Malaga (Spain), epostigo@uma.es
The group of teachers and educators seems to hold the wider expertise in communication. However, as stated above, most of the vast research has been focused on disabled subjects with some abilities. Therefore, teachers also ask for further training. Data for these claims were extracted from a survey, still ongoing, posted in December 2015 and addressed to professionals of the three fields:

![Chart](https://es.surveymonkey.com/r/WQ7HGTP)

**Source:** EC+ project survey available at https://es.surveymonkey.com/r/WQ7HGTP

30% of the respondents corresponds to professional interpreters in healthcare, 50% of the answers came from healthcare professionals in fields such as nursing, medicine and physiotherapy and only 20% belong to the educational field.

Subsequently, our research team considered this prior interest an important factor for our work. Geneticists and doctors provided templates with specific syndromes and features. Those syndromes were selected among the ones that deter communication skills. Psychologists provided documents with intervention guidelines for the same syndromes. A list of words and small phrases was compiled and multimodal resources for communication were hosted in an academic portal for training and the same materials are available using an Android operating system for an app in mobile devices. The app is intended for instant use for both disabled and professionals in their daily life scenarios.

**Second stage: training professionals**

As Gray-Stanley *et al.* (2010) state, staff working with intellectually disabled clients need support networks and interventions to help them manage work stress which according to authors can lead to better follow-through and positive contact with clients. This is also supported in recent studies on the global provision of education, as Czyż’s (2016: 307) study states:

Professionalism of the staff is vital for disabled people’s care and education. In addition the process of disabled inclusion is related to the skills of bringing adequate support from consideration of readiness of the disabled person and their expectations, as well as increase the professionalism of staff and provide adequate teaching facilities and the friendly environment.

The vital aim of EC+ project is to empower the professionals and the disabled by means of providing both groups the resources and strategies to reduce the emotional impact of complex situations, to enhance professional competence, to provide additional knowledge on disability both in the scientific and technological fields.

For the purpose of training students, professional staff and other stakeholders, the aforementioned set of medical guidelines and intervention in five languages including English is ready to be downloaded both from an academic portal and from the application. Apart from this scientific information participants can find communication documents on sign language and multimodal communication for interpreters and other professional staff.

Different online courses are currently being offered for professionals and students of the aforementioned areas.

The people who are registering belong to the three areas and they match the data percentage of the initial interest survey, although there is at the moment a slight increase in applicants from the educational field. There is also a call for family caretakers who are in charge of severe intellectually disabled subjects to enroll in the online courses. The way the courses have been designed allows the
training of participants by means of a virtual platform where they find media lectures, questionnaires on Medicine, Psychology and Community Interpreting and Sign Language. They should also need to complete a practical case related to their field of knowledge.

<table>
<thead>
<tr>
<th>Figure 2: Contents of the virtual courses /documents</th>
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</thead>
<tbody>
<tr>
<td>• Total Communication</td>
</tr>
<tr>
<td>• Linguistic and communicative acquisition with cognitive disability</td>
</tr>
<tr>
<td>• Multimodality and interpretation</td>
</tr>
<tr>
<td>• The most usual scales used for the appraisal of Intelligence and language from early childhood</td>
</tr>
<tr>
<td>• Some general considerations about communication with severely intellectually disabled individuals</td>
</tr>
<tr>
<td>• Hearing impairment / deafness</td>
</tr>
<tr>
<td>• Severe Autism</td>
</tr>
<tr>
<td>• West’s Syndrome</td>
</tr>
<tr>
<td>• Cerebral Palsy (CP) In Children, Dystonic Tetraparesis</td>
</tr>
<tr>
<td>• Deafness Associated With Other Causes Of Intellectual Disability</td>
</tr>
<tr>
<td>• Kleefstra Syndrome</td>
</tr>
<tr>
<td>• MECP2: Rett Syndrome</td>
</tr>
<tr>
<td>• Mowat-Wilson Syndrome</td>
</tr>
<tr>
<td>• Pitt-Hopkins Syndrome</td>
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<tr>
<td>• Usher Syndrome</td>
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<tr>
<td>• Angelman Syndrome</td>
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<tr>
<td>• Cornelia De Lange Syndrome</td>
</tr>
<tr>
<td>• Infantile Epileptic Encephalopathies: Dravet Syndrome</td>
</tr>
<tr>
<td>• Lennox Gastaut Syndrome</td>
</tr>
<tr>
<td>• Microdeletion And Microduplication Syndromes With Serious Language Affectation</td>
</tr>
<tr>
<td>• Phelan-Mcdermid Syndrome</td>
</tr>
</tbody>
</table>


The information listed in Figure 2 is available in five languages (Dutch, Spanish, English, Catalan and German) both in the academic portal as well as in the mobile application that our team has designed. The list of syndromes contains clinical features of those syndromes so that professionals can acknowledge the characteristics of disabled people and possible health risks (Rigola at al, 2016) and also the guidelines for intervention (Brun & Artigas, 2011). The purpose of the training courses is to enable different professionals from the field of healthcare, education, and interpreting who deal with disabled with interdisciplinary approaches to engage in teamwork in their working environments since they have been provided with the same information and be familiar with the same resources and technological tools. A number of scientific lectures were offered in a face to face previous part of the courses for university students. These lecturers were given by doctors, geneticists, social welfare politicians, healthcare interpreters, rehabilitation researchers, speech therapists, psychologists, ICT engineers, and special education researchers. Lectures were recorded and can be downloaded for the online courses. A set of questions on the lectures are displayed to be completed. Access to the mobile application is available for everyone to test using Google Play application ECPlus published by Francisco Chicanco. A set of small surveys is being currently sent to different institutions devoted to the care of intellectually disabled people within the project consortium countries to receive feedback.

All trainees involved in the courses must work with these scientific documents and questionnaires on medicine, intervention and sign language. The questionnaire for interpreters is based on communication strategies, ethic codes and emphasizes multimodal and total communication, which could be in most cases novel information for the latter group of professionals (Parrilla Gómez, 2014), (Pitkäsalo& Isolahti, 2016).
Figure 2: Contents of the virtual course/ recorded lectures and EC+ app.

Source: EC+ project (2016) http://ecplusproject.uma.es/ training online course. Recorded lectures/ App: google play EC+

Figure 2: Questionnaires and practical cases

- Medical questionnaire
- Intervention questionnaire
- Interpreters questionnaire
- Sign language questionnaire
- Practical case: healthcare
- Practical case: Psychology and Education
- Practical case: Community Interpreting
- Satisfaction questionnaire

Source: EC+ project training online course. Tasks to complete based on Academic Portal resources.

Discussion

The benefits in this case of methodology used (Choi, 2006) are by far larger than any possible drawback. A follow up of the trainees who are currently engaged in our lifelong training program this academic year would provide data of the real impact of the acquired knowledge. Their feedback after making use of it and of the technological resources in their workplace, in the case of professionals, and within the family, in the case of relatives and professional caretakers, will be really valuable.

The positive impact of the courses in healthcare, education students and professionals is a deep approach to face severe intellectual disabilities. Although clinical or intervention features of disability are included in their university academic syllabus, EC+ project provides an insight on specific clinical features and communication barriers related to subjects suffering from syndromes which seriously hamper communication skills. It is really true that a far more humanistic approach is needed for professional performance (Pino Postigo, 2017). The group of trainee interpreters who are registering in
our courses in order to receive training to communicate with intellectually disabled subjects for the first time do not have previous knowledge of sign language or total communication approaches. However, their performances when undertaking the different tasks of the courses are absolutely remarkable both for documentation on different resources, which was careful outlined, and for solving practical cases. This is perhaps due to the skills gained in their training or due to their personalities (Nicholson, 2005:126) which make them ICT experts, good communicators who are eager to fulfill documented tasks and ready to provide accurate information on time.

The feedback on the interest and potential of the course and the application is positive up to date, obtaining an average range of 4.5 out 5 in a satisfaction survey after the first online course was finished. Three more courses are ongoing at present.

Assistive technologies should be user-friendly as Cook et al. (2014, 189) states so that service providers and the disabled themselves are not reluctant to use them. The application for mobile devices (Chicano & Luque, 2016), available for Android and soon for IOS at the moment is being currently assessed by users who agree it is a friendly interface. So far professionals from different fields and those working for disabled day care units or schools have made suggestions for the application to make possible certain actions such as the following:

- Some familiar images such as the ones of relatives should be changed for each particular user so they will be really meaningful.
- Images or video material for housing, food, weather etc. should be changed depending on the culture or nationality.
- Speech therapists suggest that the materials application can be extremely useful for patients suffering aphasia after experiencing cerebral damage. The corpus of words and phrases for the compilation of resources was primarily selected from the Mcarthur Inventory (López Ornat et al, 2005) addressing the needs of people suffering severe or profound intellectual disability and hence complex communication problems. Therefore, some of the professionals when analyzing the application suggest adding more words and phrases, especially those related to their field of work. For instance, healthcare professionals ask for more words on parts of the body, hospital facilities and treatment. The project team will gather responses and study the suggestions from all online courses currently ongoing in the four institutions of the consortium in order to optimize the final version of the application.

Conclusions
The project EC+ tries to cover a gap in research for one of the most vulnerable group of people who suffer rare diseases and syndromes than hinder communication due to profound intellectual disability to such an extent that most of them need the support for every basic activity of their lives. This goal must be accomplished by multidisciplinary approaches. Our project also aims to empower professionals with scientific information, resources, training and technological tools. In initial stages there was an interest for the initiative through surveys which is now materializing in the training activities and in the assessment of technological tools by students, professionals, and other stakeholders from the three disciplines involved. Participants from the different disciplines who have been following the courses so far consider that this training would be an asset for their future careers and will provide them self-confidence in their performance. Interpreters show remarkable performance completing their training tasks although this particular type of groundwork is quite unusual for them. Another indicator of promising interest from the participants of the training courses is the active involvement and suggestions for resources compilation and the application for mobile devices.

Acknowledgements
The research has been carried out in the framework of the Erasmus+ project EC+: Reference number: 2015-1- ES01-KA203-015625 “Enhancing communication: research to improve communication for people with special needs and development of ICT resources and tools”, coordinated by the University of Malaga with the collaboration of Samsung and the networking support of Tikotekki, communication and technology Centre (Finnland) Finnish Association on Intellectual and Developmental Disabilities (FAIDD).
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The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.
A STUDY OF PROPER PRONUNCIATION AS A FACTOR OF SUCCESSFUL COMMUNICATION

Vesna Prodanovska-Poposka

Abstract: Speaking as a productive skill is one of the very first obstacles that foreign language users face when using the language. Knowledge of a language does not refer to the correct and proper pronunciation however, being able to produce sounds, words or utterances in their proper way does not refer to proficiency of a language nor can it assess the overall level of the user of that particular language. The aim of this study is to present the components of speaking as a productive skill emphasizing the role of acquiring proper pronunciation as a factor for effective communication. The study also presents the most significant “common core” of English pronunciation as a lingua franca, details of the requested phonological competence as knowledge set by the Common European Framework of Languages: Learning, Teaching and Assessment and viewpoints of EFL teachers and authors. Additionally, the study includes data from EFL self-assessments from University students in Macedonia regarding their speaking and pronunciation skills and overall evaluation from their assessor—an English language instructor.

UDC Classification: 8, 81, 81-13; DOI: http://dx.doi.org/10.12955/cbup.v5.1024

Keywords: Speaking, Proper Pronunciation, Communication, EFL

Introduction

Speaking as a productive skill is one of the very first matters that foreign language users face when using the new language. Knowledge of a language does not refer to pronouncing it correctly and properly however, being able to produce sounds, words or utterances in their proper way does not refer to proficiency nor can it assess the overall level of the user of that particular language. Speaking a language well and intelligibly regardless of the situation a language user can be found in, appears to be the utmost demand and desire among learners and users of a foreign language. Pronunciation is an inevitable part of speaking skills, and inadequate pronunciation skills can have serious negative effects on the speakers such as lack of self-confidence to speak up, restraining from speaking in front of a group and not participating in social interactions.

Language and speech utterance

According to Stefanova (1999: 89) in real life the aim of speaking is to reach an understanding between two or more partners in a given situation. Yet in SLA the mother tongue is used as a means to explain new concepts in the target language. This applies however, only if the learner and the teacher speak the same native language. While in a situation where the language is foreign to both (teacher and student), then this target language becomes the only means of communication for the teacher and for learner. In the analysis of SLA, it is established that speaking is one of the four language skills which is considered as one of the most used types of language learning activity.

However, which participant involved in the learning process (teacher and student) speaks more is another matter and it is expected that the students should be more active in speaking in order to develop the communication skills in certain situations. In a normal communication between two or more interlocutors everyone involved is dealing with both, speaking and listening.

In the analysis of speaking skill among students Stefanova (1999) states that "very often, especially at the beginning of the learning process, the learners make pseudo-communication, i.e. they speak, but in reality there is no exchange of information, but only the reproduced speech of the teacher or recording. To this kind of talk we can encounter reading out loud as well, which is defined as persistent" (p. 89).

In order to make the formation of speech utterance one must pass through several psychological units, namely Stefanova, (1999) lists the following:

“Motive for speech utterance

This refers to the need to intervene i.e. sharing certain information or own thought. In cases of dialogue, the willingness to respond to the statement of the other party can serve as a motive for speaking.

Concept of speech utterance

1 Faculty of Biotechnical Sciences, St. Kliment Ohridski University- Bitola, R. Macedonia, vesna.prodanovska@uklo.edu.mk
This is the outcome which determines the content. The participant is in a process of transformation of the subjective sense of linguistic meanings that are understandable to the other participants in the conversation.

Forming speech utterance

This process is composed of three parts namely:
- Primary semantic recording (this is an incomplete statement which is further converted into the full form or sentence of words associated with one another)
- Inner speech (this is the second stage of formation of speech utterance)
- Sprawled speech utterance (this is the last stage when the inner meaning becomes the thoughts in built form i.e. the transmission of information from one person to another, which as a whole statement becomes a system with qualities of a closed structure)” (p.90).

The aim of teaching speaking

The aim of teaching speaking is acquiring suitable reactions according to a conversational situation or sphere in direct or indirect contact. Stefanova (1999) brings these teaching targets regarding the speaking:
“-acquiring correct pronunciation
-acquiring lexical units necessary to make the speech intentions in a particular speech situation
-Correct usage of the necessary language tools for the realization of speech intentions” (p.91).

The aim of acquiring proper and understandable pronunciation does not mean that students will have to sound as native speakers of the language they learn. This can occur in exceptional cases among some very talented and motivated students but it is an unrealistic goal. As to that, a realistic goal regarding teaching and acquiring foreign language is to enable students to “escape” the threshold level so their pronunciation does not distract them from their ability to communicate. Having established the level of understandable/acceptable pronunciation, which is one of the necessary components for successful communication, the next question is which additional methodological tools should language teachers use in order to improve the pronunciation of “incomprehensible” speakers of English, so that they would become "understandable” or “acceptable" speakers? However, this is an issue of communicative language teaching, as proponents of this approach have not expressed adequately regarding learning pronunciation in language teaching, nor have developed a range of strategies for teaching pronunciation through communication.

Core Elements of Proper Pronunciation

As for the approaches to the pronunciation of English as a language of international communication, Jennifer Jenkins defines the "common core” of English pronunciation as a lingua franca and identifies four main characteristics (Shopov, 2013, p. 309):
• Inventory of consonants. All consonants are important except for the sounds 'th’ (as in thin and this)
• Consonant clusters at the beginning and middle of a word are important. For example, ‘string’ cannot be reduced to ‘sting’ or ‘tring’
• Quantitative sign of vowels: the contrast between long and short vowels is important
• Nuclear stress which is the stress on the most important word or syllable is important.

According to Stefanova (1999) pronunciation is one of the main prerequisites for successful speech communication and to achieve it the learners need to build habits of pronunciation themselves, i.e. they need to learn to pronounce the foreign sounds, especially those that are difficult and different from their native language” (p.92).

According to Dalton and Seidlhofer (1994), there are two options to feature the pronunciation as production of meaningful sounds:
“First, sound is significant because it is used as part of a code of a particular language. So, we can talk about the distinctive sounds of English, French, Thai, and other languages. In this sense, we can talk about pronunciation as the production and reception of sounds of speech.
Second, sound is significant because it is used to achieve meaning in context of use. Here the code combines with other factors to make communication possible. In this sense we can talk about pronunciation with reference to acts of speaking” (p. 3).

There are two main features of pronunciation - segmental and suprasegmental. Segmental features are actually sounds units of a language- phonemes which are divided into two main categories such as vowels, subdivided into monophthongs and diphthongs (and according to some authors and theories - triphthongs) and consonants, which generally are divided into voiced and voiceless. Suprasegmental refer to the more complex language features, such as intonation and stress namely a bit more of the phonological properties aside from characterizing the sounds as vowels and consonants. Acquiring proper pronunciation comprises competence in both, segmental and suprasegmental features.

**Abilities and Capabilities of Speakers of English as a Foreign Language**

As stated in the Common European Framework of Languages: Learning, Teaching and Assessment (2001) “Phonological competence involves knowledge of and skills in perception and production of:

- the sound-units (phonemes) of the language and their realization in particular contexts (allophones)
- the phonetic features which distinguish phonemes (distinctive features, e.g. voicing, rounding, nasality, plosion);
- the phonetic composition of words (syllable structure, the sequence of phonemes, word stress, word tones);
- sentence phonetics (prosody)
- sentence stress and rhythm
- intonation;
- phonetic reduction
- vowel reduction
- strong and weak forms
- assimilation
- elision” (p.116-117)

Or as described below, acquiring a phonological competence the speakers (referring to the CEFR levels) need to have the abilities as presented in the chart as follows:

<table>
<thead>
<tr>
<th>PHONOLOGICAL CONTROL</th>
<th>As C1</th>
</tr>
</thead>
<tbody>
<tr>
<td>C2</td>
<td>Can vary intonation and place sentence stress correctly in order to express finer shades of meaning.</td>
</tr>
<tr>
<td>C1</td>
<td>Has acquired a clear, natural, pronunciation and intonation.</td>
</tr>
<tr>
<td>B2</td>
<td>Pronunciation is clearly intelligible even if a foreign accent is sometimes evident and occasional mispronunciations occur.</td>
</tr>
<tr>
<td>B1</td>
<td>Pronunciation is generally clear enough to be understood despite a noticeable foreign accent, but conversational partners will need to ask for repetition from time to time.</td>
</tr>
<tr>
<td>A2</td>
<td>Pronunciation of a very limited repertoire of learnt words and phrases can be understood with some effort by native speakers used to dealing with speakers of his/her language group.</td>
</tr>
<tr>
<td>A1</td>
<td>Source: Common European Framework of Reference for Languages: Learning, Teaching, Assessment, page 117</td>
</tr>
</tbody>
</table>

**The Importance of Proper Pronunciation**

Since speaking is the basic element when communicating, pronunciation inevitably is seen and discussed by many authors and teachers that have come across it. EFL learners face speaking as a mere difficulty in acquiring the desired level and often it is depending on the level of pronunciation.
Even though the overall level of EFL learner can appear as high yet the pronunciation can seriously affect the communication when using the acquired language. 

Tench (1981) claims that “Pronunciation is not an optional extra for the language learner, any more than grammar, vocabulary or any other aspect of language is. If a learner’s general aim is to talk intelligibly to others in another language, a reasonable pronunciation is important” (p.1)

Wong (1987) indicates that even when the non-native speakers’ vocabulary and grammar are excellent, if their pronunciation falls below a certain threshold level they are unable to communicate efficiently and effectively.

According to Gilakjani (2012) “learners with good English pronunciation are likely to be understood even if they make errors in other areas, whereas learners with bad pronunciation will not be understood, even if their grammar is perfect. Such learners may avoid speaking in English, and experience social isolation, employment difficulties and limited opportunities for further study. We judge people by the way they speak, and so learners with poor pronunciation may be judged as incompetent, uneducated or lacking in knowledge. Yet many learners find pronunciation one of the most difficult aspects of English to acquire, and need explicit help from the teacher. Therefore, some sort of pronunciation instruction in class is necessary” (1).

Pronunciation is the initial and key aspect in the development of speaking skills. As Burns (2003) points out "... regardless of small inaccuracies in vocabulary and grammar students are more likely to communicate effectively when they have good pronunciation and intonation" (p.5) Nowadays it is not a trend for the learners to express themselves and sound like in their mother tongue. In fact, according to Moyer (2004) and Scovel (2000) (as cited in Kang 2010) "... adult L2 learners rarely achieve native-like speech patterns (Moyer, 2004; Scovel, 2000), and native-like pronunciation among those who acquire an L2 after early childhood is difficult to achieve in typical ESL classrooms” (p.106).

As Ur (1996) observes, "...the aim of pronunciation improvement is not to achieve a perfect imitation of a native accent, but simply to get the learner to pronounce accurately enough to be easily and comfortably comprehensible to other (competent) speakers " (p.52). According to Burns (2003) "... far more important for the speakers to be able to achieve the minimum level of understandability - intelligibility (acoustic models produced by the speaker to be recognizable as English) acceptable - comprehensibility (listener can understand the meaning of what is said) and high intelligibility - interpretability (listener can understand the purpose of what is said)” (p.5)

Self-assessment of EFL university students in Macedonia

In order to support the necessity of acquiring competence in pronunciation the author presents a more thorough view regarding the pronunciation level and difficulties when lacking those skills in communication, through interviews (conducted voluntarily) among two EFL university students. The interviews are a segment of the author’s PhD thesis research. The interview was conducted on two separate groups of students:

The first group- learners of English for a Specific Purposes- Business English,

The second group – students majoring in the English language.

As for the research, the target groups include students with different majors - Business and Logistics vs. English Philology, from Gotse Delchev University in Shtip, R. Macedonia. Both groups consisted of 119 participants fulfilling the prerequisites for the research- B1 level for both groups and successful completion of:

- the first semester of all English courses (including English Phonetics) for English language students, and

- the successful completion of two semesters and passed ESP (Business English course) exam for group participants of Business and Logistics.

The aim of the research was set according to the personal opinion of the students to determine their current condition in terms of speaking and pronunciation issues when using the English language.

The interview was done to both groups separately while the students were sharing their own opinions through answering questions in which they were required to debate on topics outside the curriculum, such as their own vision for the future, favourite books or movies, the reason they choose their major, and finally how they see their own skills in English so far. The answers were given voluntarily, in
order to create an informal and stimulating environment and avoid feelings of anxiety such as being questioned or sitting an exam. For the same reason the author avoided audio or video recordings, including only discrete recording of the most interesting answers and marking the mistakes in pronunciation.

In the interview students majoring in English language and Literature claim they have a hard time when communicating with foreigners at a higher level, in particular with the native speakers. They noticed that except that sometimes the meaning of what was said by the other speaker is lost, they are not being understood correctly in certain situations, especially when trying to explain issues that are almost directly translated from their native language into English. They also pointed out that some English words that are not correctly pronounced lead to ambiguity especially if not paying enough attention for example with the phoneme [th], which is most often mixed with [t, d] or [s, z], improper use of vowels etc.

In the interview, the students majoring in Business and Logistics claim that they sometimes find it difficult to communicate with native speakers or English-speaking person at a higher level than theirs. They feel relieved and more relaxed if they are able to communicate with people at a lower level of English, i.e. alike their level. Similarly to the other group, this group of students claims that sometimes they lose the meaning of what was said by the other speaker, being not understood properly, especially when trying to explain issues that were almost directly translated from their native language in English. In order to explain themselves students use a variety of ways, including hands and gestures. Special attention was paid to the answers regarding how they assess their own skills in English, the ability to speak etc. in which most of them shared that they experience serious difficulties when trying to use the language orally.

As with the interview the author was able to make generalizations and conclusions about the attitude of students in their problems while speaking English and using the correct pronunciation, such as:
- All students more or less are not quite comfortable speaking English because they are afraid of making mistakes. This usually occurs at the level of beginners, but sometimes it is noticed with students of higher level. Most of them act as if they are afraid to be criticized by teachers and other students.
- A problem also arises when students claim that they do not have sufficient information on a topic that is being discussed during the course of a debate. They do not feel able to follow and participate the discussion, miss out the idea to think or to work on their pronunciation and miss out the correct manner or using particular feature of the spoken language, such as proper pronunciation of [th], vowels in their long form etc.

Conclusion

As of the aforementioned, mastering the correct pronunciation is an important sub-objective in the development of speech skills. As widely aware of the pronunciation as a mandatory skill for English language speakers, one should bear in mind that acquiring correct pronunciation would affect the level of fluency (which can be frustrating if opposite), it could impede future success regarding jobs, education etc., and as the most significant matter if the learner masters the pronunciation initially the sooner he/ she would reach fluency. Studies in the field of English as a second language have found that the minimum intelligibility, acceptable comprehensibility and neutral accent can help achieve good oral communication. Once a fluent dialog is established, effective communication is established as well.

References


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VISION OF CHILDREN IN AN ORPHANAGE ABOUT FAMILY AND FAMILY LIFE

Boris Pták,1 Jozef Fecenko,2 Bibiana Barabasová,3 Nikola Benecová4

Abstract: The aim of this paper is to refer the issue of the vision of children in an orphanage about family and family life. The aim of the research is to identify, analyze and describe their own idea of their future family and family life. The theoretical introduction briefly describes the family, types and functions of the family and the institution of a children's home. In this study we used a quantitative questionnaire method and the techniques of descriptive (mean, median, mode) and inferential statistics. Based on the author's questionnaire we can confirm and subvert predefined research questions and draws a clear conclusion. Children from orphanages state that the most important value for them is family. In this regard, the contribution shows importance of family and recommendation of counseling for children before leaving the orphanage to help have a successful family life in the future.

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Keywords: Orphanage, Child, Family

Introduction
"The family is based on marriage, which is a relationship between a man and a woman. For her the stability of the marital relationship is most important, hence its durability to the death of a spouse, and just such can create the most favorable conditions for the healthy mental and physical development of children. Therefore it is very important that children grow up in a family that is rightly considered as the basic cell of society" (Tománek, 2015).

The target group consists of children from orphanages from all over Slovakia. To conduct research in advance, we asked the orphanages for permission.

1 Characteristics of Families

Family ties, or relations we can understand in two ways - objectively and subjectively. Objectively we see family from a multiple perspective for example: legal aspect - law (standards, laws); generally through the customs, myths, stories, traditions; religious aspect - religious beliefs, faith itself and economic-economic aspects - material status and economic activity. The subjective approach is based on solidarity and alliances with other members of one another. This is reflected in the realm of ideas associated with desires, feelings, and in the sphere of shared values (Drapaľa, 2008).

1.1 Function of family

One of the functions of the family has always been and will be, to protect its members against various aspects of society such as the economic and social problems, satisfying emotional needs, the need for parenthood and to socialize our children, and many others (Žilová, 2010).

Many other authors describe family function in more details. Tománek (2015) describes the functions of the family as:

1. Biological-reproductive function - new members of society are born in it. Although the sexual relations are also outside of the family, the society tries to motivate its members to start a family, and in this family bring up children,

2. Economic function - the function of the family as self-employed households that manage their funds,

3. Socializing function - generational transmission of social culture. How children will succeed in the future also depends on socialization in the family,

4. Emotional function - this function provides for its members protection, care, emotional support especially when they are going through challenging times in life,

5. Regulatory function - the society determines what are the boundaries of sexual behavior, which describes to its members with who they can enter into sexual relationship and prohibits this relationship between relatives,
6. **Religious function** - parental influence on children through religion,
7. **Educational function** - priority for every single family,
8. **Learning function** - family is the very first educational institution for child,
9. **Advisory functions** - this function is for advice and help for children from their older siblings, parents or grandparents, which must be complied with the rules of ethics, decency and truth,
10. **Vocational function** - helping children by their parents when they choose their future profession based on their skills, their own possibilities and limits. They don’t push their children to future jobs which are unattainable for them,
11. **Regeneration and relaxation function** - proper use of free time to rest - leisure activities for children and parents. This function is usually not used because of financial problems in families and parents spend more time by working.

Drapała (2008) states that the individual functions are different and depend on the nature of society in which the family lives. It is influenced by state, territory, religion, etc. We can not ignore factors such as education, economic status, allocation of responsibilities and authority in the family, age of children and the linkages between individual members.

1.2 Types of Families

Each family in the world is unique and authentic. Many different authors present their own divisions of the functions of families and typology of families. We present the division of Almásiová (2012), which divides the family in terms of:

1. **Leadership role in the family**
   a. patriarchal - the oldest male member leading the whole family,
   b. matriarchal family - mother takes a leadership role - a woman,
   c. egalitarian - the leadership role is shared between the both sexes;
2. **Housing after the marriage**
   a. patrilocal - coexistence newlyweds move into the residence of the husband,
   b. matrilocal - coexistence newlyweds move into the residence of the wife,
   c. non-local - the coexistence of newlyweds in a completely new environment (most currently used).

Rusnáková (2007) adds further division of families:

1. **Families in terms of the arrangement**:
   a. complete family - the educational process in the family is conducted by mother and father,
   b. complete family (unstructured or disrupted) - based on the relationship of parents, disturbed relationships of its members fails to comply with the designated role in society;
   c. single parent family - the educational process is conducted by only one of the parents (relatives), which is caused by the death of his parents, non-closure of the marriage or divorce;
   d. criminal family - patterns of behavior are in delinquent level, all the negatives that children see they see as normal and natural, but this doesn’t mean that every member will inevitably be delinquent.
2. **Family in terms of education**
   a. perfectionist family - one or both parents require specific forms of behavior,
   b. inadequate family - a family type that is immature, seeking help from outside (family, relatives, community, social workers);
   c. egocentric family - one or both parents are more interested in career advancement, mostly wealthy families of cold relations,
   d. asocial family - families that are characterized by aggressive and deviant behavior.

2 **Specification of orphanages**

Orphanages as institutions in the Slovak Republic represent organizations whose primary purpose is mainly to create a substitute environment which provide care for children who for many different reasons can’t be brought up in an environment of their biological family.

Since the family is in our fundamental cell of viewing the whole society and its importance in the life of a child is almost irreplaceable in defining competencies of orphanages in Slovakia, it is necessary to choose an integrative approach and proceed individually in relation to each child. The child and its
needs and requirements must be considered very sensitive because when the child gets into the care of the orphanage, they are going through a very difficult period of their life, which is associated with feelings of separation, fear, sadness, hopelessness and so on. At this point, significantly changing the existing relationship bonds, which are in most cases not associated with positive emotions and there is space for the creation of new bonds, whose role should be to create the conditions for successful integration into society and to prepare the child for adult life.

It is important to remember that the goal of foster homes should only be a temporary replacement of the natural family environment and it is therefore necessary to try to cooperate with other institutions to find out in what relationship binding to a specific child, failed in its original environment, if it is possible try to fix these relations and return the child to their natural environment.

2.1 Organization, structure and operation of orphanages

Organization of orphanages in the Slovak Republic is formed by 3 basic steps of the Government Regulation no. 5/2016:

1. **Micromanagement** - is a central management level, carried out by the Ministry of Labour, Social Affairs and Family of the Slovak Republic,

2. **Middle level of management** - which is the responsibility of the Central Office of Labour, Social Affairs and Family of the Slovak Republic,

3. **Micromanagement** - it's a basic control to which management belongs under different orphanages.

Based on the Law no. 36/2005 Act of the family, child care in orphanages is generally provided in the residence form until they reach the age of majority, 18 years of age. In cases where the person has a specific request, their can stay in the orphanage be extended, but only according to legal conditions and until 25 years of age.

This legislative correction, in our opinion is done like this because at the age of majority it is a difficult situation for a person when they have to enter to independent lives and integrate into society (Act no. 36/2005 Coll., the Family Act, 2005).

The child is accepted by a final court decision into an orphanage, which the court ordered inpatient care, by final court decision on imposing an educational measure or as a result of interim relief the court pursuant to special legislation (Act no. 36/2005 Coll. Act family, 2005).

Many times in our opinion is the problem with integration into society - with becoming independent. It must be said that integration into society is an important step, which involves great responsibility, concern, anxiety and in the case of individuals who grew up in normal conditions their biological families whose ties have been disrupted in more serious way.

We think that it must be harder for a person who went through many critical situations which had the result of disrupting relationship ties especially in relation to their own parents because ultimately, they had to be depended on alternative care in an orphanage.

3 Research

The subject of our research are the visions of children in an orphanage of their future family and family life and also how they see these factors. Specifically, we focus on two factors - the perception of family and family life now and the idea of the family in the future.

3.1 Object of research

Our research sample are children from orphanages from all over the Slovakia. The age range of research sample was:

14 years old (20.8%),  
15 years old (30.6%),  
16 years old (23.6%) and  
17 years old (25%).

3.2 Purpose of research

The aim of the research is to identify, analyze and describe their own idea of their future family and family life.
3.3 Partial goals
So that we know better set a target of research, we created a few targets.

a. Find out how respondents perceive (define) family.
b. Find out the views of respondents on how should their family look like in the future.

3.4 Research questions
1. Research question 1: How respondents perceive the concept of family?
2. Research Question 2: How do respondents see their future family?

3.5 Research Methodology
In our empirical section, we used a quantitative questionnaire method. The author's questionnaire included closed and open questions. In the closed questions respondents were offered the choice of options, the respondents can choose only one of them, and for one of the questions they can choose multiple options. In the open questions, respondents have space to create their own answers. Children will be filling out the questionnaire in the presence of the Contractor, which will at any time answer to their questions. Based on the questionnaire we confirm / refute by us predefined research questions and we draw a clear conclusion.

3.6 Characteristics of the research sample and timing of research
The author's questionnaire was designed for 72 children from various orphanages from all over Slovakia; the selection of the children from the orphanages for the research sample was taken at random. Questionnaires were distributed among respondents personally and their return was 100%. For all statistical operations we used the IMB SPSS statistic program 23.

3.7 Interpretation of research results
As the first open question was: What do you think is the family? After reading all the questionnaires some answers were the same, so we decided to divide them into categories. The most frequent response of our respondents was that, according their opinion family consists of: the closest people who they love and held in difficult situations, trust you, also the family for them is a place where they feel safe and are able to find understanding. Another larger group of respondents sees the family as emotion, respectively, happiness, joy and responsibility. Others, probably on the basis of their past, perceive the concept of family as something that is important or that the family is the only basis of life, but that's all. They were found also those for whom the concept of family does not mean anything, because it is their own family disappointed them repeatedly and they can’t know forget that feeling of frustration.

The following bellow are example answers to above question, we have decided to quote directly from the questionnaire because it seemed to us the most interesting:

- "Family for me is happiness in life, it is the best thing in life. When you have no mother, father or siblings you do not have anything!"
- "The family does not have to be biological. Family should consist of people who love each other."
- "Nothing, family to me now means nothing, because in life I went through a lot of disappointing by my family."
- "The Family - a circle of the closest ones, where everyone is honest with yourself. Consist of father and mother. It is mainly a feeling of love to someone you care for. You have to fall back on, ask him for help."

Second open question in our study was: How our respondents see their own family in the future. In this question again, we have more than half of respondents agreed, in answer that they want their future family to be formed "from the good wife / husband" to have children together and their own housing. They want in their family to feel love and understanding, and to always have all been together. Some of them want bigger family some of them - in meaning of the number of children that would like to have. Other ideas about how they see their family were the modest description and that they would like to have a family with family members who love each other. Other answers were colder such as many of the respondents do not want to imagine their family, or whatever it will look like but they don’t want to have family like they already have.

We also chose examples of the most interesting answers:
"My family should be harmonious. There should not be lies in it. We should be happy."
"Perfect = harmonious, cohesive, supportive, particularly to provide members of security, reassurance and knowing that somewhere are and always will belong."
"My own family is perfect. With children I have a friendly relationship, but I will be strict, tactful and fair. Especially I will not discriminate."

With the third and the last question we investigated the importance of values, according to respondents. The level of importance to indicate on a scale from 1 to 5, where 1 = very important and 5 = not important at all. As you can see in Table 1 which shows the mean values of responses - respondents identified as the most important value (average 1.19) health, the family itself was in second place. The third most important were two values - their own housing, and the independence and education (average 1.46). Other values in order were friends, money, career, fun car. A big surprise was that the respondents reported religion as the least important value (average 2.39).

<table>
<thead>
<tr>
<th>Values</th>
<th>Arithmetic mean</th>
</tr>
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<tbody>
<tr>
<td>Health</td>
<td>1.19</td>
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<td>Family</td>
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<td>Own housing</td>
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<td>Education</td>
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<td>Children</td>
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<td>Car</td>
<td>2.35</td>
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<td>Religion</td>
<td>2.39</td>
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Source: Author

4 Discussion
The empirical part of our work was focused on the idea of children from orphanage of family and family life. In the following discussion, we answer questions and we complete answers by statements from various authors on the issue.

1 How respondents understand the concept of family?
Children are in orphanages for some different reasons. One of these reasons is the failure of parents. Therefore, we asked what the children in foster care think that the family is and how they see it and what they think of first when they hear the word family. In evaluating the responses of our respondents, the most surprising fact was a very small number of them responded about their vision and perception of families with answers consisting of mother, father - parents and siblings. Most of them described family as feeling, just a circle of people with whom they feel safe and meet the various positive qualities that the respondents reported (eg. honesty, love, security, sincerity).
Matějček (2007) in his publications gives an important insight that the child is coming to the world, is equipped with everything what is needed for living in this world and has every tools to be able to have a human relationship. People with who the child is building a relationship are parents, but when this relationship is absent, it is understandable that the perception of the concept of family is a little different. Some respondents are by this absence of that relationship, and therefore the absence of attachment stigmatizing more.
Nosková (In Mosty k rodine 2011 No. 2) mentions that children who come from risk families create some chaotic bonds, which can lead to the disruption of the development of emotional ties. They have
in themselves a lack of confidence, feelings of anger, loneliness, etc. What they say they are expressed in terms of the family for them does not mean nothing, because it is their family who is hurting them again and again.

2 How respondents represent their future family?
Our second question is more less related to the previous one. Everything that we mentioned affects our respondent’s next answers about how they see their family in the future. The majority of respondents do not want to repeat the mistakes of their parents and want to have a husband / wife, children, his own house, they want just harmony inside of their family.

Výbochová (In Mosty k rodine 2011, no. 2) describes that first relationships for the childare of great importance and the first binding that is not built, affects all its future ties. The author argues that this is the case of children from orphanages. Based on this we conclude that children's ideas about their future family is more or less positive, as real in the future may not be valid and will confirm.

3 What is respondent’s attitude to the selected values?
Children determined from the selected values the importance of their own opinion. From the results, we can say that the most important value they considered the family. This result is attributed to the fact that their family disappointed and failed them and they realize that in the future they do not want to make the same mistake or worse. A surprising phenomenon for us was that religion in children was in the last place in terms what they deem most important. The values that children consider as important are related to how they fill their needs and what they consider as missing for them.

Rusnáková and Szabóová (2014), based on practical experience argue that orphanage fill the following needs of children: biological, psycho-social and material. If those needs are not filled sufficiently, children most likely won’t be able to be ready for adulthood and parenthood. Since orphanages can’t fill 100% of the biological needs of children as they were filled with the family, we believe that is the reason that children have chosen for themselves the most important value as: family.

5 Conclusion and recommendations for practice
Children from orphanages could pass through counseling provided by qualified professionals and receive training before leaving the orphanage for potential family life. Intermediaries of this kind of counseling might be different NGOs that work with orphanages.

Social workers and orphanage workers could attend courses on family guidance and counseling which would help children from the orphanage to be better prepared for family life in the future.

Lectures, meetings, meetings of self-help groups, which could result in "former foster kids" who have already had their own family and their experiences could pass to those kids and in those meetings they could assist in the preparedness for family life in the future.

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Http://Www.Usmev.SK/Index.Php?Option=Com_Content&Task=View&Id=15
THE HUMAN FACTOR IN RESEARCH PROJECTS CONDUCTED AT POLISH UNIVERSITIES

Ewa Ptaszyńska¹

Abstract: This article is based on research conducted at the Wroclaw University of Science and Technology and was financed by the National Centre of Science with the purpose of identifying success and failure factors for university research projects. The research shows that the human factor was crucial in determining the outcome of university research projects. This article presents the analysis and results of selected aspects of a research project into human resource management. The study involves in-depth interviews with 40 project managers of university research projects. Based on interview responses, the following features are evaluated: main reasons for starting research projects, different methods of selecting the research project manager, research team member selection criteria, management styles used by research projects managers, and crucial problems connected with the human factor that occurred in the research projects being analyzed.

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UDC Classification: 005.95/.96

Keywords: research projects, management, human resources, personnel.

Introduction

Research projects are usually experimental scientific elaborations that aim to provide novel solutions within a certain domain (Katz & Tushman, 1979).

The following aspects of research projects are of interest in human resource management:

▪ the main reasons for starting research projects;
▪ different methods of selecting the research project manager;
▪ research team member selection criteria;
▪ management styles used by research projects managers; and
▪ crucial problems, connected with the human factor in research projects.

This article’s objective is to present the results of a study into such selected aspects regarding university research projects. Its main aim is to identify success and failure factors relevant to such projects.

Data and Methodology

The study was conducted at several Polish universities and was financed by National Centre of Science. In-depth interviews were conducted with 40 project managers of research projects, with varying team sizes (Figure 1).

Figure 1: Varying team sizes of research projects assessed for success factors

Source: Author

¹ Wroclaw University of Science and Technology ewa.ptaszynska@pwr.edu.pl
Interviews were conducted on the basis of a formal questionnaire, as described in Klaus-Rosińska et al. (2016). The questionnaire was compiled based on the literature concerning project success and failure factors (Balachandra & Friar, 1997; Betta et al., 2014; Blumer et al., 2013; Camilieri, 2011; Elkadi, 2013; Frączkowski et al., 2014; Jain & Triandis, 1997; Luglio & Bertazzoni, 2010; Mahmood et al., 2014; Pinto &; 1989; Zou et al., 2014) and based on Goodman & Ignacio (1999), which contains similar idea for civil engineering construction projects. Interviews were each 1–2 hours duration. During interviews, research project managers were asked why they undertake such projects at Polish universities. More than one answer was possible. The study also analyzed management styles used by research project managers.

This present research considered six styles:

- The Democratic Management Style where project team members are trusted to have the skills, knowledge and come up with decisions to which everyone is committed. Project manager’s role is only to fine-tune and approve the plan;
- The Affiliate Management Style where the project manager promotes harmony, cooperation, and pleasant feelings among project team members;
- The Authoritative Management Style where decisions are made by the project manager. The manager’s goal here is to provide a vision and a focused leadership;
- The Coaching Management Style directed towards the professional growth of employees;
- The Perspective Management Style based on a continuous control; and
- The Process Oriented Management Style focused on standards and how to perform the tasks.

Results and Discussion

The research showed that human factors connected with human resources were valued indicators of success for research projects. Project managers could select as many indicators as they considered relevant for project success. All respondents (40 project managers) considered the involvement of the project team members as critical to the success of their research project. Thirty-nine included strong motivation of project managers. The least popular was the ability to work in a team, which was attributed by 34 managers as a critical factor. This indicator still scored more than 50% of the 40 possible.

![Figure 2: Success indicators for research projects as rated by project managers](image)

Figure 2 presents the project manager responses to the question about their reasons for initiating their research projects. Eleven project managers gave their reasons as a desire to acquire additional funds. Therefore, research topics are selected for the grant rather than for the research itself. Nevertheless, 21 project managers stated that their reason was ‘to solve a research problem’ and eight project managers advised that their main reason for starting a research project was self-development.
The responses to the interview question about methods of selecting the project manager for the research included the following:

- the originator of the research, project initiator, automatically became a project manager;
- the person who submitted the application automatically became a project manager;
- the person selected himself and chose the team;
- the team itself selected a person with the greatest knowledge and experience in the given research area; and
- the head of the research center that received the grant became a project manager.

In most cases (35 of the 40), the responsibilities of the project manager and team members were clearly defined. Though not always formalized in the form of project documentation, responsibilities were defined informally through frequent and regular team meetings. Only in one project had the team members signed a list of responsibilities. Project managers did not use any formal tools for supervising and monitoring the performance of employees. They motivated their team members with their own attitude, involvement, and passion.

The responses to the interview question regarding the criteria and methods for selecting the research team members included the following:

- competence and substantive preparation;
- their number of publications in a given research area;
- current scientific achievements;
- experience in similar projects completed;
- previous successful cooperation and trust resulting from long-term cooperation;
- person was within a given unit that reported themselves to the project from this unit;
- person was an external applicant, accepted on a competitive basis;
- person was the best student or PhD student;
- person was an associate who dealt with the same subject as the project manager.

Results of analysis regarding management styles of the research project managers are presented in Figure 4. In some cases, project managers were associated with more than one management style. Not applicable in the cases where 1-2 people were involved in the analyzed project.

The Democratic Management Style results in harmony and understanding. The Authoritative Management Style or the Perspective Management Style are not ideal because team members usually find their motivation in themselves. One project manager stated that he usually applied ‘the mixture’ of the styles depending on the situation and depending on the people he is working with. The results show that some research project managers prefer to use more than one management style.
Finally, in connection with the human factor, research projects were found to suffer the following crucial problems:

- A project manager resigned from his role during the project due to personal reasons. This delayed the project because it was necessary to recruit a new project manager.
- The institution governing the project changed employment conditions from a contracted to a regular job with a decrease in salaries reducing motivation.
- The skills of the competitively selected members were found to deficient. Thus, it was better to engage people from the home university who were already known to the researchers.
- Conflicts between scientists and administrators. Problems resulted because of differences in understanding the responsibilities of both parties, i.e., what is most important in the project.
- One team was overly small, and team members were overloaded with work. The grant work was surplus (additional) to normal work, and the scientists worked on many grants, and this affected the implementation of the project (e.g., delays).
- Conflicts between scientists within one project team. These were due to personal reasons, different personalities, and views.
- Some projects managers did not have predispositions for managing human resources. During interviews, many project managers stated that it was difficult to manage people who were specialists in the field and had high academic degrees.

**Conclusion**

The results of interviews revealed that human factors were crucial in the success of research projects at the Polish universities is a human factor. This was also confirmed by a preliminary analysis of interview surveys conducted within the same project, but not yet published. Moreover, the study identified the main reasons for starting research projects. Based on the performed interviews with research project managers it can be said that the main reasons for starting research projects are: the need of solving an identified research problem and the need of acquiring additional funds.

The study also defined main methods of selecting research project managers and research team member selection criteria, analyzed management styles used by research project managers and crucial problems connected with human factor that occurred in the research projects being analyzed. Most often the project initiator became automatically a research project manager. The main research team member selection criteria are: competence and substantive preparation in the area of a given project and previous successful cooperation and trust resulting from long-term cooperation. Most often the research project managers use democratic management style in their projects. Conflicts between scientists and administrators is the crucial problem connected with human factor that occurred in the research projects being analyzed.

The direction of future research could involve the views of other stakeholders in research projects and a comparison of the results.
Acknowledgements

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References


CHILDREN LEARN TO PROTECT ANIMALS – AN INNOVATIVE EDUCATIONAL PROJECT RUN BY "FOUR PAWS" – PRACTICAL CASE

Dora Radeva,¹ Hristina Petrova²

Abstract: The introduction of the FOUR PAWS educational project "Children Learn to Protect Animals" to the Bulgarian school system was prompted by a disturbing trend of a considerable increase of violence among children, including cases of cruelty toward animals. As a response to the social request for proper reaction and relevant decisions, FOUR PAWS offers a flexible educational program that includes an interactive textbook for children "Close to Animals", a complete teachers’ methodology and a new university teachers’ program. All textbooks and qualification trainings for teachers are provided by FOUR PAWS animal welfare charity free of charge. The approach offered is focusing on the specific welfare of and love for animals to address the general issue – teach children to be tolerant and show empathy towards both animals and humans, and thus prevent aggression.

The program is directed to pre-school and primary school children and teachers. It is promoted closely with Bulgarian educational institutions and local authorities.

Results: over 6000 kids included, 130 teachers trained; programme is well-accepted in all sorts of schools: of high and not so high reputation. It helps facilitate socialization and integration of children from marginalized minority groups.

The social acceptance shown proves the programme’s potential and the need for expansion via new educational tools and measures.

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Keywords: education, educational system, teachers' qualification, animal welfare, children's aggression

Introduction

This paper intends to present the educational project run by FOUR PAWS named "Children learn to protect animals" (CLPA), to describe its essence and the practical steps that were undertook to put it into practice within Bulgarian schools and kindergartens.

About FOUR PAWS: it is a non-government international organization that operates in the animal protection sector, working for more humanity toward animals, with projects and campaigns regarding wild and farm animals, animal companions, etc. The offices of FOUR PAWS operate in thirteen countries³.

The CLPA project offers some topics that could be specified between civil and ecological education. Also, it is an original tool created to act against the reasons for cruelty both toward animals and humans starting from its roots, to prevent aggression and to educate primary school students at the age of 7-11 in love and care. Its main approach is to make children share some common ethical principles and types of behavior toward animals. Thus, creating a ground of a sympathy towards something in particular (in this case animals) – which appears natural for most (but not all) of the children – to reach the whole, to teach them to show tolerance and empathy to all. So, the CLPA project aims and offers integrated methods for children to develop social, ecological and civil competences and to prevent attitudes to violence.

CLPA Project development

The CLPA project is international, as it first started in Romania in 2005, run by the Romanian office of FOUR PAWS. It was implemented in a number of cities like Bucharest, Brashov, Sibiu, Kluzh Napoca, etc. The team first developed the original textbook for children, named "Close to animals." The authors are Veronica Tulpan, Sorina Cuzum, Mihai Vasile and Gina Velcu. Actually, the textbook is an interactive pedagogical tool that contains flexible, easy-reading and well-accepted texts, games, questions and topics for discussions, and training situations. It was also translated into English.

In 2008, the CLPA project was transferred to Bulgaria to begin its independent life in the country because of the specifics characterizing the Bulgarian educational system. The beginning was difficult and the CLPA’s entrance into the school network was problematic. The Bulgarian educational system

¹ FOUR PAWS Bulgaria, dora.radeva@four-paws.org
² FOUR PAWS Bulgaria, hristina.petrova@four-paws.org
³ More information on http://www.four-paws.bg/en/
not only was but still continues to be old-styled, capsulated enough with a strong hierarchy that allows limited access to children for "players" not recognizable as naturally belonging to the system. Although FOUR PAWS' desire to work with the school directors couldn't allow themselves to open the door for the CLPA project without permission "from above" – namely the Ministry of education itself or its secondary units – the Regional Inspectorates of Education (RIE). In the same time, the system suffered many disadvantages as its heavy bureaucracy was difficult to work with. The extravagant and non-suitable academism in the textbooks made them not attractive for students. There was a total lack of links to present-day topics in the regular contents for most textbooks. A clear analysis made for the Institute for Market Economics (IME) describes the condition of the Bulgarian school education as a system orientated to provide theoretical knowledge rather than practical skills (Nikolov, 2013).

Before 2010, when all the Member States of the European Union adopted the Council of Europe's Charter on Education for Democratic Citizenship and Human Rights Education, the Bulgarian primary and secondary schools used to ignore civil and also ecological issues. The importance of an ecological education is crucial for determining the people's behavior to one of the most polarising 21st century problems (Vacleva 2008). Even after the subject of civil education became compulsory, it was approved as a separate subject for one year only and just for upper secondary education. This statement is provided by a report compiled for the European Commission by the Eurydice network, named "Citizenship Education in Europe" (2012).

In the long term, the common neglect of civil and ecological education terribly affected children and young people's socialization and ability to live in the society. In these circumstances, it was not a surprise when acts of aggression and cruelty became more frequent, and some of the most shocking ones were acts of cruelty toward animals. Periodically, Bulgarian media outlets were reporting more and more cases of violence. They raised a great alarm within the Bulgarian society. The live relation between the violence on animals and people is an object of numerous studies (Arluke, Levin, 1999). FOUR PAWS Bulgaria pointed strongly in the media to this relation (Gechev 2010). It was not until 2011 when the Bulgarian National Assembly approved a change in the Criminal Code that determined sanctions for cruelty toward animals that the CLPA project started operating.

After the CLPA's beginning in Bulgaria it appeared that not only the textbook but the whole programme needed adaptation and more flexibility in order to gain success. Aiming at straightening the project's administrative capacity, FOUR PAWS Bulgaria engaged for CLPA implementation trained experts familiar with specific features of the national educational system. There were few new components developed. First, the textbook was translated from Romanian to Bulgarian and adapted, covering the following topics: 1. "Animals have a home, too"; 2. "Animals do feel"; 3. "Stray animals"; 4. "A dog's best friend"; 5. "Pets"; 6. "Animals have magic powers"; 7. "The animal's unseen world"; 8. "Animals work too"; 9. "In the animals yard"; 10. "Animals can be saved"; 11. "If I only was a bird"; 12. "Altering animals' behavior".

The print and distribution of the textbooks in the school system was fully provided by FOUR PAWS, so the books were free for children. The idea is every single student, without any differences, to have their own book while working in groups. The programme is well-accepted in all sorts of schools: of high and not so high reputation. Without having some special intentions, it appeared that the textbook finds surprisingly excellent acceptance within the children from marginalized minorities, such as Roma. It helps facilitate their socialization and integration.

Second, a new strong focus came in line. For the CLPA project's success, it was evident that not only children, but teachers had to be involved in the entire process. Immediately after the textbook translation into Bulgarian, an original and innovative teachers' methodology 'Notes for teachers' was developed, based on the most modern pedagogical practices. The methodology stands far from the typical extra academic style and is close to real-life topics and situations as well. 2-3 different variations were offered for all of the textbook's 12 lessons. The approach used is based on multiple intelligences (Stavreva, Kitanova 2012) and the activities done a variety due to which teachers can choose their own approach while working with students. It is based on hands-on exercises and learning-by-doing (Pollard 1990) – this way the teachers can see practically and experience the organization of the classroom personally.
At first the "Close to animals" textbook was designed for primary school children, but as it was reviewed by different educational and pedagogical experts, FOUR PAWS was advised children of pre-school age to be joined in their initiatives because of the textbook’s well-determined pedagogical situations. Now the textbook is in its final stage of a process of adaptation for this specific age. Along with its adaptation for kindergartens, a second methodology for teachers was elaborated, based on the popular fundamental pedagogical studies for the pre-school age (Getova 2013), (Koleva 2004).

The authors of both methodologies – for schools Stefka Kitanova and for kindergartens Assoc. Prof. Katya Getova – are well-known names, working in the Bulgarian Academy of Science and Sofia University "St. Climent Ohriskyi".

Third, in 2014 FOUR PAWS Bulgaria signed an agreement with Sofia University "St. Kliment Ohriskyi", via its Teachers' Department (DIUU) for a partnership teachers programme. After its authorization, the programme allows organizing certificated training that increases a teacher’s qualification. Highly experienced Bulgarian experts with great practice were engaged as trainers. The trainings are specified for primary and kindergarden teachers. FOUR PAWS provided the overall financing for these trainings, so the they are free for all teachers involved in the project. The trainings are held not only in the Bulgarian capital – Sofia – but also in other Bulgarian cities as well. By now FOUR PAWS Bulgaria has trained about 130 teachers.

The project is quite flexible in regard to its particular implementation in school. The teachers are free to decide how and where to examine the textbook's 12 topics. They are suitable for the regular lessons of "Human and nature," "Humans and society," "Art," etc. But as the school day for first-graders is organized as a whole-day routine, the programme is usually implemented as free or out-class activities. The teachers are not asked at all costs to finish all topics for one school year. Some of them prefer to expand it longer and the course may continue up to two school years. In the very beginning of the work process, the involved teachers compose an indicative schedule. In the end of the school year, teachers provide with basic feedback information about all they have done. Teachers give their estimations and suggestions freely how to improve the programme. From the beginning of the project until today the number of the involved children was more than 8000.

Another important component of the project is FOUR PAWS' large informational campaigns for the project's promotion. Usually, they are organized with local support of the RIE and local authorities. These are RIEs that are engaged via their internal networks to inform all school and kindergarden directors under their direct submission for the CLPA project. Most often, as part of the campaigns, FOUR PAWS Bulgaria organizes meeting events with all directors in the area, RIE and responsible experts from municipality to present the project and to discuss its resources.

The model created by FOUR PAWS Bulgaria shows good practice on how NGOs could enter into educational systems even when visible obstacles exist. By now, the whole CLPA budget is covered by FOUR PAWS without any external financial support. This includes the printing and distribution of books, training of teachers, project management, etc. As the programme grew, the interest to it grew as well. More and more schools with their children wish to join and participate, so there is a challenge to meet all the needs with only the organization's own resources.

In 2016, a new Educational Law was approved by the Bulgarian National Assemble and new national standards for civil and ecological education were included. The directors of schools and kindergartens were given more freedom to decide about school initiatives. Now there are better preconditions in Bulgaria for better CLPA project implementation. The next step that FOUR PAWS intends to undertake is to work on the determination of special educational subjects with topics like humanity toward animals, animals protection and welfare.

References


USING CLOUD TECHNOLOGIES AS A TOOL IN ORGANIZING THE EDUCATION PROCESS

Aigul Sadvakassova,¹ Meryert Serik,² Jaroslav Kultan³

Abstract: The transition towards innovative cloud computing technologies will allow universities to reduce the costs of purchasing software licenses and expensive computer parks with large amounts of memory and disks, since the programs used in training sessions, as well as all the results of work done, can be stored in the cloud. The transfer of educational services to the cloud will facilitate switching to a format of "learning everywhere and all the time". This article considers the pedagogical possibilities of cloud technologies, which confirm the expediency of use in the education process. The definition of cloud computing is discussed. In addition, the main task of the research was considered: using cloud technologies as a tool in the organizing education process. The experience of using open source software in training is given. The basic methods of using cloud technology in the learning process are presented.

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Keywords: cloud computing, cloud storage, open-source software, education process

Introduction

Contemporary computing experiments aimed at solving a great number of important practical tasks require the usage of huge computer capacities. For instance, tasks requiring computing capacities include: precise long-term forecasts of climate changes, genetic engineering, physical processes, chemical reactions and modeling of financial calculations; the auto industry, oil- and gas extraction; pharmacology; circuitry engineering; new materials synthesis; geological cataclysms, and many others.

The solution to the aforementioned tasks requires knowledge in concurrent programming, in the architecture of modern multiprocessor computers; systems software of parallel computers and networks; technology of parallel computers programming; parallel algorithms, dispersed data, client-server technology; grid technology, simulation, mathematic foundations of parallel programming; GPU and cloud computing.

Integration of contemporary information technologies into education enables users to achieve plans only in the case of stable, safe and productive functioning of the entire IT infrastructure (Pang, 2009). It has to meet the increasing requirements of increased productivity and fail-safety with constant increase of the processed information volumes. Simultaneously, requirements are set to reduce expenses on support and development of the IT infrastructure and enhance its adaptability to changing requirements to the IT of educational institutions. The most effective means of satisfying those requirements is IT development relying on cloud-based computing, which represents one of the most promising innovative IT trends.

Cloud technologies as an instrument of organizing the learning process

The ideal goal of cloud computing lies in granting remote dynamic access to end-users for services, computing resources and applications (including operating systems and infrastructure) via the internet. The development of hosting services (hosting is a service of a hosting client’s equipment in a provider’s territory with a provision of connection to high-capacity channels), was stipulated by the demand for software and digital services capable of being managed from within, yet more cost-effective and efficient.

The concept of cloud computing has largely altered the traditional approach to delivery, management and integration of applications. In comparison to a traditional approach, cloud computing enables running bigger infrastructures, serving various groups of users within a single cloud, and implies dependence on a cloud services provider.

Cloud computing in informatics is a model of providing overall and convenient network access on demand for common computing resources (for instance, data-transmission networks, servers, data storage units, application programmes and services – both altogether and separately), which can be

¹ Faculty of Information Technology, L.N. Gumilyov Eurasian National University, sak79@bk.ru
² Faculty of Information Technology, L.N. Gumilyov Eurasian National University, serik_meruerts@mail.ru
³ Faculty of Informatics, University of Economics in Bratislava, jkultan@gmail.com
promptly provided and relinquished with minimum operating cost and/or addresses to the provider (Sklejter, 2010).

The main distinction of cloud computing lies in the irregularity of users’ requests for resources. In order to smooth out this irregularity and provide service, an additional layer is placed between real hardware and middleware, i.e. virtualization of servers. Middleware control is the software ensuring monitoring of equipment’s state, load balancing, and provision of resources for problem solution (Sarrab et al., 2015). Servers that run applications get virtualized and load balancing gets performed both through the software and the means of allocating virtual servers, real servers.

**Experience of cloud technologies introduced into the learning process**

Cloud technologies ensure optimization of such activities as collection, systematization, storage, retrieval, processing and presentation of information, are of general academic significance and can be applied in studies of all educational disciplines. Implementation of cloud technologies into the learning process is of great value since the latter can increase study hours without changing the curricula of educational institutions.

At the given stage, the integration of the given technology into the learning process and education is underway and has already yielded favorable results. The teaching staff of the L.N.Gumilev Eurasian National University has been engaged in this issue at the university, i.e. setting up a cluster of high-performance parallel computing on the basis of available computers and networking equipment, using it for solving resource-intensive tasks and introducing cloud-based technologies (Serik & Bajgaraeva, 2014). Scientists of the Russian Federation, Slovak Republic and our university have been dealing with this problem for recent years (Voeyodin & Zhumatij, 2007; Kopyltsov et al., 2010; Schmidt, 2016). Joint articles were published (Kopyltsov et al., 2014; Serik et al., 2016).

Scientists from our country and abroad (the Russian Federation, USA, People’s Republic of China, and the Slovak Republic) have acquainted themselves with some of the surveys’ results. Partially the results have already been used at the leading universities of the aforementioned countries and received positive responses.

At the Faculty of Information-Processing Technologies of L.N.Gumilev ENU special courses on the subject under study have been introduced into the learning process (three course credits) at all levels of instruction. For instance, in the process of the learning discipline “Fundamentals of cloud technologies” free services are used, i.e. Google (Google documents: online word processing program, tabular processor, presentation mode, and a cloud storage service with file exchange tool); and web-oriented software functioning as a web-browser not requiring installation on a user’s computer. Also during the learning process students learn to create their own cloud storage in a local network with the help of the OwnCloud service, and study the possibilities of its usage in the learning process and their future professional activities.

Figure 1 presents the possibilities of cloud storage usage. Calendar and scheduler are essential tools for designing an efficient learning process, which enable to organize a schedule, plan fulfillment of tasks and projects; make notes; look through to-do lists and receive proper warnings in due time. The organization of shared access to files of various users is one of the most powerful and convenient mechanisms, which is enabled through the usage of cloud data storage. Teaching staff can allow access to students for their electronic versions of their lectures, laboratory tasks, additional literature and other documents. In a similar way students have an opportunity to interact both with teaching staff and their group mates. The ownCloud users can grant access to a file to a predetermined group of people. The given concept might facilitate students’ work over a common academic project or any other activities carried out in groups. The concepts also include an opportunity of file distribution among people not registered in ownCloud system - exchange is performed via public links. The change of record is one of the functions ensuring data integrity. A version of a control subsystem enables users to receive access to old file versions with an opportunity to trace down records of their changes. Students and instructors are able to cancel file updating at any moment and return to the earlier version. Also, when assessing students, a lecturer as an administrator can see which contribution was made by each student during their work on the project, hence they can assess separate student’s activities in an unbiased manner.
At the given moment, we have been considering a possibility for students to carry out cloud computing using the resources of a remote server, so that they could compile a program and receive results not without installing software on their own computers.

**Figure 1: Model of data exchange within personal cloud storage between a student and an instructor**

Source: Author

**Conclusion**

One of the educational system’s tasks in contemporary society is to provide every person with free and open access to education during all life with due regard to their interests, abilities, and demands. Cloud technologies are able to assist in solving those problems since they remove restrictions to usage of operational systems; in fact, with the operating system Linux installed, users can work with any applications and applied programs if they have access to the internet. It can save both material and labor resources.

In the learning process, participants display high interest in some information services, which means that it is advisable to carry out work on introducing cloud technologies into the learning process. Information and communication technologies is a powerful instrument of increasing learning efficiency through the solution of a set of tasks:

1. increase of study hours without changes in curricula;
2. quantitative change in control over students’ activities;
3. improvement of information-communicative culture of all the learning process’ participants;
4. enhancement of academic motivation among the students;
5. provision of flexibility in learning process management.

**References**


CONTEMPORARY TECHNOLOGY SUPPORT FOR EDUCATION

Teodor Savov,1 Valentina Terzieva,2 Katia Todorova,3 Petia Kademova-Katzarova4

Abstract: The information and communication technologies (ICT) have penetrated into almost all areas of human life. They have a dual impact on education – increase learning efficiency and train students actively to use innovations. We assess this impact by examining teachers’ experience with innovative tools in Bulgarian schools. In an anonymous online survey, we investigate their opinions on the issues related to technology integration in contemporary classrooms. The research shows that educators appreciate the benefits of technology implementation in the teaching-learning process, but they need a single structured system encompassing all technological resources and tools. This work proposes a conception for a smart classroom – an innovative learning environment that can establish and control suitable conditions for education as well as to impact the instructional process directly.

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Keywords: ICT, smart classroom, personalization, Internet of things (IoT), technology-enhanced learning

Introduction

Recently the information and communication technologies (ICT) have become omnipresent in the whole society, and the educational area is not an exception. The traditional classroom becomes rich of technology to meet the expectations of digital age. Although it provides many facilities, the usage of technology as a tool to boost students learning is still evolving. So as to get know to what extent this practice has penetrated into Bulgarian schools, we conducted an online survey among innovative teachers. It is designed to explore their general perceptions and attitude to technology in education. The main goal is to gain a better understanding of how teachers implement ICT in their work, what are the important aspects and which are the most used tools and services. Data from our study shows that teachers still have a dual attitude to technology – they recognize its value, but they still need more qualification and help when it comes to using it in meaningful and engaging ways for students. Most of the teachers are ready to use ICT tools in classrooms. However, there are not enough appropriate applications integrated into a single structured system. Furthermore, respondents outline contemporary usage trends as well as the forward-looking technology applications to smarten up the teaching-learning process. To generalize, teachers require not only structural but functional enhancement of the learning space. They need an engaging learning environment, satisfying the different educational needs and interests of learners, fostering collaboration and interaction between students and teachers as well as supporting multiple ways to share knowledge. Traditional classroom transformed to smart one, i.e. designed with build internet of things (IoT) integrated into a smart educational system can fulfill such educational needs.

Teachers’ Opinions

According to the survey, only 40% of the respondents have a learning management system in their schools. The use of ICT in support of educational process has versatile effects for both teachers and students. It enables the creation of a dynamic environment that allows students to express both their skills and competencies and to acquire new knowledge. In such an environment various tools for personalization of learning process according to students’ preferences and needs can be used. Relay on their experience, respondents point out some of the most significant advantages of using technology-enhanced learning. Fig. 1 depicts a detailed diagram of their answers. During their pedagogical activities, most of the teachers (89%) recognize increased interest and activity of learners, which is directly related to technology-based resources that add value to traditional training by multi-sensory elements. The method contributes to a more comprehensive perception of the material (imperceptibly learning – 74%), and the result is increased effectiveness (67%). More attractive learning resources and access to extra information increase the motivation, the pace of work and the degree of acquiring of knowledge. Last but not least, students acquire computer literacy (59%) that

1 Bulgarian Academy of Sciences, Sofia, Bulgaria, teodor_savov@isdip.bas.bg
2 Bulgarian Academy of Sciences, Sofia, Bulgaria, valia@isdip.bas.bg
3 Bulgarian Academy of Sciences, Sofia, Bulgaria, katia@isdip.bas.bg
4 Institute of Information and Communication Technologies - Bulgarian Academy of Sciences, Sofia, Bulgaria, petia@isdip.bas.bg
stimulates independent learning according to 53% of respondents. Technology is a valuable tool for teachers – it enables new instruction forms and methods (72%), and it helps especially adaptation and personalization upon presentation of the material as well as immediate feedback (61%). As the results of the survey show an excellent effect of the technology-enhanced learning, we come to the decision to develop a concept of a smart classroom.

<table>
<thead>
<tr>
<th>Figure 1: Benefits of implementing technology-enhanced learning (multiple answers are allowed)</th>
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<td>autonomous learning</td>
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Source: Authors

Conception of Smart Classroom

The widespread opinion is that smart classroom should involve an integration of technology within the learning space. Many researchers stress their attention also on the need of methodological paradigm shift – providing a modern and efficient education services by combining innovative pedagogy and technological teaching tools. Gligorić et al. (2012) present smart classroom concept and methodology for monitoring student's attention. Slotta et al. (2013) work out a pedagogical model (Knowledge Community and Inquiry) and describe an interaction between people, materials, tools, and environments. Rehman et al. (2008) show the great importance of RFID system in an educational environment as a way for increasing physical security of students and teachers. Temkar et al. (2016) study IoT for improving the learning process. Uskov et al. (2016) make a classification of a wide range of applications and software for smart classroom and university environment which could be applicable for the current conceptual model of a smart classroom. Bogart and Wichadee (2016) do research among 40 students concerning smart classroom technologies and take into account their opinions and recommendations. Lane and Finsel (2014) research the usage of Big Data in smart colleges and universities. Their work offers a technique how these data can be collected, analyzed and used for achieving better results.

The paper outlines authors’ concept of a smart classroom – a learning space that better fits the learning needs and expectations of the digital generation. The focus is both on the technology that creates conditions for the effective learning process and innovative technology-enhanced pedagogy. Therefore, as Terzieva et al. (2016) write, the smart classroom should provide basic and functional smartness. The first one is responsible for specifying and controlling microclimate parameters of the room that have an indirect influence on the learning process and ensure learning comfort. Usually, monitoring and control of the microclimate are performed by an air-conditioning system or smart window that open at certain times, depending on the schedule of room usage. Functional smartness concerns provision of appropriate tools for a smart teaching-learning process. A smart classroom is intended to employ technologies that directly impact the methodology, design, structure, and implementation of the teaching process. During the lesson, sensors monitor student's engagement and their activity parameters (response time, the correctness of answers, etc.) and to provide teachers with real-time feedback and information. Furthermore, such information allows teachers to get deep inside
of student’s knowledge acquisition and thus to adapt and personalize the process of teaching for every student according to individual characteristics if needed.

The main purpose of the smart classroom is to enable a smart educational process – from management of the teaching process, through the workspaces for teachers and students to knowledge delivering and testing. Smartness implies pedagogical changes – teaching practices evolve; various innovative teaching strategies that require new roles of teachers and students emerge; new types of learning content and resources appear; extra learning opportunities are offered. Also, smart functionality provides an opportunity for personalization basing on automatic tracking of student’s attendance and recording individual progress. This information helps teachers’ decisions about appropriate interventions in supporting individual needs or overcoming encountered problems and difficulties. The data, related to the teaching-learning process, are stored in a centralized repository as a part of web based smart learning system that serves all the education-related issues.

**Structural Model of Smart Classroom**

This model is a conception for smart learning environment build by using most of the modern technical achievements in fields of IoT, wireless sensors networks, Big Data, etc. according to educational requirements and student’s needs. The project is open for implementation of new features and different technologies not only for responding of changeable educational necessities but also for adapting a system to a broad circle of users. Bogart and Wichadee (2016) write that term “smart classroom” can be misleading because by itself the classroom is not smart in any sense of the word, nor are students who are taught in a smart classroom necessarily going to become smart by learning lessons in one.

A structure of this conceptual model consists of five operational modules in which specialized software operates and controls all physical elements and devices (hardware) – refer to Fig 2.

![Structural model of smart classroom](source: Authors)

**Classroom environment module (CEM)**

This module is responsible for supporting and providing normal environmental conditions in the learning process. There are a variety of sensors and actuators that measure different environmental parameters as temperature, motion or presence, humidity, dust, oxygen level, noise level, lightening, water dispenser shortage, recycle bin fullness, security system, etc. According to these parameters, a microcontroller runs and controls central heating system, light system, fresh air flow, cleaning schedule and sending service messages to school staff. This microcontroller is connected through Bluetooth to the central microcontroller, which is a part of System operation module (SOM). CEM is individual for each classroom and could be set up according to studying material or student's needs. The system could be adapted to work for students with special needs.

**System operation module (SOM)**

This unit coordinates all modules and supports the whole system in working order. It maintains connections with other modules constantly and provides coordination between different subsystems.
That part is the brain of the entire system. This module processes all the data concerning learning process and system functionality. It provides a broad range of settings and different profiles for each user. SOM may coordinate more than one classroom. For that reason, classrooms with same characteristics and parameters are combined and managed by one module.

Educational resource module (ERM)

The educational resource module is the most powerful and provides a broad range of educational services. There are several multimedia servers with various data covering all study materials – electronic textbooks, manuals, movies, audio, learning applications and specific learning software. This module has an interactive system for creating lessons and task for students. The application helps teachers to prepare their lessons and organize classes by using all multimedia devices and smart classroom resources. Slotta et al. (2013) explain that such systems could simulate different learning environments (as rainforests, war scenes, manufacture installation, etc.) and include all students in researching and observing activities. Students also have a right to use this module through a special account and student's profile that allows them to access all learning resources in the classroom or do their homework remotely at home due to the Communication module and secure Internet connection. This module is connected to other modules by SOM and could use their resources for providing better educational process. ERM is common for the whole school. It could be utilized for all classrooms because it contains the full complex of studying materials for students of different course's groups.

Communication module (CM)

The communication module is a combination of various communication applications and services. There are an email server and client software, instant messages applications, Internet connectivity, mobile connectivity and interactive system for voice, text and remote control system for classroom activities (ISVTRC). An important part of the learning process for teacher and students is ISVTRC. This system connects all monitors and peripherals like a touch pad, headphones, camera, microphone mouse and keyboard put on every student's desk, multimedia smart board, projector and teacher's personal computer. Different learning styles can be accepted using a multimedia smart board. Temkar et al. (2016) indicate that learners can learn by touching the board and visual learners can help themselves by observing the teaching on the board. Uskov et al. (2016) classify different software that allows the teacher to communicate via text or voice messages to students and observe student's work on their desks. All students' desk connections are LAN based. The teacher can be in touch with all students in class activities by this system. He/she could send a text or voice messages in real time or monitor student's desktop by remote control. The module also provides Broadband Internet access to all users. A SIM module connected to the system can send short text messages or make a phone call to students or their parents in real time.

Evaluation and control module (ECM)

A module carries out various exams and tests for students. There is an electronic diary for each student and detailed information about student's work and achievements. Parents have a chance to access this electronic diary and be notified about their children's grades. The system could be set up to send instant messages or SMS to parents concerning the behavior, grades or absences of their kids. There is a website and mobile application (Android and iOS) with detailed information for children achievements. Lane and Finsel (2014) conclude that performance of a student in a given semester was not known until course grades were reported and GPA calculated at the end of the semester. While it is possible to track student activity on an almost daily basis and provide interventions in the middle of the semester with the desire of supporting the success of the student.

The vital part of this module is a subsystem for measuring student attention. While active learning activities run, the teacher has an opportunity to monitor each student's care and take measures for increasing student's attention. This system constantly sends data to SOM, which can change some environmental parameters automatically by CEM to increase students' attention and concentration. The system evaluates individual student behavior and behavior of entire group by observing the level of noise, student's movements and analyzing facial expression. Gligorić et al. (2012) write that fidgeting and noise are two most common ways of expressing the lack of interest. Noise sensors, PIR sensors RFID reader, and camera are installed on every student's desk. RFID reader allows students to identify themselves and to log in the system by special RFID ID card. Rehman et al. (2008) point out that this
card could be used for access to classroom, school library, sports facilities, and canteen. Although that allows different groups of students to use one classroom, it is better every group (class) to have an individual classroom. That way in each classroom could have access only student from the specific group. This module manages several databases for system logging and collecting student's grades and other personal data. ECM is specific software for each classroom.

The system is built for the following groups of users:

- Students (limited privileges and rights to access ad hoc applications, devices, and learning resources; rights for setting up a personal profile)
- Teachers (wide privileges and rights to use different applications, upload, remove and create new educational resources)
- Parents (monitoring and communication functions; wide possibilities to contact with students and teachers through the communication module)
- School staff and technical maintenance (specific tasks and duties concerning service and system's maintenance)
- Admin (administrative function).

**Conclusion**

The proposed concept of a smart classroom has many advantages – it presents learning spaces that can be easily adapted to meet a variety of teaching approaches and learning preferences. In fact, it is an active learning environment that can improve students’ engagement by facilitating their focus and concentration. It meets students' curiosity and supports a better understanding of matter by enabling interactive teaching with multimedia learning resources and access to extra information beyond the syllabus. Also, there are technical facilities for recording lectures and digital handouts which are a benefit for absentees and distant students. Smart classroom empowers teachers with the necessary technology tools for managing and providing smart teaching process – real-time feedback, comprehensive reporting and various analyses. It can support different tasks for different groups of learners and provide real-time feedback, assessment, and directions. Furthermore, communication module enables discussions with colleagues, tutors, researchers, experts, etc. as well as the acquisition of relevant information of live events beyond the scope of the textbook. As a disadvantage of the smart classroom, it can be pointed out the need of additional qualification of teachers as well as the maintenance and regular updating of the system components.

**Acknowledgements**

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**References**


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METHODS OF ATTRACTION AND RETENTION OF GENERATION Z STAFF

Irina Sidorcuka,1 Anna Chesnovicka2

Abstract: The contemporary job market is facing the arrival of new type of employee – generation Z representatives, known as “digital natives”, who are described as technological, social, global and developed, the most connected, clever and educated generation that ever existed before, driven by social media, influenced by brands and musical culture. At the moment, this generation is considered to be two billion big. This study is looking at the existing methods of generation Z staff attraction and retention in the company Evolution (Latvia), where they make a majority. Further analyzing which of the methods are perceived as most efficient and which values of this generation are met by the company. Methods include company literature review, questionnaires and interviews. It was concluded the Gen Z have specific preferences in communication and can be reached through a variety of social platforms and special events provided by the company. As potential and current employees, they are not looking for life-long employment, put forward their specific values and expect the potential employer to attract them by meeting their needs in terms of flexible working hours, flexible (varied) jobs where their individuality can be applied, company excellent reputation, innovation, speed of change, platform for educational and promotional advancement, specific fringe benefits.

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Keywords: Generation Z, staff attraction, retention, employees’ values.

Introduction

Nowadays, attraction and retention of new staff is becoming more challenging because of the diversity of job roles needed on the one hand and the variety of new methods of attraction and technologies available on the other hand (Blacksmith and Poeppelman, 2014). Recruitment today is more strategic, personalized, and targeted than ever (Sunderberg, 2014). The main challenge for the companies remains finding and attracting new staff that would most successfully fit the company and would contribute to its further development. It is crucial to select right people since it has direct interconnection with the further success of a company on the market and deals with the competitiveness of an organization in general (Osoian and Zaharie, 2014).

The contemporary tendency on the job market, where the increasing number of potential recruits are representatives of generation Z calls for analysing the needs and expectations, values and interests of this potential workforce of the future, in order for the companies to be well equipped in meeting these values and expectations and, thus attracting and retaining the best candidates.

The purpose of this paper is to provide an overview of the existing methods of new staff attraction through recruitment procedures and retention policies, build the profile of the generation Z potential employee, analyze which of recruitment methods and company benefits are the most effective in attraction and retention of generation Z.

The study comprises a literature review and empirical part carried out in the company: Evolution Gaming, the biggest employer in Latvia, where the majority of employees (81% in 2016) are representatives of generation Z.

Literature review

Both prosperity and survival of each organization strongly relies on the quality of human capital employed by the company. This is the reason why organizations should concentrate on attracting highly skilled and competitive candidates, which can be ensured by an efficient recruitment process (Muscalu, 2015). It is important for organization to understand that employees are intangible assets as their knowledge, skills and behavior can play an essential role. Organizations with professional and experienced employees have an enormous competitive advantage (Hawkins, 2007). The main objective of recruitment can be defined as attracting enough candidates that are responding to particular job requirements, so that the employer could choose and recruit the greatest individual to fill the vacancy (Muscalu, 2015).

According to Chand (2015) informing candidates about new vacancies available in the organization and attracting them are essential aspects of the recruitment and hiring process in which both internal and external resources can be exploited.

1 RISEBA University, 3 Meza str., Riga, Latvia, irina.sidorcuka@riseba.lv
2 Senior Schedule Specialist, Evolution Latvia, 151 Brivibas str., Riga, Latvia, Acesnovicka@evolutiongaming.com
Internal recruitment strategy according to Applegate (2015) is usually implemented through promoting employees already working in organization. The following advantages of internal personnel selection for the vacant post were suggested (Reichard et al. 2014): time efficiency, improvement of loyalty and morale of employees, possibility to better estimate the abilities of the candidate, lower costs involved, motivation of other employees to aim at promotion, ease of contacting applicants.

However, in majority cases, organizations refer to external recruitment when there are no appropriate candidates able to fill the particular job position within company staff. Reichard et al. (2014) highlight the following advantages of external recruitment for the companies (Reichard et al. 2014): possibility to invite fresh ideas and welcome innovation, provision of opportunities for unemployed, bigger number of applicants to choose from, possibility to bring new departmental insights.

Decenzo and Robins (2014) and Shamis (2015) identify the following methods of external recruitment: advertising through media (Internet, newspapers, radio and television); employment agencies; recruiters who usually are used in colleges and technical schools; special events when employees of the company are used to attract a big number or candidates for interviews; internship programmes, placing a student in a seasonal or temporary positions for further employment; executive search firms services (headhunting); employee referral (when existing employees are offered to recommend names of individuals they believe would be the right ones for a vacant position, usually in return for a financial reward for such recommendation); unsolicited Walk-In applicants (applicants can be attracted by organizations with perfect reputation without any recruitment method being used).

Whatever methods the company chooses, it should address to the potential hires through the most efficient method taking into account the needs and values of the future employees. As hiring is not only a process of assessing potential candidates in terms of their suitability for the position, but rather an organization as a future employer is being assessed by an applicant (Mason, 2014).

In order to be successful in attracting a large pool of applicants, organizations need to understand their potential candidates looking at such factors as the candidate’s values, motivation and attitude. Mason (2014) highlights that it is crucial to understand motivation of potential applicants as this is going to assist in choosing sourcing strategy and style of communication. Applicants might be employed by another organization holding the same position as the vacant one, or, vice versa they might occupy lower level position, however they are ready for promotion. It is worth considering values applicants may have related to both inside and outside the working place. Often, candidates are interested in the possibilities of a future promotion, advancing specific skills, gaining experience and positive feedback from their direct manager. Outside the working place applicants tend to value family life, communities, cultural activities, professional and social networks.

Armstrong (2006) advises analyzing recruitment strong and weak points from the very start, as this analysis can enhance employer’s attractiveness for the potential candidate through building a special value proposition, thus becoming the “employer of choice.” Barber (1998) suggests that the stage of hiring can be related to applicants’ working preferences and decisions. And to ensure successful hiring, organizational attributes should fit candidate’s individual employment values and critical indicators of employee satisfaction. Basically, organizational attributes include a perception of what the company provides in terms of working conditions and environment. Such aspect as advancement opportunities, fringe benefits and job security are positively appreciated by applicants when evaluating future employer, and influence organizational attractiveness (Robertson et al., 2005).

There are some tangible and intangible factors that attract candidates and motivate them to work for a certain organization, and to stay within it or vice versa drive them away (Regovich, 2014). Among the most widely acknowledged by Crossley and Jamieson (1997) and Regovich (2014) are the following factors that influence staff attraction and retention: pay and bonuses, the job itself (when employee get satisfaction through work), creative benefits and rewards, fun and safe working environment, cooperative and helpful colleagues, the organization’s brilliant reputation and corporate success, and understanding managers.

Fringe benefits offered by companies have a powerful influence on employee satisfaction. According to the survey of annual trends performed by Andrus (2012) 49% of employed respondents noted that benefits were a significant motive when they started working for a certain company, while 60% responded that benefits are a significant reason for remaining within an organization. There is a variety...
of different fringe benefits offered by contemporary employers, starting with snacks and free drinks, to a retirement plan (Horton, 2014). Dishman (2016) highlighted the most important benefits valued by employees: health care insurance (e.g., medical, dental) 40%, vacation/paid time off 37%, performance bonus 35%, paid sick days 32%, and retirement plan and/or pension 31%.

Z Generation Characteristics

Generations are built of people who were born during a certain period of time and who were exposed to the same events, have been impacted by similar technologies and spend their lives under equitable conditions (McCrindle, 2015). According to Burrus (2016), every generation is most likely to form different needs, aspirations and wants accordingly to the various periods of their lives when their responsibilities and tasks change. Generation Z can be described as technological, social, global and developed. They are called the most connected, clever and educated generation ever existed before, who have adopted technological developments, are driven by social media, influenced by brands and musical culture. At the moment, this generation is considered to be two billion big and according to McCrindle (2015), they are not only introducing the future, they are constructing it. There are different thoughts concerning the exact time period when Generation Z starts and ends however, the majority of experts agree individuals born from the mid-90s till 2004 belong to the generation (Mueller, 2015).

The childhood of Gen Z was spent during the economic crisis and periods of terrorism and climate change. There is an opinion that this generation is about to spend their youth and adult years in an era of economic and social renewal. Moreover, they are observers of changes in different household structures. Today they are students and college graduates, nevertheless tomorrow they will become employees of the big organizations, clients and consumers (McCrindle, 2015). Generation Z is sometimes called “digital natives” because of their ability to feel comfortable with ICT. People from Generation Z were born after the Internet and mobile phones were invented, so they do not know life without having those innovations accessible when only there is a need for them. They spend a lot of time online, communicating with their friends, or sometimes with virtual strangers, they are not afraid of sharing personal information in different social media (Bernstein, 2015).

This generation is considered to experience unique stimuli in their lives, starting with the Global Financial Crisis, continued by growing cultural diversity, the spread of worldwide known brands, and acceleration of communication in social media. As McCrindle (2015) assures, this generation will live longer lives, and they will most likely change jobs and work in different organizations than any generation before them. Mueller (2015) notes that this generation is able to grasp and create innovations in technology quicker than predecessors. Generation Z has witnessed a lot of difficult moments during their childhood years: parents losing jobs, sold family homes because of crisis, war and social argues across the world. They do understand that hard work is needed to gain money and live in peace (Harris, 2016).

Gen Z usually are ready to express their opinions, it is significant to respect them and assist, to emphasize their energy and creativity. Companies, that will meet all needs of this generation, will benefit from their hard work, continuous engagement and brilliant ideas in the nearest future (Half, 2015). It is predicted that Generation Z is about to change workplaces with their different attitudes, perceptions and styles as soon as they will enter workforce (Mueller, 2015) like Millennials or Generation Y, born 1977 - 1994 (Harris, 2016). Generation Z are used to immediate access to information and are sure that everything can be found on the internet, similarly to their older Gen Y representatives, they are unstoppably engaged in the processing of information. Like Millennials, they prefer to deal with their problems independently, and before asking for advice or help will search for solution on YouTube or other platforms of video tutorials (Biro, 2015), Mueller (2015) assures, that Generation Z are born multitaskers which is an advantage. However, McCrindle, (2015) argues that at the moment they are completing many tasks at once, their attention is divided by particular tasks, so it may result in losing ability to concentrate so generation requires more time to analyze complex information. It was also stated by McCrindle (2015), that sometimes for them speed matters, not accuracy.

Generation Z at the working place

In 2017 the eldest representatives of Generation Z will turn 22-23, so a large part of them are still not employed however, in the nearest future the situation will change dramatically, by the year 2020 they
are going to comprise 1 in 5 employees. Due to ageing population in Europe, this generation will start their careers in times where the supply of employees is reducing. Workforce shortage will take place since there will be fewer people entering the working force than exiting it. The optimistic point is that the younger generation is going to possess a high level of education however, due to issues arising in the employment sector described above, it is the Generation Z workforce that is going to be in demand, rather than jobs (McCrindle, 2015).

Generation Z’s entrance in the workforce will bring some changes for recruiters. They shall be ready to advertise and engage potential employees on a wide range of different platforms on an everyday basis. Companies will have to understand that it is important to be as connected as Generation Z is if they are willing to recruit young talents. Organizations will need to follow up to their favorite networks, and companies will require to be honest and transparent concerning things they say and promise, as Generation Z tend to be skeptical of marketing (Biro, 2015).

Apart from the need to be connected Generation Z is mostly looking for temporary rather than long-term permanent or even life-long employment as the previous generations (O’Malley, 2006), they are not expected to stay working for the same company for more than a few years.

Flexible schedules will be even more popular as they are nowadays because of preferences of Generation Z to move farther away from classic 9-to-5 hours spent in the office. As Biro (2015) notes, this generation will be able to separate working time and life. As it was told by Baumann (Baumann, 2014) on average, the young generation is planning to be employed by four companies during their lifetime. It can be explained by their willingness to gain robust work experience, which can be obtained from one or two companies, nevertheless this will be reached from working at different organizations.

Generation Z as employees of the future will consider it is important to have life/work balance, trust, flexibility, engagement, fresh ideas, amusement, creativity, and global working atmosphere (McCrindle, 2015). They will appreciate recognition for their efforts, which can be explained by their children years spent in safety and support at home, in public and during their education. That is a reason why they believe support will continue to be around, even at the working place. For nowadays workers it is crucial to have a variety of needs met at work, for Generation Z it more about social connection, experience, education, knowledge, and even environmental sustainability. As McCrindle (2015) notes, this generation is not so much motivated by remuneration as they are by other benefits.

When searching to attract and maintain Gen Z, the employers should take into account that they value ownership and individuality at the working place. Motivation comprises task variety and creativity, while it is the internet that has influence over profession selection. According to Stone et al. (2015) Millennials as employees prefer more interactive, interpersonal, information-rich approaches to all of the areas of HR management. They tend to prefer an interactive training style. They believe the most effective leadership style can be reached through consensus, they are influenced by global and short-term desires. They are expressing their ideas freely and boldly when it comes to management (McCrindle, 2015).

Research process, methodology and design

The research was conducted in the company Evolution Gaming which is a leading B2B provider of Live Casino systems in Europe. The group today employs approximately 1,800 people of whom a majority are based in Latvia and Malta. The parent company is domiciled in Sweden. (Evolution Gaming Group, 2016). At the moment, there are 1,300 employees working in Riga Offices, mostly holding position of Game Presenters or IT specialists. In 2017 Evolution Gaming is planning to expand and to offer 600 new job positions. According to LETA (2015) the CEO of a company Svante Liljeval announced at annual Nordic-Baltic business forum that Evolution Latvia will continue investing in its employees, infrastructure and offices, increasing its office space to 7000 square meters.

As the requirements for the staff are specific and the level of demand is high in terms of skills and competencies (advanced English language competence, stress resistance, artistic and presentation skills, etc.) and the staff turnover is high (approximately 30% per annum), the company is actively working on finding the most effective methods of staff attraction and retention (Evolution Gaming Group, 2016)
The initial aim of the research was to evaluate the existing recruitment practices and to identify the most effective ways how to attract Generation Z staff. To evaluate perception of the company by the young generation and investigate whether Evolution Latvia addresses the values of their existing working force through offering motivation benefits.

The data were collected through questionnaires and interviews with the current staff as well as from the company documentation. The sample for the questionnaire comprised 210 current employees of Evolution Latvia, the age group from 18-21, making 58% or 121 respondents, 23% of respondents in the group from 22-24. The questionnaire was based on graded answers (from 1- least preferred to 5-most appreciated) to the questions regarding the most effective methods of advertising posts, factors influencing attractiveness of the employer, preferred benefits offered, and possible reasons to leave the company. The author calculated the average score of each characteristic by combining the responses of the 210 respondents.

**Findings**

**Sources and methods of job advertising**

Among a wide variety of sources of job advertising used by the company at present Generation Z respondents gave preference to word-of-mouth advertising (4,9) as the most noticeable and effective one. The second and the third most effective methods appeared to be the same as for older than 23 employees – Social Media (4,8), however youngsters tend to notice adverts there more often compared to the group aged 23 and more (4,2). Advertising in Cafes, Restaurants and Cinemas is the third most noticeable (4,6). Both age groups found that Newspapers & Magazines (2,5 and 2,2), TV (2,6 and 2,3), Billboards (2,7 and 2,6) are less effective sources of advertising, that are often being ignored by Generation Z (18-22), and those older than 23. In the interviews it was highlighted that employee referrals and special events organized by the company at schools, colleges and campaigns in social networks are most effective, e.g. Virtual Career Days with www.draugiem.lv, www.delfi.lv, www.cv.lv, using Facebook and Instagram accounts, and a YouTube channel, where they run number of campaigns and competitions. Advertising campaigns were considered more successful if combined with attracting celebrities and brands (e.g.now the company has come out externally in cooperation with Reebok Latvia), supporting a healthy lifestyle, positioning itself as being young and dynamic (Figure 1).

**Factors of employer’s attractiveness to staff**

The most highly valued factors of employer’s attractiveness were: pay (4,5), the job itself (4,3), and benefits and working environment equally (4,2), whereas less important stated were training & development (3,3), new contacts (3,7), and location/position of the office (3,8). However, for the youngest representatives flexible schedule was the most important factor (4,7), followed by the job itself (4,6) which they described as exciting, interactive, communicative and using advanced IT. The corporate image was the third most important factor (4,5). The company’s growth, dynamism, international environment were highlighted. Respectively, the less important elements stated were new contacts (3,5), location/position of the office (3,6) and pay (3,7). Nevertheless, Generation Z considers benefits offered by the company (4,4), and training & development (4,2) to be significant (Figure 2).
Meeting the values of staff

The majority of respondents evaluated flexible schedule (4,8) to be the value of young generation the company is most likely meeting. It is followed by innovation (4,6) and promotion possibilities (4,5). According to the responses of Game Presenters, Evolution Latvia is less successful in meeting such values as ability to show individualism (3,4), trust (3,6), and life work balance (3,9) (Figure 3).

Fringe benefits offered by Evolution Latvia

The most important to respondents benefit currently offered by Evolution Latvia is the gym (4,8) showing that the young generation is supporting a healthy lifestyle, it is followed by paid vacation (4,7) and health insurance (4,6). 25% or 53 people would appreciate to have free parking, a paid day off on a Birthday was supported by 23% of respondents, while 20% would like to have more free sports events it is closely followed by free healthy food that was chosen by 19%.

Special offers for SPA
services would be the most desired fringe benefit for 8%. 5% of respondents falling into “other”
category, have stated that they would like to see different development classes organized, free cinema
tickets, language courses, etc.

Turnover and reasons to leave Evolution Latvia
42% of respondents or 87 people are planning to stay in work from 6 months till one year, that
indicates that they tend to consider short term employment. 25% of respondents would work in the
Company from 1 year till less than 3 years. 23% current Game Presenters are planning to exit in 6
months long period. Only 8% showed willingness to remain at Game Presenter position for 3 years till
5 years, and only 8% of respondents are eager to work for 5 years or more. The potential reason to exit
the company is unwillingness to work long for one company (28%), followed equally (23% each) by
moving to jobs related to an improved level of education/qualification and desire to gain new
experience. 13% have chosen burn-out of Game Presenter’s position, 8% lack of innovation.

Research limitations
The study was limited by the specifics of the jobs profile in the company Evolution, and to get a wider
view on the attraction and recruitment of generation Z a study should be proceeded in a number of
companies in different sectors of economies among representatives of a wider variety of jobs. Another
limitation is specific personal values of each individual which may differ from the generalized values
of generation Z.

Conclusion
The most powerful method in attracting new recruits ,the company Evolution is currently using, word-
of-mouth with employee referrals, a continuous presence in majority of popular media platforms,
attraction of famous brands to cooperate(Reebok Latvia), facilitation of sports and social events, and
promotion in schools and universities.

The most important attributes of employer’s attractiveness appeared to be flexible schedule allowing
to combine work and studies; the job itself which is interactive, varied, communicative, exciting,
connected with new IT; and a corporate image of the company as famous, growing, dynamic.

Generation Z values, successfully met by the company, are flexible work hours, innovation and the
possibility of growth(Evolution Academy). Evolution Latvia is less successful in meeting such values
as the ability to show individualism, development of trust and provision of life work- balance.

The most important benefit for Gen Z currently offered by Evolution Latvia is gym facilities showing
that the young generation is supporting a healthy lifestyle, it is followed by paid vacation and health
insurance. Nevertheless, the majority expressed a wish to have more possibilities for sports, social
events, paid day-off for birthdays.

The majority of Gen Z staff have short-term desires and are not planning long-term employment in
one company, they are ready to leave their current employer in search for better opportunities,
innovation, novelty. This lack of loyalty to their present employer and fast changing priorities of Gen
Z require permanent adaptation to their needs and values, active permanent communication, quick
reaction to change and continuous innovation in the companies.

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LONG TERMS AND READABILITY OF PHYSICS SCHOOL TEXT

Ivana Škorecová,1 Aba Teleki,2 Ľubomír Zelenický3

Abstract: This article presents a comparison of two physics school texts from the perspective of readability and use of specific terms. The study uses the survival function to associate the readability of physics school text to the length of terms used in the text. First, the study compares the survival functions of two full texts and that of the terms in these texts, and then analyzes the associated relative readability. Next, the results of two cloze tests involving 150 students are compared. The last step investigates the randomness of the differences between the results. The results show a strong correlation between the test scores and the probability distributions of terms used in the school texts. The difference between the probability distribution of the compared texts corresponds with the differences between the appropriate survival functions, where random fluctuations in the frequency of terms are suppressed.

UDC Classification: 37.02; DOI: http://dx.doi.org/10.12955/cbup.v5.1031

Keywords: Cloze test, Survival function, readability, physics school text

Introduction

Because of fewer classes today than previously, current physics students need greater access to textbooks than ever for learning to remain effective. Thus, for effective study with fewer classes more emphasis is placed on home study. As a result, students need materials free of errors. In the time of the internet, information is easily accessible. However, finding appropriate information, especially in readable text form, is problematic. The readability of school texts is the first and foremost precondition for a valid study hour.

In accordance with Škorecová et al. (2016b), terms are part of physics school texts, and we cannot write school text without terms. Thus, the frequency of terms is critical for a readability study. However, the length of such is also important (Škorecová, et al., 2016a). In this case, where the frequency of terms is similar between texts, the most readable and thus more suitable for study hour relates to the frequency counts and length of the terms.

The aim of this study was to compare two physics school texts from the perspective of readability and use of specific terms.

Data and Methodology

This study examined the following texts:

- Physics for 2nd grade on high school (2r) by Demkanin (2010), Section: Properties of Liquid and Gases
- Physics for 3rd grade on high school (3r) by Pecho (1994), Section: Stationary and Non-Stationary Magnetic Field

The hypothesis was that the readability of physics school text depends on the length of the terms.

The study also examined the importance of theoretical knowledge as part of the learning process, considering terms as the basic building elements of such knowledge. Terms were separated from both texts, prior to calculating the survival function for the terms.

Two cloze tests were used to confirm or reject the above hypothesis (Hₐ). The first involved the text 2r and the second the text 3r. Both tests examined 300 words with every 7th word missed. A total of 150 students of a high school in Nitra performed the two tests before studying this topic.

Finally, the study findings were validated regarding the significance of differences in the survival function and the cloze tests. The null hypothesis (H₀) was that the difference between the survival functions for terms of the different school books was random. For this, the p-value for chi-square (χ²) distribution was calculated using the Monte Carlo method to generate data (Meunier et al., 2001).

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1 Department of Physics, Constantine the Philosopher University in Nitra, ivana.skorecová@ukf.sk
2 Department of Physics, Constantine the Philosopher University in Nitra, ateleki@ukf.sk
3 Department of Physics, Constantine the Philosopher University in Nitra, lzelenicky@ukf.sk

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Survival Function in Study of Readability

The required information was encoded in the probability distribution function (PDF) of words of a given length (Škorecová et al., 2016a). However, in the case of terms, the appropriate PDF was found to be unsuitable due to the relatively small number of terms. The fluctuation in the PDF was significant where the analyzed text was short. For this reason, the study used the cumulative distribution function (CDF) instead of the PDF. In the CDF, the fluctuations were suppressed due to its random characteristic. The survival function (SF), or complementary CDF, has the same property as CDF. Here, the survival function of probabilities was used to obtain a decreasing function. The survival function $S_n$ was defined as follows:

$$S_n = \sum_{j=n}^{\infty} p_j, \quad n = 1, 2, 3, ..., \quad \text{and} \quad S_1 = 1,$$

where $p_j$ was the frequency of words in the analyzed text. The infinite sum was formal only, as all texts contain a word with a maximal length. The survival function, $S_n$ for words, yielded better results and improved graphical visualization of the results. The readability of the simultaneous comparison of the three texts in graphs was improved using this approach.

**Results and Discussion**

Despite the improvements mentioned above, little differences in readability were evident between the texts, 2r (Demkanin, 2010) and 3r (Pecho, 1994) (Figure 1). The finer scale of Figure 2 displays the difference between the survival functions of the analyzed pair of tests. In this difference, the fluctuation was naturally suppressed.

**Figure 1: Results of the survival function for two school texts**

![Figure 1](image1.png)

2r: Physics for 2nd grade on high school text (Demkanin 2010); 3r: Physics for 3rd grade on high school text (Pecho 1994); $L$: the length of words; $P$: the probability (survival function) that a given word has at least the length of $L$

Source: Author

**Figure 2: Difference between two survival functions of school texts - full text**

![Figure 2](image2.png)

2r: Physics for 2nd grade in high school (Demkanin 2010); 3r: Physics for 3rd grade in high school (Pecho 1994); $L$: the length of words; $P^{2r} - P^{3r}$: the difference between the survival functions $P^{2r}$ and $P^{3r}$.

Source: Author
Table 1 presents characteristics of the analyzed texts. Because of different topics, authors used distinctive terms with discrete lengths. Whereas Figures 1 and 2 show the readability of texts as somewhat similar, Figures 3 and 4 reveal differences in respect of terms. Thus, text 3r was less readable than text 2r (see Figure 5).

<table>
<thead>
<tr>
<th>Specification of the text</th>
<th>Number of words</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full-text 2r</td>
<td>7 604</td>
</tr>
<tr>
<td>Terms</td>
<td>1 521</td>
</tr>
<tr>
<td>The rest of text</td>
<td>6 083</td>
</tr>
<tr>
<td>Full-text 3r</td>
<td>12 025</td>
</tr>
<tr>
<td>Terms</td>
<td>4 058</td>
</tr>
<tr>
<td>The rest of text</td>
<td>7 967</td>
</tr>
</tbody>
</table>

2r: Physics for 2nd grade in high school (Demkanin 2010); 3r: Physics for 3rd grade in high school (Pecho 1994)

Source: Author

Figure 3: Survival function of terms of two school texts

Figure 4: Difference between two survival functions - terms

We compared the success of students in two cloze test, the first close test for the textbook 2r (Demkanin 2010) and the second close test for the textbook 3r (Pecho 1994). The null hypotheses was that there was no difference. Figures 3 and 4 indicate that text 3r was the less readable of the two texts.
Table 2 shows the level of significance for a result of null hypotheses. Figure 5 presents the success of students in the cloze tests.

Table 2: The level of the significance of null hypotheses

<table>
<thead>
<tr>
<th>Analyzed Texts</th>
<th>Text Shown as Less Readable</th>
<th>The level of the significance of null hypotheses (p-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2r, 3r</td>
<td>3r</td>
<td>5.14 × 10⁻⁹</td>
</tr>
</tbody>
</table>

2r: Physics for 2nd grade on high school (Demkanin 2010); 3r: Physics for 3rd grade on high school (Pecho 1994)

Source: Author

Figure 5: Success of students (%) in the cloze test

![Cloze test success](image)

2r: Physics for 2nd grade on high school (Demkanin 2010); 3r: Physics for 3rd grade on high school (Pecho 1994); $s$: the success of students (%) in the cloze test; $N(s)$: the number of students with success $s$ in the cloze test

Source: Author

Figure 6: The $\chi^2$ distribution calculated from Monte Carlo (MC) generated data with the red line showing the approximation of the $X^2$ distribution defined in (Škorecová et al., 2016a) which is more suitable for practical purposes.

![Chi-squared distribution](image)

2r: Physics for 2nd grade on high school (Demkanin 2010); 3r: Physics for 3rd grade on high school (Pecho 1994); $X^2$: the quantity defined in (Škorecová et al., 2016a) by Eq. (2) has a distribution similar to the $\chi^2$ distribution; $p$: the probability distribution (PDF)

Source: Author
The results validated the hypothesis that text with shorter terms performed better in the cloze test. Thus, school texts with shorter terms are deemed more readable than texts with longer terms. Therefore, readability of school texts depends on the length of terms.

To compare the similarity of the two textbooks, we used the statistical quantity $X^2$ defined in (Škorecová et al., 2016a). This quantity has a similar probability distribution as the well known $\chi^2$ distribution does.

Figure 6 and Table 3 show the results of the $X^2$ distribution using the Monte Carlo method. The results confirmed the null hypothesis ($H_0$) that the difference between the survival functions of terms of the school books was random ($p = 1.80 \times 10^{-4}$).

**Conclusion**

The readability of school texts is a crucial parameter for effective learning. Such readability depends on the frequency of terms. For evaluating school texts, an alternative to using the cloze test is to use the survival function of terms to compare texts. The results of this study show that this type of analysis is useful and can provide teachers with results faster than if they were to use the cloze test alone. By using more readable texts, the studying of texts will be more effective, especially for home study.

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| Table 3: Results of analysis of the second cloze test |
|-------------------|-------------------|-------------------|
| $p^{2r}$          | $p^{3r}$          | $p = p^{2r} p^{3r}$ |
| $\chi^2$          | $1.30 \times 10^{-2}$ | $1.39 \times 10^{-2}$ | $1.80 \times 10^{-4}$ |
| MC                | $1.50 \times 10^{-3}$ | $2.05 \times 10^{-3}$ | $3.06 \times 10^{-6}$ |

MC: Monte Carlo method; P: Level of significance; 2r: Physics for 2nd grade on high school (Demkanin 2010); 3r: Physics for 3rd grade on high school (Pecho 1994)

Source: Author
SYSTEM OF DIGITAL CRITERIA FOR EDUCATIONAL WEB RESOURCE ASSESSMENT
Valentina Aleksandrovna Solovyova

Abstract: An educational web resource is a tool that can help discern useful data on the Internet. A system of criteria, however, is needed to assess the quality of this resource. Existing assessment models use various principles for this purpose. Ten such models are considered in this paper, though none of these use the basic principles of education. This paper suggests a unique new model that considers the major pedagogical principles of scientific content, visualization, the availability and feasibility of education, humanization of education, and students’ consciousness and participation. These principles are modified for the requirements of e-learning. The main focus of creating the model is the learner. Some assessment-related points in the suggested model are described in a more detailed manner than in previous models. The new model provides criteria that can ensure the quality of an educational Web resource. Thus, the model can form the foundation for creating educational resources.

UDC Classification: 37.02 ; DOI: http://dx.doi.org/10.12955/cbup.v5.1032

Keywords: educational, Web, resource, quality, assessment, digital, criteria, e-learning

Introduction
Such terms as information environment, post-industrial society, information society, information era, and ZettaByte epoch are frequently used to describe today’s era. The cause includes at least these two reasons:

▪ The volume of digital information doubles on average every eighteen months; and
▪ The global IP traffic is set to overpass a ZettaByte (10^21 bit) and increase annually in the future, as stated by the 2015–2016 Cisco Visual Networking Index Forecast and Methodology report.

These scenarios reflect the increase in generated information volume and growth of its use on the net and give rise to certain problems. It is becoming more difficult for an individual to discern useful data and information overload is increasing, which leads to intellectual ‘stroke’ (a term used to describe the state of ‘numbness’ due to information and knowledge overload; Shrayberg, 2016).

This problem is especially interconnected with education, mostly as education involves extremely complicated tasks because of widespread information and technology (IT) development. For example, the digitizing of knowledge that requires mechanisms to facilitate the use of online information and to enable an individual to both use and critically assess such large amounts of data.

One tool that can help solve such problems is an educational Web resource. When used correctly it can provide many advantages to all participants of education (Krelja Kurelovic, 2016; Hilton, 2016; Bacsich, Pepler, Bristow, Ossiannilsson, Creelman, Szalma & Slaidins, 2015). Thus, there is a need to understand whether an educational Web resource is used or created correctly. One possible way could be to assess its quality by way of a comprehensive analysis of its advantages and effectiveness of the operation.

Assessing the quality of a Web resource requires a system of criteria. Classical models for assessing the quality of educational Web resources (e.g., paper textbooks) are counter-productive for two reasons:

▪ Students’ way of thinking changes, therefore, the type of presentation should change also, and
▪ The functioning of an online web resource changes the perception of information.

This paper reports on a new model of assessing the quality of educational Web resources that is based on an analysis of existing models but which incorporates a system using the basic principles of education.

1 Postgraduate Student, Faculty of Nano- and Biomedical Technologies, Saratov State University, Russia, v.a.solovyova@gmail.com
**Literature Review**

In the scientific sources of literature, 10 models for assessing the quality of an educational Web resource were found. These involved various principles, standards, or groups of criteria for specifics unrelated to the course of work chosen for this current study. For example, for estimating the quality of a Web source, Joo, Lin, and Lu (2011) proposed a model based on three subscales: effectiveness, efficiency, and learnability. A model by Toleva–Stoimenova and Christozov (2013) used a similar set of three criteria: effectiveness, efficiency, and user satisfaction.

Polillo (2011) proposed to evaluate an educational Web-source with these characteristics: architecture, communication, functionality, content, community, platform, accessibility, usability (external quality and quality), and usability (internal quality).

According to Jabar, Usman, and Awal (2013), such an evaluation should use factors of attractiveness, controllability, helpfulness, efficiency, and learnability. Under Hasan (2014) the appraisal includes categories of navigation, organization or architecture, ease of use for communicating, design, and content.

Other analyzed models were based on dimensions of content, navigability, structure or design, the appearance of multimedia, and personalization (Matas, 2014). Another was on maintaining current educational resources, enhancing the learning environment, providing quality assurance mechanisms, and aligning open educational resources (OER) to common standards (Orr et al., 2015). Pow and Li (2015) used these groups: perceived usefulness, actual usefulness, perceived ease of use, and actual ease of use. Criteria of authority, update, usability, accessibility, communication, graphic design and multimedia quality, content, navigation, and the speed of access and interaction were used by Santos (2016), and eight general standards were proposed by Lowenthal and Hodges (2015).

Notably, most of these models offer similar criteria for evaluating a resource. Figure 1 shows the different criteria and their frequency of use across the 10 assessment models.

![Figure 1: Criteria and frequency of use across 10 assessment models](source: Author)

**Data and Methodology**

The system of criteria proposed by this current study was based on aligning the educational Web resource with the major educational principles. This decision was justified by a need to achieve a pedagogical effect when using educational Web resources. The analysis identified five major educational principles:

1. Scientific content,
2. Visualization,
3. Availability and feasibility of education, and
5. Students’ consciousness and participation.

These principles were used to discern the digital criteria and to provide insight with consideration to the specifics of e-learning.

The principle of scientific content corresponds to accuracy and correctness of the educational information available to learners and needs to contain scientific facts and knowledge. The following criteria were formulated for the principle of scientific content:

- Scientific feasibility.
- Lack of factual mistakes.
- Lack of unethical information.
- Compliance with the syllabus (in case the Web resource is a part of an educational program).
- Completeness of the subject under study, e.g., the number of didactic units, which have to be included to cover the topic and their proportion against the total number of didactic units.
- Additional materials, i.e., useful links related to the topic and educational material available for downloading (textbooks, articles, and books).

Web page content requires constant verification and updating for authenticity, and thus, timely visualization was another criterion identified as influencing the quality of an educational resource.

The principle of visualization corresponds to the possibility of educational material perceived using several sense organs. Visualization of the material is a tool for improving a learners’ memory (e.g., infographic, animation, video, mind maps and interactive maps, diagrams, charts, photographs, and pictures). In addition, relevant program segments are benchmarks, as Barthes (1977) stated, “Almost all images, in all contexts, are accompanied by some linguistic message. This seems to have two possible functions: anchorage and relay”. Thus, appropriate matching of text and visual material provided a possible and prominent pedagogical effect.

The principle of visualization was developed in the works of such prominent classical educator as Comenius (1697). Pestalozzi also considered visual thinking to be one of the most powerful features of the mind, and believed that imagery was the start of all knowledge (as cited in Webster, 2005). The expediency of using multimedia technologies was also substantiated in the works of modern researchers (Ilhan, & Oruç, 2016; Kilonzo, Sandfort, & Liu, 2016; Tang, 2016).

Setting this principle as being crucial for Internet information was considered appropriate as students’ use of the educational Web resource is neither supervised nor accompanied by teacher explanations.

It was assumed that an effective educational Web resource required the following:

- Appropriate data submission for audio, video, graphic educational materials (and their combinations); and
- A suitable balance of visual and text material to strengthen the educational impact of the resource.

In respect to principle availability and feasibility of education, it was deemed that educational material should be presented gradually and logically. Considering the intellectual potential of learners, their age-related peculiarities, and current knowledge status discerned the following three requirements:

1. Material should be thoroughly planned, divided into completed sections (if it does not contradict the selected educational method), possess the ideological center as well as basic concepts that form the content of the resource. Each information section should be accompanied by a glossary and abstract (commentary). Optimal sequence of educational material presented on the Web page has to be defined, i.e., information text blocks and visual material has to be logically positioned so that they attract the attention of the potential learner;

2. One has to take into consideration the various teaching materials necessary for creating an educational Web resource. An overabundance of material, as well as a deficit, leads to a loss of students’ concentration. Therefore, the aim is to define the optimal quantity of didactic units (such as theorems, methods, rules, and laws) and explain units (properties and characteristics) for the Web resource; and
3. Because the Internet provides extensive opportunities for logical transitions between interconnected blocks of information, one has to define the logic of using links and hyperlinks in the text.

For assessing the effectiveness of using the principle of availability and feasibility of education, the following criteria were selected:

- The complexity of material
- A number of didactic and explaining units collocated to the speed of information processing by a human (e.g., reading 18–45 byte per second);
- The number of hyperlinks in the text; and
- Reference information.

An example application for complexity of material is the Flesh-Kinkaid Score (Venig & Solovyova, 2016).

The principle of humanization of education may be denoted as one that creates user-friendly conditions for students’ education. This principle was substantiated as the fundamental principle for the education environment in the works of outstanding educators of Ancient Rome (Quintilian and Cicero) and later was developed in the works of educators of the Renaissance as Campanella (1981). Modern research also indicates actuality and feasibility of this principle’s application (Zarevski, 2015; Gilad, 2015).

With regards to e-learning, this principle involved several requirements.

The first requirement involved creating accessibility features in the resource for the Internet user. Primarily, this principle interconnects with the peculiarities of how educational material functions in the Internet environment and creates a user-friendly environment. This implied the following:

- Creating the opportunity to work with the source for students with disabilities. In this case, it means designing the version for visually-impaired users;
- Providing an opportunity to connect with the Web source from any device; from smartphones and tablets to laptops and computers (adaptable layout);
- Providing a fast ‘boot’ of the Web page and high downloading speed;
- Securing resistance to erroneous and incorrect user actions;
- Limiting annoying advertising;
- Limiting broken links to pages, documents, and images;
- Using easy formalization of text (font size, line spacing);
- Using high-quality multimedia material (definition); and
- The correctness of text data.

The second requirement related to the influence of e-learning on a student’s personality. The digital material should provoke the feeling of emotional and psychological security in a learner. These are the psychological and pedagogical requirements. The criteria that were distinguished here are the availability of feedback (individual information support) and timely error correction by the Web resource developers in response to users’ complaints.

The third requirement involved the criterion of data update and the manner of its presentation, especially, for assessing the quality of the Web resource. It was important to consider the peculiarities of modern learners’ perceptions and their thinking as a ‘Web surfer.’ Because there is a large amount of educational and other types of material, a learner skims through web pages in the course of two to three seconds to identify whether they will use that specific resource. Therefore, it was necessary to define how the attention span of a student is met in order to choose the most suitable structure of information arrangement on the website. Major requirements for headings, text, and graphics location of the pedagogical design should form the foundation of an educational Web page design.

Another pedagogical principle that was identified is the principle of student’s consciousness and participation. It does not presume the order of information presentation, but rather the way data collection relates to the effectiveness of implementing the four principles described above. Assessment of implementing this principle is possible by evaluating the visiting statistics of the Web source, as well as the target actions on the Web page, such as downloads of videos and audios, and clicking on hyperlinks. Basic parameters of Google Analytics, e.g., the average duration of page views and the
number of downloads can be used to fulfill this task. These indicators would be adapted to the specifics of every web page, for example:

- Average duration of a page view correlated with data size of page contents;
- A number of downloads correlated with data size of the page content.

**Results and Discussion**

The results of analyzing didactic requirements provided a system of digital criteria for assessing the content of an educational Web source. All criteria discerned were systematized into corresponding sub-groups (Table 1).

It should be noted that these criteria reflect the analysis from the perspective of one participant’s educational needs only, i.e. the learner’s. Viewing the Web resource design from the perspective of an educator or developer requires an extra important criterion, i.e., the amount of time or money spent on the development of an educational Web resource.

<table>
<thead>
<tr>
<th>Indicators of scientific and educational feasibility</th>
<th>User characteristics</th>
<th>Information and Technological characteristics</th>
<th>Indicators of source use</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Scientific feasibility</td>
<td>1. Ergonomic index (convenience of use) included:</td>
<td>1. Adaptive page layout</td>
<td>1. Estimated average number of page views (defining the potential user audience) over a certain period (for comparison with the following characteristics)</td>
</tr>
<tr>
<td>2. A number of factual mistakes</td>
<td>• Availability of a version for visually impaired learners</td>
<td>2. Average page loading time</td>
<td>2. The number of page views</td>
</tr>
<tr>
<td>3. Correspondence with the syllabus</td>
<td>• Easy access from various gadgets (PC, tablet, smartphone)</td>
<td>3. Average multimedia file loading time</td>
<td>3. The number of unique page views</td>
</tr>
<tr>
<td>4. Completeness of topic under study</td>
<td>• The correctness of text data (number of punctuation, syntactic and semantic mistakes)</td>
<td>4. Average material downloading time</td>
<td>4. The average duration of a page view (in correspondence with data volume available on the Web resource)</td>
</tr>
<tr>
<td>5. Availability of downloadable educational material</td>
<td>• The balance between text and visual material</td>
<td>5. The number of broken links (to non-existent pages, documents, images)</td>
<td>5. Copying content elements to the clipboard</td>
</tr>
<tr>
<td>6. A number of useful links</td>
<td>• Utilization of user-friendly information presentation (the F-effect rule)</td>
<td>6. Availability of text hyperlinks</td>
<td>6. Navigation</td>
</tr>
<tr>
<td>7. Lack of unethical information</td>
<td>• Lack of irritating advertisements</td>
<td>7. Resistance to misleading and incorrect user actions</td>
<td>7. Image scaling for more precise viewing</td>
</tr>
<tr>
<td>8. Availability of a glossary and abstract</td>
<td>• Availability of feedback</td>
<td>8. The average server response time</td>
<td>8. Conversion (following the links; downloading files; video viewing; listening to the audio files)</td>
</tr>
<tr>
<td>9. Availability of video and audio materials</td>
<td>• The orderliness of text and graphic elements (font size, highlighting, line length)</td>
<td>- Timely update of materials and material presentation methods</td>
<td></td>
</tr>
<tr>
<td>related to the topic under study</td>
<td>• The quality of multimedia material used (picture definition, audio, and video materials' bitrate)</td>
<td>Source: Author</td>
<td></td>
</tr>
<tr>
<td>10. Availability of supporting materials (illustrations, graphs, tables)</td>
<td>2. Esthetic index included the color design of the Web resource (utilization of Web design rules).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Required volume of didactic units of the material presented</td>
<td>3. Timely correction of system errors upon users' request.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. The difficulty level of educational material</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This nomenclature may be expanded for specific tasks and needs in the course of creating the educational Web resource. Table 2 features the comparison of criteria of eleven analyzed assessment models and the unique model formulated in this present study.
<table>
<thead>
<tr>
<th>No</th>
<th>Combined Criteria of 10 Existing Models</th>
<th>Criteria of the Proposed Assessment System</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Usability / Communication / Ease of use (perceived and actual)</td>
<td>User characteristics</td>
</tr>
<tr>
<td>2</td>
<td>Design / Structure</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Accessibility</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Content / Quality of explanation of the subject matter / Quality of practical exercises</td>
<td>Indicators of scientific and educational feasibility</td>
</tr>
<tr>
<td>5</td>
<td>Efficiency / Usefulness (perceived and actual)</td>
<td>Scientific feasibility + Convenience of text manipulation (font size, highlighting, line length)</td>
</tr>
<tr>
<td>6</td>
<td>Learnability / Learner support / Helpfulness</td>
<td>Availability of glossary and abstract. Availability of feedback.</td>
</tr>
<tr>
<td>7</td>
<td>Navigation / Navigability</td>
<td>Hypertext links.</td>
</tr>
<tr>
<td>8</td>
<td>Interaction / Quality of technological interactivity / Learner interaction and engagement / Compatibility</td>
<td>Partially: hypertext links, availability of subject-related video and audio materials, availability of supporting data (illustrations, graphs, tables), availability of educational material for downloading, number of useful links.</td>
</tr>
<tr>
<td>9</td>
<td>Appearance / Multimedia / Attractiveness</td>
<td>Availability of subject video and audio materials on the topic under study. Availability of supporting data (illustrations, graphs, tables). Quality of used multimedia materials (picture definition, audio, and video materials’ bitrate).</td>
</tr>
<tr>
<td>10</td>
<td>Architecture / Personalization</td>
<td>These criteria have not been considered in the present model because the goal of the model is to assess the quality of the educational page only, not the quality of the complete electronic educational resource.</td>
</tr>
<tr>
<td>11</td>
<td>Degree of alignment to standards</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Assessment and measurement / Quality of assessment materials</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Opportunities for deeper learning</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Instructional materials / Quality of instructional materials</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Errors tolerant / Controllability</td>
<td>Resistance to misleading and incorrect user actions.</td>
</tr>
<tr>
<td>16</td>
<td>Effectiveness</td>
<td>This criterion is similar to the group called Indicators of source use. However, it ignores the criterion called “time spent on the creation of the resource.”</td>
</tr>
<tr>
<td>17</td>
<td>Update / Up-to-date material</td>
<td>Timely update of material and methods of material presentation</td>
</tr>
<tr>
<td>18</td>
<td>Graphic design and multimedia quality. Utility of materials designed to support teaching</td>
<td>Quality of used multimedia materials (picture definition, audio, and video materials’ bitrate).</td>
</tr>
<tr>
<td>19</td>
<td>Functionality</td>
<td>Information and Technological characteristics</td>
</tr>
<tr>
<td>20</td>
<td>Platform</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Course overview and introduction</td>
<td>Partly: Availability of glossary and abstract.</td>
</tr>
<tr>
<td>22</td>
<td>Learning objectives</td>
<td>This criterion implies correspondence with the education principle: availability and feasibility</td>
</tr>
<tr>
<td>23</td>
<td>Authority</td>
<td>The Web site creator authority matters, but in the present model, primary attention has been paid to content assessment because the content quality is undoubtedly interconnected with Web developer’s professionalism.</td>
</tr>
<tr>
<td>24</td>
<td>Community / Social-organizational expertise</td>
<td>This criterion has not been considered yet and will be viewed at the next stage of the present study.</td>
</tr>
<tr>
<td>25</td>
<td>User Satisfaction</td>
<td>Indicators of source use</td>
</tr>
<tr>
<td>26</td>
<td>Speed of access</td>
<td>Average page loading time.</td>
</tr>
</tbody>
</table>

Source: Author
Conclusion
The major aim of this study was to develop a model to assess the quality of an educational Web resource from the point of view of its main user, the learner. The need for the model emerged because certain criteria had not been considered in previous models. In this regard, some of the assessment-related points have been described in more detail than in the previous models. The present work can be used for discerning criteria that form the foundation of an educational resource. Considering the quality of an educational resource influences the quality of education in general, ensuring Web resource quality is a priority for the educational community.

References
THE PARTICULARITIES OF (SELF-)EDUCATION OF ‘LEARNING TO LEARN’ IN A PRESCHOOL INSTITUTION
Goda Stonkuvienė

Abstract: This article discusses (self-)education of ‘learning to learn’ in a preschool institution. It emphasizes the particularities of this (self-)education in the context of pedagogues’ experiences. The (self-)education of learning how to learn at a preschool age is an essential foundation for lifelong learning, defined not only in documents of the European Union but also in those of Lithuania and ones regulating preschool education since 2014. This pilot research reveals pedagogues’ experiences in applied education practice, as well as features of the children’s (self-)education in ‘learning to learn’ in a preschool institution. Interviews provide an understanding of pedagogues’ approaches to the structure, planning, and development of the ‘learning to learn’ concept. They also reveal results on how to manage (self-)education, as determined by the children’s individual learning, experiences and abilities, learning topics initiated by them, and the significance of their educational environment. Pedagogues’ preparedness to develop children’s ‘learning to learn’ is expressed by the need for help necessary for them, to strive towards a more successful (self-)education of children’s ‘learning to learn’ in the preschool institution.

UDC Classification: 37; DOI: http://dx.doi.org/10.12955/cbup.v5.1033

Keywords: children’s learning to learn, preschool education pedagogues’ experiences, process of (self-)education of learning to learn, educational environment.

Introduction
The competence of lifelong learning is necessary for a person to develop a meaningful and successful life, and therefore underlines a person’s essential competencies. In accordance with the Recommendation of the European Parliament and the Council on Key Competences for Lifelong Learning (The European Parliament and the Council of the European Union, 2006), the competence of ‘learning to learn’ is described as an ability to learn persistently and successfully, to manage effectively (to plan, organize, and correct) an individual’s own learning independently, as well as in a group. Furthermore, ‘learning to learn’ is regarded a sphere, which, apart from offering new understanding and skills, provides values and beliefs that allow individuals to become more efficient, flexible, and organized with learning in different situations (Hofmann, 2008). The outcome of the learning to learn competence, as the majority of scientists acknowledge, is related to education in early childhood, as, according to Thanassis (2009), the whole education system seems inconceivable without the first step, i.e., preschool education. This first step helps shape a lifelong learning experience, and evidence suggests that important habits and approaches, that are inherent to lifelong learning, evolve at this age. Scientists (Broström, Johansson, Sandberg, & Frøkjær, 2012) note, that learning is a unity of care and education, where the focus is on a child’s welfare and the foundation of lifelong learning. Sprigle (1968) prepared the Lifelong Learning Program, which was created and developed with the assumption that early-age education has to help a child to know how to learn. However, French (2007) argues, that early-age child education is complex, dynamic, and interactive, where knowledge arises through transformed experience. Scientists researching childhood learning (Broström et al., 2012; French, 2007; Mustard, 2006; Smith, Cowie, & Blades, 2003) concentrate on how children participate and become involved in the learning process and with a rich learning environment, where children can investigate, touch, interact with environment, ask questions, raise hypotheses, and develop thinking. During the learning process, children’s relationships with other children and adults, their cooperation, a pedagogue’s responsibility and preparedness, as well as an ability to inspire children to know the world surrounding them, are all necessary. Parents’ involvement in their children’s learning is highly appreciated. In Lithuania, newly prepared documents regulating preschool education (Description of Preschool Age Children’s Achievements, 2014; Methodical Recommendations for Preschool Education, 2015), emphasize children’s learning to learn. These documents also note that a preschool-age child acquires substantial experience, and this becomes the foundation for further learning and undermines the success of lifelong learning. In these documents, learning to learn is described as a wish to learn something and a persistent pursuit of this aim. This is

1 Faculty of Education Sciences and Social Welfare, Šiauliai University, goda.stonkuviene@gmail.com
an ability to set the goals of learning or other activity, to plan how to achieve them, to choose relevant activities, to consider what was successful and what the outcomes of the activity or learning as well as further aims are. These documents oblige pedagogues to rethink in-depth about the available experience, to form a correct approach to learning to learn, as well as to reconstruct educational processes to develop the ability successfully. The above has led to the formulation of the main research questions: what are the pedagogues’ experiences in developing children’s learning to learn in the preschool institution, and what particularities of this development are accentuated. Therefore, the aim of this research is to analyze pedagogues’ experiences to reveal the particularities of learning to learn in the preschool institution.

Data and Methodology
To achieve the research aim, a pilot study was carried out by way of a guided interview approach, which is an appropriate way of approaching subjects on the definition of meanings and situations, as well as reconstructing their experience (Creswell, 2007). Six pedagogues consented in writing to volunteer for the study. To collect the research material, the researchers chose six subjects from a target group of preschool education pedagogues, with no less than 10 years of teaching experience (interval: 10-25 years) and in educating 5-year-old children. The pedagogues selected work in different preschool education institutions of Vilnius city. For the interview, the pedagogues were given five main questions, which covered an understanding of the ‘learning to learn’ concept, planning and organizing of learning to learn, the creation of an educational environment, and aspects of help needed for pedagogues. To collect more in-depth information, during an interview, a researcher would ask additional questions. Interview material was obtained using a phenomenological approach where a researcher seeks to interview a participant for self-expression of the research object (Husserl, 1989; Moustakas, 1994), in this case, their professional experience. Based on the research results and analysis of the content, meaningful categories and subcategories emerged from the ideas expressed by the research participants.

Research Results
In analyzing the answers given by pedagogues about the concept of ‘learning to learn,’ it was noted that their experience differed in how they described the main components (Tables 1-4). The pedagogues’ statements about how they understood learning to learn distinguished the seven subcategories (Table 1). In the concept of learning to learn, ‘formulation of learning aim’ received responses relating to a child’s ability to set and describe learning goals (Table 1). For ‘selection of means suitable for learning’ responses were around a child’s activity to achieve this aim. The pedagogues, while describing the concept of learning to learn, indicated that it is important that children perceive the significance of knowledge, and that this conditions the application of knowledge, that children set the goal on the basis of their own experience. In the subcategory, ‘child’s initiative and independence’ the responses emphasized a child’s initiative for a new experience, independence, and reflection. Some pedagogues’ experiences systematized in subcategory ‘motivation and willingness to learn’ suggested that children’s desire to know is essential while talking about children’s learning to learn and its development.

In analyzing the planning of learning to learn, the study defined five subcategories (Table 2). ‘Integrity of planning,’ revealed an integrated nature of learning to learn, emphasized by the pedagogues, i.e., responses indicated that this ability is developed in different spheres of children’s activities and education (Table 2). The majority of interview participants emphasized ‘targeted planning’ that the pedagogues prepare in advance for children’s learning to learn (Table 2). However, when the pedagogues prepare for a topic (subcategory ‘linking of planned topic to children’s experience’) they relate it to the children’s experience, plan considering children’s and group’s needs, and emphasize a pedagogue’s flexibility in education planning process (Table 2). The pedagogues, while talking about learning to learn from a child’s point of view, emphasized that planned topics and activities are often changed and amended, as determined by the children’s wishes, needs, and situations (subcategory ‘planning considering children’s and group’s needs’, Table 2). In the subcategory, ‘situation determined planning’ the pedagogues’ responses suggested that experience is reflected when a plan foreseen in advance is amended in accordance with unforeseen situation or case (Table 2).
Table 1: Component of concept of ‘learning to learn’ and answers from pedagogues

<table>
<thead>
<tr>
<th>Category</th>
<th>Subcategory</th>
<th>Supporting statements</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘Learning to learn’</td>
<td>Formulation of learning aim</td>
<td>“A child firstly has to be able to say what he/she will be striving for, what he/she wants to learn, i.e. to raise a learning aim”; “teaching a child to say what he/she wants...”.</td>
</tr>
<tr>
<td></td>
<td>Selection of means suitable for learning</td>
<td>“to select means in order to achieve this aim...”, “the means are important in order to achieve the aim...”.</td>
</tr>
<tr>
<td></td>
<td>Activity selection</td>
<td>“A child has to be able to select an activity...”, “...a child has to act, work”, “A child’s willingness to act...”.</td>
</tr>
<tr>
<td></td>
<td>Motivation for learning</td>
<td>“It is the most important to raise their motivation, that a child would want to know”; “a child’s willingness to want something is the basis of learning to learn.”</td>
</tr>
<tr>
<td></td>
<td>Activity reflection</td>
<td>“children’s reflection on what they would like to know...”; “for ‘learning to learn,’ it is important to discuss what children have learned, to find out gained experience,” “…they see what else they need to know”.</td>
</tr>
<tr>
<td></td>
<td>Child’s initiative and independence</td>
<td>“A child’s willingness to act, take initiative, his/her independence.”</td>
</tr>
<tr>
<td></td>
<td>Perception of significance of knowledge</td>
<td>“a child’s understanding why knowledge is necessary, that it is important to seek for knowledge”; “…it is important to what extent the gained knowledge is used practically...”.</td>
</tr>
</tbody>
</table>

Source: Author

Table 2: Component of planning of (self-) education of ‘learning to learn’ process

<table>
<thead>
<tr>
<th>Category</th>
<th>Subcategory</th>
<th>Supporting statements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspects of planning of (self-) education of learning to learn</td>
<td>Integrity of planning</td>
<td>“I integrate the development of ability of ‘learning to learn’ into all activities...”.</td>
</tr>
<tr>
<td>Targeted planning</td>
<td>“...I prepare a weekly plan”; “I always foresee a topic, prepare all means necessary for activity”; “…I feel responsibility, so I foresee what children will do, what means they will be able to select in order to achieve the aim...”; “…I want children to be active, have a possibility to act, so I get ready in advance...”.</td>
<td></td>
</tr>
<tr>
<td>Linking of planned topic to children’s experience</td>
<td>“We discuss with children the foreseen topic, what we already know about this topic, what we still need, what we would like to know.”</td>
<td></td>
</tr>
<tr>
<td>Planning considering children’s and group’s needs</td>
<td>“Activity is planned according to children’s needs”; “I plan considering the strengths and weaknesses of children’s group”; “Though I am ready for some topics, children’s wishes and needs make it change, so a pedagogue has to be flexible.”</td>
<td></td>
</tr>
<tr>
<td>Situation determined planning</td>
<td>“Plan is usually amended in accordance with the situation, or occurred event”; “An unforeseen event happens for group children, e.g. a tooth falls out, thus during that day we talk about this, and the planned topic is postponed to another day”.</td>
<td></td>
</tr>
</tbody>
</table>

Source: Author

The pedagogues’ responses from experience showed that, in the process of developing learning to learn, the pedagogues mostly emphasized and selected the children’s activity. This highlights that due to their different abilities to learn it is difficult for children to select an activity and that they need help from the pedagogue, who encourages the children to perform this activity further themselves (subcategory ‘need for help,’ Table 3). The pedagogues’ statements emphasize cooperation and that there is learning from each other (subcategory ‘cooperation while learning’, Table 3), the importance of children’s experience-based learning (subcategory ‘experience-based activity’, Table 3), and that there are discussion and reflection of activities performed by the children (subcategory ‘activity discussion and reflection’, Table 3). In the pedagogues’ statements, the children’s abilities to set the
goals were reflected upon (subcategory ‘formulation of learning aim’, Table 3). In the pedagogues’ opinion, positive emotions and encouragement of self-confidence seem important for the children as well (subcategory ‘positive emotions and promotion of self-confidence, Table 3).

<table>
<thead>
<tr>
<th>Category</th>
<th>Subcategory</th>
<th>Supporting statements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organization of (self-) education of ‘learning to learn’ process</td>
<td>Formulation of learning aim</td>
<td>“Children do not always succeed to raise the aim. More active children do this better”; “They look at each other and then say or do”; “Children raise aims very individually...”; “it is tried to find out what we want...”.</td>
</tr>
<tr>
<td>Experience-based activity</td>
<td></td>
<td>“An activity, when they can themselves try, touch, succeeded, failed, to experiment”; “Children want to try...”; “They look for ways how to learn or know this”; “...I encourage a child to try himself/herself...”; “It is important to arouse children’s curiosity, that it would be interesting for them, firstly, through experiential education.”</td>
</tr>
<tr>
<td>Need for help</td>
<td></td>
<td>“Children need help, today we are going to learn this and that. It is necessary to give some hints”; “...you give some hints, try to do together”; “Children’s ability to learn is not the same, so not all children come up with ideas what they will do, thus they are usually suggested with activity and then I pay more attention to this to that children would think themselves how to do this”; “...in order children would succeed it is necessary to show how to do this or I ask that more gifted children would do this...”.</td>
</tr>
<tr>
<td>Activity discussion and reflection</td>
<td></td>
<td>“After performed activities, we discuss and reflect them...”; “...we clear out whether it has succeeded, what he/she has lacked, what he/she would do differently...”; “...I ask what he/she would do differently”; “In discussing the activities we emphasize what new things he/she has learned”; “...I ask to tell me what he/she has been doing ...”.</td>
</tr>
<tr>
<td>Cooperation while learning</td>
<td></td>
<td>“Children want to tell what was important and interesting for them...”; “...we learn from each other”; “I encourage that children would cooperate with each other, teach each other, correct each other’s mistakes...”); “... to allow to tell about this, encourage, that later he/she would do his/her best again”;“...I ask them to tell friends, so general discussion is triggered, his/her own gaps of knowledge are seen”.</td>
</tr>
<tr>
<td>Positive emotions and promotion of self-confidence</td>
<td></td>
<td>“...to encourage the ability to be happy about this that you have learnt something new”; “...to be happy that you have done, that succeeded”; “...to encourage, promote them to be more self-confident, so they get used to think and express this in words”; “...you have to regularly encourage them to be happy with success, that a child would be brave...”.</td>
</tr>
</tbody>
</table>

The educational environment has a significant influence in the process of learning to learn. This is indicated by the pedagogues’ responses, as shown in Table 4.

The analysis of interview material revealed the pedagogues’ preparedness to develop the children’s learning to learn. This category can be broken into two subcategories: 1) the need for development and 2) the need for help to be provided for the pedagogue. Regarding the first subcategory, the emphasis is exemplified by these interviewee responses:

- “need to develop both in deepening the perception of the concept of learning to learn and practical aspects of the development of this ability”;  
- “I assess my preparedness as satisfactory”;  
- “I think that I have to deepen the experience in the development of children’s learning to learn, especially, it is difficult to manage educational process conditioned by situations”;
“previously learning to learn was not emphasized in the programme – thus I regularly keep interested in this how to develop this ability”;

“as this sphere of education is newly emphasized in preschool education, in critically evaluating my preparedness, I have to admit that it is necessary to deepen into both theoretical assumptions and especially in practical abilities of children’s learning to learn, as experience is gained while acting and looking for the best means and ways to implement this”;

“I am not fully prepared to implement successfully the requirement to teach children to learn.”

Regarding the second subcategory, ‘the need for help to be provided for the pedagogue,’ the following responses substantiate the case:

• “I would need methodical material about this how to develop children’s learning to learn”;

• “the descriptions of concrete successful cases would help to understand better how to successfully develop children’s learning to learn in kindergarten.”

Table 4: Component of educational environment favorable for (self-) education of children’s ‘learning to learn’

<table>
<thead>
<tr>
<th>Category</th>
<th>Subcategory</th>
<th>Supporting statements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Educational environment and its suitability for (self-) education of children’s ‘learning to learn’</td>
<td>Attractiveness of environment</td>
<td>“Environment is very important. If children come to the group and see some changes, then a big interest occurs. Children immediately notice a new thing, new game”; “Environment has to be attractive, arouse curiosity.”</td>
</tr>
<tr>
<td></td>
<td>Micro-climate in a group</td>
<td>“Good relationships are important for this, trust in a pedagogue, sincere communication”; “emotional environment is important that a child will not be afraid”; “micro-climate in a group and emotional environment are very important, that a child would trust in himself/herself, would not be afraid, would be able to perform spontaneously, would communicate and cooperate”.</td>
</tr>
<tr>
<td></td>
<td>Means for (self-) education</td>
<td>“A variety and quality of learning materials are very important”; “that there would be spaces, where there are a lot of materials, that he/she would know, be able to take them”; “sometimes there is shortage of materials, so I have to bring them, we agree with children that they would bring themselves, create learning materials ourselves”; “modern learning materials have a big influence, however, there is a shortage of them in kindergartens”.</td>
</tr>
<tr>
<td></td>
<td>Adaptation of environment for a child</td>
<td>“Environment has to be adapted to a child”</td>
</tr>
<tr>
<td></td>
<td>Family environment</td>
<td>“There are a lot of things which depend on the environment at home, or encourage a child to be interested in innovations, or a child is interested himself/herself, in this way children become more curious”; “Children together with their parents perform various tasks, they tell about this to other children...”.</td>
</tr>
</tbody>
</table>

Source: Author

Discussion

The results of this research distinguished several factors. First, the pedagogues’ experiences of the concept of learning to learn have not been fully expressed and do not reflect the overall perception of structural components of this ability. The scientists researching the concept of ‘learning to learn’ (Hofmann, 2008) emphasize the competencies necessary for an educator to support the process of children’s learning. Therefore, a clear understanding of learning to learn and its achievements determine the ability to develop this competence. The data obtained during the research about the pedagogues’ preparedness to develop the children’s ‘learning to learn’ highlight the need for improvement and help for a pedagogue. The data also provide insights into developing competence to evolve children’s ‘learning to learn.’ Information about the planning stage of the process of learning to learn reveals the pedagogues’ purposeful preparation, as well as the need for change and flexibility in this activity. These responses would be determined by topics initiated by the children’s interest, which depend on their different experiences in learning skills. This status highlights the context of ‘free’
education and reveals the existing expressions of educational interaction between children and pedagogues, as well as emphasizing the exceptional culture of children’s learning to learn. This concept is emphasized in the works by childhood researchers (Seefeldt & Barbour, 1998; Juodaitytė, 2004) and actualizes in-depth studies of pedagogues’ experiences. In organizing learning to learn, cooperation and mutual assistance at all stages of learning to learn are important, as substantiated by the children’s experience that was emphasized by the pedagogues. This amends and influences the change of a pedagogue’s experience. A pedagogue’s role is highlighted by promoting, initiating, and providing assistance to children while learning. The pedagogues’ statements about the development of learning to learn in the educational environment that are favourable for children’s learning to learn reveal controversial aspects and indicate the need for more detailed analysis of this issue.

Conclusion
The results presented in this article reflect the conclusions of a pilot research. The findings will be developed and widely discussed in future research stages, with the aim of examining, in greater depth, the tendencies observed in this research, and to formulate proposals for a more effective development of children’s learning to learn in the preschool institution.

References


ACCOUNTANT’S PROFILE: PERCEPTION OF STUDENTS AND PRACTITIONERS

Rasa Subaciene,¹ Kastytis Senkus²

Abstract: The profession of the accountant has many aspects. Accountants shape the largest amount of information in an enterprise and play an important role in the enterprise’s activity. This profession is highly regulated, very responsible and usually includes a wide range of topics: including but not limited to different spheres of accounting, formation of accounting policies, or even information system for enterprises. This suggests the need for an investigation into the accountant’s profile, in order to determine the set of features which ideally should be developed for the profession. The purpose of the article is to investigate the accountant’s profile from the perception of students and practitioners. For the achievement of this purpose the following methods were used: a questionnaire-based study, information systematization, comparison, and summarization. The results of the research from the study were used for the evaluation of the profile of the accountant, for the development of the necessary set of features an accountant should hold, and finally, the results may be used for the future assessment of accounting study programs of higher educational institutions.

JEL Classification Numbers: M40, M41

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Keywords: accountant’s profile, features, perception

Introduction

There is no enterprise, institution, or organization where accounting would not be used. Accounting is one of the first systems of gathering information for managing economic activity (Mackevičius, 2004). In any type of business, the existence of the accounting profession is required. The field of accounting is very large and includes but is not limited to: public accountants, internal accountants who work in industrial companies, finance and/or trade, accountants who worked in the government, and accountants as academics (Amilin, 2016). The information given by accounting comprises roughly 60% to 90% of all economic information, which is necessary to plan, analyze, and manage the activity of the enterprise while guaranteeing its continuance (Mackevičius, 2004). Accountants have to be the people who would help the managers of companies to with many tasks including: the introduction of new information on a company’s activity and its control forms in order to increase the responsibility of the employees, and to make management system of the company more effective (Mackevičius & Subačienė, 2016). This leads to the need for an analysis of the accountant's profile, which includes determining its features, and expressing their functions and responsibilities correctly. Although the perception of the accountant's profile may be different and may vary in respect of the students and the practitioners. An analysis of the accountant’s profile in this aspect will give us insights into development into the attributes of this profession.

The purpose of the article is to investigate the accountant's profile in the perception of students and practitioners. For the achievement of the purpose of this study, the following methods were used: a questionnaire-based study, information systematization, comparison and summarization.

Overview of researches on the accountant’s profile

The accountant’s profile was investigated by different authors from various countries in different aspects. Some researchers analyzed emotional and intellectual features of the accountant’s profession and their impact on the development of the career. Amilin (2016) investigated the role of self-confidence in moderating emotional intelligence towards career development of an accountant and made the conclusion that the higher the emotional intelligence of an accountant then the better the efforts for career development in the accounting profession are. The author also provided an opinion, based on his research results, that with good emotional intelligence an accountant is expected to establish good relations with fellow employees, superiors and subordinates so that objectives of organizations can be achieved simultaneously with the development of the careers of the accountants. Also, he states that the research results show that confidence can strengthen the effect of emotional intelligence on the career development of accountants (Amilin, 2016). Interesting results were

¹ Faculty of Economics, Vilnius University, rasa.subaciene@ef.vu.lt
² Vilnius University, Faculty of Economics, Vilnius University, kastytis.senkus@ef.vu.lt
presented Chelariu & Emil (2015), who investigated the psychological profile of professional accountants. They investigated other authors’ researches and stated (Chelariu & Emil 2015), “that 61% of an auditing firms’ partners have the type of personalities, which usually start from abstract concepts and create a general framework for perceiving the world, they do not like detail oriented work, while only 20% of auditing firms’ employees have the same type of personality”. (Chelariu & Emil, 2015).

Authors explained this by the necessity of the auditing firms’ partners to have a broad vision and have abstract thinking because of the need to have skills to solve unstructured problems. Employees of auditing firms do not have such needs (Chelariu & Emil, 2015).

Bogdan et al. (2016) designed the profiles of professional accountants and managers in the perception of master degree students. Scientists revealed three types of account profile: the liberal and independent professional accountant, the statutory professional accountant who is responsible for the compliance with the requirements of legal accounting and financial reporting, and the advisor professional accountant who advises the managers and owners of the company in order to develop the business’s activity and improve its performance. Under the results of the research the authors made the conclusions that the better that professional judgment is, the more the respondent views the accountant as statutory (following rules, regulations and principles). In addition, the authors determined a negative correlation between the professional judgment in accounting and the third profile of accountant – the advisor, signifying that the poorer the professional judgment in accounting, the more the respondent views the accountant as an advisor for the management, in addition, they concluded that none of the profiles were related to the attitude in uncertain circumstances and risk management, nor with creativity (Bogdan et al, 2016).

Researchers analyzed the accountant’s profile in terms of the support it gives to managers to design information on the enterprise for various spheres and policies. Grosu et al. (2014) investigated the accountants’ perception – as providers of the accounting information – in the role of management accounting in Romanian organizations. The research identified the accountants and managers’ perceptions regarding the management accounting information by investigating the accountants’ attitude regarding decision-oriented accounting (Grosu et al., 2014). Cernușca et al. (2015) studied the perception of professional accountants opposite to the managers regarding the approach of developing and substantiating the company’s accounting policies. Len et al (2016) investigated concepts and the content of an accountant professional judgment and proposed a general definition of the professional judgment of the accountant as the application of the necessary skills, knowledge and experience in the context of management, accounting standards, taxation, management accounting, and professional ethics under decision making processes aimed at carrying out accounting tasks (Len et al, 2016).

Lithuanian researchers analyzed the accounting quality in terms of the accountant’s qualification and the mandatory qualifying examination of Lithuanian accountants. Legenzova, Barbrauskaitė (2014) under the literature analysis stated, that the attitude of accounting information users to the enterprise's financial statements and the total accounting information quality depend on the personal accountants’ competence. Besuparienė (2016) investigated the role of the professional accountant in the accounting service enterprise and stated that subjects of legal entities relate accounting quality with the professional accountant and give priority to such accounting service enterprises, where professional accountants provide services. In addition, a professional accountant is expected to give consultations and recommendations for the business (Besuparienė, 2016). Raziūnienė et al. (2012) investigated the conception and attributes of the accounting profession in Lithuania in the aspect of the accounting profession as an element of the accounting system.

So, an accountant’s profile, competence, expected features, and functions were analyzed by foreign and Lithuanian authors. This article presents the investigation of accountant’s profile in the perception of the students and the practitioners.

**Research methodology**

For the investigation of the accountant’s profile a questionnaire was built. The structure of questionnaire is presented in Table 1. The first two parts of questionnaire were prepared for the identification of respondents and enterprises, which they represent. The third and fourth parts – for the determination of tasks, functions, time structure and basic features required by the accountant. The questionnaire was presented on-line on the website: www.apklausa.lt from 28th of February till 7th of
March, for second, third, fourth years bachelor studies’ students, first year master studies’ and doctoral studies’ students, as well as for practitioners of different enterprises in Lithuania.

<table>
<thead>
<tr>
<th>Table 1: The structure of questionnaire</th>
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<tbody>
<tr>
<td><strong>Part of questionnaire</strong></td>
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<tr>
<td>Demographics</td>
</tr>
<tr>
<td>Type of enterprise</td>
</tr>
<tr>
<td>Time structure and functions</td>
</tr>
<tr>
<td>Features of accountant’s profession</td>
</tr>
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</table>

Source: Authors

A Likert scale of 5 points was used for evaluating the features of the accountant’s profession. The features of the accountant’s profession were distinguished according to the proposition of Mackevičiūs, Subačienė (2016). Authors presented 3 groups of features: 1) professional, 2) personal and 3) social. The professional group of features consists of such person’s abilities: to record economic transactions on accounting documents and registers; to prepare financial statements; to form financial accounting policy; to form tax accounting policy; to form management accounting policy; to form an information system for the company; to plan, analyze and evaluate company’s performance; to present the analysis of the results; to support internal control systems; to make decisions; be interested in innovations and changes in regulation. The personal group consists of such features as: responsibility, accuracy, sense of duty, independence, consistency, flexibility, quick thinking. Finally the social group consists of features includes such abilities: to communicate with colleagues and persons from other institutions; to cooperate with colleagues and persons from other institutions; and to work in team. Respondents in addition were asked to indicate other features, which might be important for the accountant’s profile. The survey involved 66 respondents.

Research results

59.7 % of respondents were students. More than half (53.7 %) was students of bachelor studies, 4.5% - students of master studies, 1.5 % - doctoral studies’ students. 40.3 % respondents were practitioners. This number comprises of 3 % of certified accountants, 9 % of chief accountants and 28.3 % different positions of accountants. Regarding the demographic indicators, 55.2 % of respondents were younger than 25 years old, 22.4 % was in range of 26-35 years old, 9 % - in range of age groups of 36-45 and 46-55 years, the rest were older than 56 years. Accordingly, to the age of respondents correlated to work experience with the analysis results showing, that 64.2 % of respondents has less than 5 years’ work experience, 14.2 % - from 6 to 10 years, and 7.5 % from 11 to 20 years. The analysis of respondents’ education shows, that 31.8 % had a bachelor diploma, 29.5 % - a secondary or special education certificate, 14.8 % - a master diploma, 3.4 % - a doctoral diploma and what is interesting 5.7 % of respondents had national and international trainee center’s certificates. The rest of the respondents had college diplomas.

The structure of the enterprise’s category was quite consistent 35.8 % respondents were form small enterprises, quarter were from micro and the same part from large enterprises, rest were form medium enterprises. Enterprises perform in all activity types (according to classification of economic activities), the most popular was financial and insurance activity which made up 20.6 %, the other types of activity varied from 1 % to 7.8 %.

For analysis of types of areas, the accountant should perform all the accountant’s functions which were divided into financial accounting (by spheres), management accounting (by spheres) and other spheres. The results of research show that students and practitioners consider that the profession of accountant as related with financial accounting (mostly with cash accounting, accounting of labor expenses and other financial account spheres), less than with management accounting (cost accounting, budgeting and planning were distinguished). Respondents emphasized financial analysis and internal control system spheres of other activity’s type.

Analysis of distribution of time shows, that 25 % of students presume that communication with clients takes less than 10 % of the whole time structure, 15 % of students think, that it take around 15 %, 13...
% - around 25% and 11% - from 41% to 50% (Figure 1). Rather similarly, the perception of practitioners on the distribution of time for communication with clients – approximately the same part of respondents consider, that communication with clients is at almost the same proportion of time, but generally they consider that for this activity accountants spent more time. Regarding the opinion of students, the communication with persons of other institutions (tax agencies) and enterprises takes from less than 10% (13% of students) to 30% (32% of students), but 59.7% practitioners think, that this activity takes less than 20% of the total time. The tendency of this presumption of consultation/discussion with colleagues is rather similar, except a slight difference in consideration of practitioners, that it takes more time (11% of practitioners defined for this activity less than 10% of time, and 2% of students, but one third of both groups think, that communication/discussion with colleagues takes less than 30%). Regarding the main activity (accounting procedures), the general tendency shows, that students assign more time for it and more time for training (attendance to seminars, courses and similar): 22% of students define less than 10% for training activity and as almost 38% of practitioners consider, that till 10% of time should be distributed for training. Other activity was defined by practitioners as “financial analysis, internal audit / control procedures”, “new ideas implementation, development”, by students - “to think how to improve the financial position of an entity”, “developing the knowledge of accounting by himself”, “reading the articles, increasing qualification”, “investigative interest related to bettering one's technical know how on the accounting profession” or “knowledge and skills”. So, students were more oriented to increase the qualification of the accountant profession, but 51% of students and 66% of practitioners consider, that other activities takes less than 30%.

Figure 1: Distribution of time

Abbreviations: POS - perception of students, POP - perception of practitioners

Source: Authors

Grosu et al. (2014) also evaluated the time distribution of the account’s profession and their research results showed, that accountants’ time for different activities were distributed in such way: for data processing – 25.44%, cost analysis and control – 16.67%, preparation of financial reports – 15.09%, preparation of fiscal reports – 11.75%, ensuring the relationship with banks – 6.31%, legislation study – 15.09%, other activities – 9.65%. Authors stated that preparing the information for external users represents the main objective of the accountants within organizations (Grosu et al., 2014). It is not possible to compare both study’s results, as the information is prepared in different ways.

Table 2 shows that practitioners evaluate accuracy, responsibility as the most important features of the personal group. Students consider these features in a rather similar way, but there were also respondents, who think, that these features may be unimportant. Students define a sense of duty, quick thinking, flexibility and consistency as important features for the accountant’s profession, but practitioners give more attention for these features.

Table 3 shows the results of analysis of features of professional group. It is interesting, that according to students’ opinions all listed features may be evaluated as most unimportant, especially the ability to plan, analyze and evaluate a company’s performance, ability to support an internal control system, the ability to make decisions, be interested in innovations and changes in regulation. Accordingly, about

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40% of practitioners mentioned features as most important. Practitioners also assess as more valuable almost all the features than students assessed, except for the formation of different accounting policy types and the preparation of financial statements.

Table 2: Features of personal group

<table>
<thead>
<tr>
<th>Likert scale</th>
<th>Perception of students</th>
<th>Perception of practitioners</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Accuracy</td>
<td>2.6</td>
<td>0.0</td>
</tr>
<tr>
<td>Responsibility</td>
<td>2.6</td>
<td>0.0</td>
</tr>
<tr>
<td>Flexibility</td>
<td>23.1</td>
<td>25.6</td>
</tr>
<tr>
<td>Sense of duty</td>
<td>7.7</td>
<td>10.3</td>
</tr>
<tr>
<td>Quick thinking</td>
<td>2.6</td>
<td>23.1</td>
</tr>
<tr>
<td>Independence</td>
<td>10.3</td>
<td>12.8</td>
</tr>
<tr>
<td>Consistency</td>
<td>2.6</td>
<td>7.7</td>
</tr>
</tbody>
</table>

Source: Authors

Table 3: Features of professional group

<table>
<thead>
<tr>
<th>Likert scale</th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Ability to record economic transaction to accounting documents and registers</td>
<td>2.6</td>
<td>0.0</td>
</tr>
<tr>
<td>Ability to prepare financial statements</td>
<td>2.6</td>
<td>5.1</td>
</tr>
<tr>
<td>Ability to form financial accounting policy</td>
<td>2.6</td>
<td>0.0</td>
</tr>
<tr>
<td>Ability to form tax accounting policy</td>
<td>2.6</td>
<td>0.0</td>
</tr>
<tr>
<td>Ability to form management accounting policy</td>
<td>2.6</td>
<td>0.0</td>
</tr>
<tr>
<td>Ability to form information system of the company</td>
<td>5.1</td>
<td>15.4</td>
</tr>
<tr>
<td>Ability to plan, analyse and evaluate company’s performance</td>
<td>7.7</td>
<td>7.7</td>
</tr>
<tr>
<td>Ability to present analysis results</td>
<td>2.6</td>
<td>7.7</td>
</tr>
<tr>
<td>Ability to support internal control system</td>
<td>7.7</td>
<td>2.6</td>
</tr>
<tr>
<td>Ability to make decisions</td>
<td>10.3</td>
<td>15.4</td>
</tr>
<tr>
<td>Be interested in innovations and changes in regulation</td>
<td>7.7</td>
<td>2.6</td>
</tr>
</tbody>
</table>

Source: Authors

Regarding to the analysis of features of the social group results, presented in Table 4, it may be stated that all types of features practitioners assessed as more important than students. Students consider this features’ group as less valuable and important to the accountant’ profession.

Table 4: Features of social group

<table>
<thead>
<tr>
<th>Likert scale</th>
<th>Perception of students</th>
<th>Perception of practitioners</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Ability to communicate with colleagues and persons from other institutions</td>
<td>2.6</td>
<td>7.7</td>
</tr>
<tr>
<td>Ability to cooperate with colleagues and persons from other institutions</td>
<td>2.6</td>
<td>0.0</td>
</tr>
<tr>
<td>Ability to work in team</td>
<td>2.6</td>
<td>2.6</td>
</tr>
</tbody>
</table>

Source: Authors

General tendency shows that practitioners assess all groups of features as more important and consider that accountants spend more time for communication with clients, while as students are more oriented in increase of qualification. Our research results coincide with the results of the Rumanian researchers, who stated that a more correct judgment is given by respondents who already work in this field and also by the ones that consider that the accountant should be a professional guided by rules, regulations and the main principles of his or her occupation (Bogdan et al., 2016). Bogdan et al. (2016) found out...
that there is a significant correlation between the scale of professional judgment in accounting and the opinion of students regarding the fact that high quality professional judgment is reflected in the preparation of relevant financial information.

Wen et al. (2015) examined “the factors influencing the decisions of accounting students in China concerning the certified public accountant (CPA) designation” (Wen et al. 2015). Authors made the conclusion (Wen et al. (2015), that “students need to realize that accountants are more than number crunchers. Today’s CPAs are engaged in many managerial functions besides bookkeeping: they are actively involved in business development, estate planning, management consulting, retirement and college planning, and investment counseling. It is urgent to educate students and the public about the industry’s changing profile. Finally, universities might partner with accounting firms to provide more internship opportunities” (Wen et al., 2015).

**Conclusion**

The accountant’s profile was investigated by different authors in aspects of this profession’s competences, psychological characteristics, and the functions they have to perform. The perception of students and practitioners on profile of accountant is presented in this article.

The analysis of the questionnaire based study results showed that both groups of respondents assessed financial accounting as the main sphere for performance of an accountant’s functions. Cash accounting and accounting of labor expenses were mentioned as the most important areas of financial accounting. Management accounting was not distinguished as a significant type of accounting for the performance of the accountant’s functions, but cost accounting and budgeting planning spheres were indicated as the most important areas of management accounting. Accounting of intellectual capital was defined as the least significant area of other activities of accounting. The results of analysis of distribution of time show, that practitioners indicate more proportion of time for communication with clients, persons of other institutions, tax agencies, and colleagues, while students suggest that more time may be spent for other activities especially for the development of qualification. Although both groups agree that, the biggest part of time goes to the main activity. The analysis of the features of the accountant’s profession let us state, that practitioners indicate all features of personal and social groups more significant to this profession than students.

**References**


REGARDING THE TRANSFERABILITY OF SKILLS AND COMPETENCY AND THEIR DEVELOPMENT IN THE COURSE OF EDUCATION IN MATHEMATICS IN PRIMARY SCHOOL

Peter Petrov, 1 Maria Temnikova 2

Abstract:

Introduction: The building up of transversal competencies and the creation of transferable skills is one of the most important factors for efficient education of mathematics in primary school.

Purpose of study: The purpose of this article is the development of the concepts of transferable skills and transversal competencies, as well as the alternatives for their creation and development in and through the education of mathematics in Grades 1 – 4.

Methods: For the purposes of this study, longitudinal qualitative and quantitative research was applied. The following methods were used: experiment, observation, test, analysis of the content, and mathematical-statistical methodology for data processing.

Findings and results: The percentage of the Grade 4 students who wrongly correlate the text of the mathematical task to a given mathematical model decreased from 42,31% to 3,85%. Also, the percentage of the students who were not able to create a mathematical model decreased from 38,46% to 7,69%. The percentage of the students who correctly created mathematical models increased from 26 % - 38%.

Conclusions: Transferable skills and cognitive transversal competency for processing of information were developed completely.

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Keywords: strategies, skills, competences, competencies

Introduction

The transition to a post-industrial and informational society in world scale is characterized with the globalization of the economy and the financial resources, as well as with high mobility of the work force which requires new types of competencies and skills in personal, social and professional aspects. It can be said that the world trends related to the content and the organization of education are: orientation to understanding and rationalization of the knowledge; restriction of the role of the reproductive knowledge; and stimulation of students’ creativity.

Purpose, object, subject and aim of the study

The purpose of the study is to systematize and develop a basic theoretical formulation of transversal skills and transversal competencies. Following this, to create a system and series of mathematical tasks, and to study the level of transversal competencies forming in and through education of mathematics in Grade 4.

The object of the study is the process of education of mathematics in Grades 1 – 4.

The subject of the study is the combination between productive and reproductive strategies, and the related approaches and methodologies of work for development of cognitive transversal competency for the processing of information and the development of transferable skills in the education of mathematics in Grades 1 – 4.

To achieve this goal the following tasks needed to be completed:

1. The theoretical analysis of works of Bulgarian and foreign authors related to the competency approach, competencies, competencies, transversal competencies and transferable skills.

2. To apply problem-productive strategies for the development of technological and methodological systems of work in the education of mathematics.

3. To study the efficiency of the applied problem-productive strategies as part of the methodological system of work in the educational process of mathematics in Grade 4.

1 Trakia University – Stara Zagora, Pedagogy Faculty, pdp@dir.bg,
2 Trakia University – Stara Zagora, Pedagogy Faculty, mpt66@abv.bg
The following criteria were proposed: the knowledge and skills to choose a mathematical model and to work with it; the knowledge and skills to create a mathematical model; the knowledge and skills to bring into proper correlation to the initial one newly received information.

In psychology, pedagogy, and the particular methodologies there is no common understanding in the differentiation between the nature of skills and habits in general. There is a widespread view that the skills represent “knowledge in action” and the habit is an action whose components have become automatic as a result of their multiple repetitions (Andreev, 1987, p.90). On the other hand, the founder of cognitive psychology, Ulrich Naiser, suggested that the cognitive activity of a person is better explained and associated with the process of acquiring of skills. (Naiser, 1976).

Another concept with a strong explanatory function offers the view that “during scrutinizing the process of acquiring the skill to perform certain activity in its entirety, the structure of this skill (this could be painting a picture, singing, drawing, solving mathematical tasks, etc.) often appears to be multicomponent. This will include not only the perception, understanding, and coordination but also the theoretical and the methodological knowledge, creative thinking, and different habits (perceptive, intellectual, and life driving”). (Ylin, 1986, p.139). In this case the issue with the automation of skills is not addressed because the skill as an entire process cannot be automated and habits represent part of the skills.

There are two aspects of understanding of the concept of “skill” – the aspect of action and the aspect of operation. The first one is related to the ability to do whatever action, and the second one the ability to perform certain activities and operations.

Studying the skills to solve mathematical tasks in the aspect of action supposes that the main substance in this skill is the quality and the efficiency of execution of the task. In the same time, automation of this skill is not necessarily an indication for the possession of this ability. These aspects suggest a complicated hierarchy structure involved in the skill to solve mathematical tasks.

Brunner pointed out something very important and namely the fact that “the process of forming of habits and the process of solving of mathematical tasks are very similar in the early age of little children” (Brunner, 1977, p. 272). According to us, this means that the two processes facilitate each other.

The relationship between the skill and the ability to solve mathematical tasks is displayed in the activity “task resolving” where these two features represent the two sides of its effective application. The difference is that the skill to solve mathematical tasks is related mainly to congenital (inborn) qualities. This would assure constant success in one or more activities and can explain the differences in the ease and swiftness in acquiring the necessary knowledge and skills for solving mathematical tasks.

Boris Minchev developed an interesting concept affirming that the transversal function of skills is low due to their locatedness. He based his conclusions on the context nature of the skills, especially the ones that have in their structure multiple components of acceptance and action. This concept in certain respect can be supported by the following fact. Through big scale studies performed during the second half of 20-th century it was found that the memory and perception of high level chess players do not differ from the ones of the ordinary people when they are not in a process of chess playing. “Actually, the general intellect is transversal, i.e. the capability to form skill, but not the structure of the skill itself.” (Minchev, 1991, p.80).

The relationships are oriented to the system of values in life and shall be analyzed as a complex of assessment reasoning and emotional charge directed to the environment – to the nature, to society as a whole, to human relations. Typically, once formed, these relations are very stable.

For the first time in 1996, Bernard Ray (Ray, 1996, p.169) brought up the issue of transversal competencies. He noted that through “his transversal competency a man gives sense to the situation… As a result, transversality can be described as the simultaneousness which exists between multiple situations united by their common sense assigned to them by the subject…” Yana Merdzanova wrote about the existence of two aspects of transversal competency: as function and as intention. “In reality, the competency-function cannot go beyond the specifics but the competency-intention as a point of view, as an approach, as a manner, as a style – it can and it must be pedagogically formed and to be transferred through different ages and activities. This is the sense that every person assigns to the specific situation in which he acts through his narrow competencies”. (Merdzanova, 2005, p. 62)
It is well-known about the existence of four main groups of transversal competencies defined by Bernard Ray: “autonomy and responsibility, communication competency, organizational and methodological competency, and cognitive competency for processing of information.” (Merdzanova, p.165). Transversal competencies as such are universally valid. It seems that during the process of studying the ability and the skills to solve mathematical tasks as integral parts of the transversal competencies, the accent shall be put on their semblance of competency as a style and approach for solving mathematical tasks. The process of “transversing” presumes an active mind and before all, generalization. The last requires the actualizing of existing knowledge, abilities, habits, relations in respect of orientation in a new mathematical task (analysis, abstract thinking), the creation of conditions for qualification (assessment) of certain objects, and the connection of the new mathematical task to antilog ones, as well as summary and generalization. All this represents the foundation of the „actual transversal process.” (Karagyozov, 1984, pp.77-83). The transversion of experience depends on personal subjective qualities like the ability to do wide classification ns, and the ability to participate in “associative games” and flexible thinking. This description demonstrates that the realization of an efficient transversal process would require solving of mathematical tasks representing complicated, repeatable situations.

Transversion is an important psychological pre-requisite for fast and easy acquiring of new knowledge, habits, and skills. It is simultaneously a condition for learning and a result from learning, “a bridge between present experience and newly acquired ones.” (Tsanev, 1968, pp.187-235). The physiological basis of the transversion is the mechanism for relocation or switching over of the relative connection due to mutual influence (not always realized) and the interconnection of one system of temporary nerve connections with another.

It is worth mentioning three circumstances that the possibility for transversion can be explained with: the unity of the brain activity in entirety; the integrity of the person where each particular acquisition of ability and skills has got an effect on the entire system; similar and/or identical elements in different kinds of labour and study; the flexibility of the mind, of the application of the habits, of the dynamic stereotype and its transversing from one area to another. (Dessev, 1996, p.461).

A process for systematic accumulation of educational competences in mathematics is realized in each one of the Grades (from Grade 1 to Grade 4) of the primary school. These educational competencies represent a system of interacting specific mathematical competencies and key competencies. The teachers are of significant importance in this long and complicated process. They are the professionals who shall direct their efforts towards the creation of universal competencies, transversal competencies and transferable skills which will help to avoid the fragmenting of knowledge, in order to create specific competencies not only in respect of that particular subject but also in respect of all other subjects which are being studied.

This work studies the cognitive transversal competency for the processing of information and transferable skill as an object of creative diagnostics.

An education in mathematics in Grades 1 – 4 aiming at creating a competency can be with good quality if this education is cast and developed through the introduction of tactical and strategical studying. This is the reason why these two types of studying are used to achieve the final goal.

During the process of studying existing works related to productivity, productive thinking, and productive activities of the students it was found that there are multiple publications about the subject, for example: Vigotsky. In all the studies, one can clearly identify the connection between the productivity and the aims, the achieved results from the education on one side and the process of achieving these results on the other. In the United States and European countries specialists apply effective productive didactical strategies and approaches towards education. Priority is given to the active studying “through discovering” during the process of the activity.

Two approaches for teaching mathematics in the primary school can be conditionally distinguished. The first approach reflects the traditional education and is of a re-productive nature, offers knowledge prepared in advance which the student must learn and reproduce. The second approach aims at overcoming the re-productivity in the process of education. It activates the mental activity, creativity, active participation, and independence of the students. Jiordan relates this to “studying through discovering” (Jiordan 1995, pp. 114-115) and to “following the spontaneous needs and interests of the
students.” On the basis of these two approaches it is possible to build up two types of strategies: reproductive and productive. A problem-productive strategy: complex technology together with its related methodology of work was built up over the research process. During the application of the problem-productive strategies in the process of solving mathematical tasks, the competency approach was used and the following productive and reproductive methods were combined: variable exercises, creative type exercises, heuristic discussions, comparison, inductive and deductive methods, analytic and analytic–synthetic methods, reproductive discussion, exercises after given sample, demonstration, and observation, etc. During its application in the educational process and based on the options offered by D. Coats and J. Voz (Vitanov, 1999) priority was given to one of the following activities: activities of the students subjected to the study and related to observation and communication during applying of the strategy, practical activities of the students subjected to the study; mathematical research done by the students; and illustrative practical activity of the students during applying of the strategy.

For the purposes of the application of the methodology system of work, a problem-productive strategies series of mathematical tasks were created. Each one of them was related to a separate chapter of the educational content in mathematics and was aimed at acquiring knowledge, the creation of transferable skills, and the building up of cognitive transversal competency for the processing of information. For the creation of the series of mathematical tasks our main standing points were: they are the main tool for the formation of transversal competency, mathematical tasks from different areas were included for the purposes of forming separate parts of the transversal competency; they are mutually complimentary and create complex repeating situation.

Results

During the period 2004 – 2012, research regarding the creation of transversal competencies in the education in mathematics in Grades 1 - 4 was performed (Temnikova, M., Own scholarly essay, 2016). 112 students were subjected to the study. The results regarding transferable skills and cognitive transversal competency to process information are presented in this article.

From one side, the set of tools for diagnostics was created after analysing international projects TIMSS, and PIRLS and PISA as they are leading examples in the area of testing the success of students. From the other side, the state legislation of Republic of Bulgaria and the requirements regarding the education in mathematics in Grades 1 – 4 were also subjected to deep analysis for the purpose. Analysis of the results of the tests from the entry and from the exit diagnostics as well as a comparative analysis of these results was performed. The data from the comparative analysis of the entry and the exit diagnostics related to the knowledge and the skill to select a mathematical model, to create a mathematical model, and to correctly correlate newly received information to initial information, are presented in the below diagrams.

The received data demonstrate the presence of a statistically significant difference between the results received from the entry and from the exit diagnostics of the relative portions of students subjected to the study in respect of knowledge, skills, and transversal competencies. After applying the methodology system of strategies, methods, and procedures the percentage of the Grade 4 students who worked correctly was increased with 34% - 38% on average. The percentage of the students who
didn’t know and failed to correlate the text of the mathematical tasks to a given mathematical model decreased from 42,31% to 3,85%. The percentage of the students who correctly created the mathematical model increased from 26% to 38%. The percentage of the children who did not know and failed to create a correct mathematical model decreased from 38,46% to 7,69%. The level of knowledge, skills and specific mathematical competencies of the Grade 4 students to create and work with a mathematical model increased. The percentage of the children who worked correctly and fully completed the mathematical tasks increased from 38% to 46%. The percentage of the students who did not know and failed to create a correct mathematical model decreased from 42,31% to 3,85%. There were no students who failed to solve five of the tasks included in the exit level test.

**Figure 2:** Comparative analysis of the knowledge and the skills of the students to create a mathematical model

<table>
<thead>
<tr>
<th>Task</th>
<th>0</th>
<th>50</th>
<th>100</th>
<th>150</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task 10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task 9</td>
<td></td>
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<tr>
<td>Task 8</td>
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<td></td>
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<tr>
<td>Task 7</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Task 6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Author

**Figure 3:** Comparative analysis of the knowledge and the skills of the students to correlate correctly new information to the initial information.

<table>
<thead>
<tr>
<th>Task</th>
<th>0</th>
<th>50</th>
<th>100</th>
<th>150</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task 7</td>
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<tr>
<td>Task 6</td>
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<tr>
<td>Task 5</td>
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<td></td>
<td></td>
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<tr>
<td>Task 4</td>
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<tr>
<td>Task 3</td>
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<tr>
<td>Task 2</td>
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</tr>
<tr>
<td>Task 1</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Source: Author

**Conclusion**

Based on the results of the research, the following conclusions can be made: transferable skills and the transversal competency to process information are getting developed completely. The Grade 4 students learn to study a group or groups of data, apply different techniques for processing and selection of information, can analyse, compare and synthesize, can decode information, can transfer from one semantic system to another and from the language of the text of the task to the language of mathematics, and can induce and deduce.

The development of the transversality as a characteristic of the skill is not proportional to its efficiency. High transversality of a particular skill could occur in the stage of “advanced beginner” and later be lost in the stage of “expert,” but the efficiency could be greater. In this case it is not appropriate to separate a group of transversal skills as the basis for their classification as it does not have permanent structure. High transversality doesn’t necessarily mean high efficiency. The fact that a particular skill has got higher level of transversality will not authorize the attribution of characteristics like universality and efficiency to it.

It will be more appropriate to talk about transversal competencies (which include skills as well) than about transversal skills. The transversal competencies do not automatically lead to the development of efficiency in a particular activity.
Instead of talking about transversal skills, it will be more appropriate to talk about skill to transverse. Thus we preserve in greater extend the authenticity of the phenomenon that we study.

The form of the mathematical task for the development of a skill to transfer shall impose a complicated situation in closer areas. There are similarities between the approach of imposing a constructive mathematical task and the approach of involving the development of descriptions of the act of solving the mathematical task. Also, there are similarities in the most important specifics of the mathematical tasks like variability, anticipation of several alternatives of the task solution, analysis at the end of the mathematical task, and the offering of several similar approaches for the task’s solution, as well as searching of similarities in the process of their application (open transversality).

References
RESEARCH ON THE MANAGEMENT SKILLS AND ABILITIES ACQUIRED IN THE MILITARY EDUCATION SYSTEM

Venelin Terziev,¹ Nikolay Nichev²

Abstract: The socio economical changes in the Bulgarian society leave their traces in all spheres of public life and in the military education system in particular. The implemented reforms in the Republic of Bulgaria assign to military higher schools the task to train officers with management skills and abilities at a higher level, ready to solve efficiently complicated and versatile tasks. The specific character of the non combatant officer’s activity, sets increased requirements to their training and assurance of its effectiveness. The non combatant cadet’s management skills and abilities appear to be significant indicators of improving the effectiveness in the military professional training for management activity and developing a readiness for the timely taking of quality management decisions. The research target is the professional military training of the future logistic officers. The research aim is to analyze the acquired skills and abilities in the course of professional military training management and to related to them management effectiveness. The methods of research are: theoretical analyses of the military education literature, inquiry, statistics, substantiation and general conclusions.

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UDC Classification: 378

Keywords: military training, training of cadets

Introduction

Contemporary challenges in the system of higher education has led to significant reforms in the educational system in the Republic of Bulgaria. The military education system is not exempt from these changes and the training of officers targeted to the application into practice of the acquired knowledge and skills and to strive constantly for perfection of their professional skills is a topical question. The specific character of the non combatant officer’s activity, sets increased requirements to their management skills and abilities, especially concerning decision taking and management activities.

The management abilities can be inborn or acquired. Logical thinking, the power of observation, concentration ability, perception power and communication skills are inborn abilities. The acquired abilities are: determination, dynamics, reliability, responsibility, persistency, self-confidence, and accuracy.

Quality is a category which describes the characteristics of a particular object. Nowadays this is subjected to serious discussion in the social and economic sciences and is one of the basic concepts, upon which a number of political, management and organizational theories are being grounded.

The ability is the possibility to succeed in a given task or undertaking, a way of self-dependent use of knowledge and concepts, intellectual processes and physical activities for the solution of theoretical and practical tasks.

Management abilities are a combination of the following: meaningful abilities – to perform a certain profession successfully and to contribute to the implementation of a specific activity; competencies for team work, including the skills to communicate, in order to solve different kinds of conflicts; conceptual competences – ability to foresee the future development of the organization and to take the correct strategic decisions; abilities to diagnose and analyse the problems, which creates possibilities to work out various alternatives in decision making; and management competencies.

The management activity of the logistics officer of the troops, compared to the commanders of fighting formations, is more versatile and has peculiarities, which must be taken into consideration in the training process of future logistic officers for the implementation of their professional military activity.

¹ Vasil Levski National Military University, Veliko Tarnovo, Bulgaria; University of Rousse, Rousse, Bulgaria; University of Telecommunications and Post, Bulgaria, terziev@skmat.com
² Vasil Levski National Military University, Veliko Tarnovo, Bulgaria, nicheff@abv.bg
Material and methods

The research work was carried out in the Land Forces Faculty of the Vasil Levski National Military University during the period 2014 – 2016. The research embraces cadets from the specialties “Organization and management of the tactical subdivisions for logistical support” with specializations “Non-combatant troops and fuel and lubrication materials” (FLM) and “Movement and transport”; “Organization and management of the military formations on a tactical level” with specialization “Material resources, movement and transport”. The examined group consists of 49 people, separated into the following subgroups (SG): SG1 - 9 Cadets, SG2 - 6 Cadets, SG3 - 7 Cadets, SG4 - 7 Cadets, SG5 - 11 Cadets, SG6 – 9 Cadets (Table 1).

Table 1: Summarized data of the examined group

<table>
<thead>
<tr>
<th>Sub-group</th>
<th>Military specialization</th>
<th>Year of training</th>
<th>Curriculum</th>
<th>Number of students</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Non-combatant troops and FLM</td>
<td>5th</td>
<td>07</td>
<td>9</td>
</tr>
<tr>
<td>2</td>
<td>Movement and transport</td>
<td>5th</td>
<td>07</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>Non-combatant troops and FLM</td>
<td>4th</td>
<td>07</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td>Material resources, movement and transport</td>
<td>second</td>
<td>12</td>
<td>7</td>
</tr>
<tr>
<td>5</td>
<td>Material resources, movement and transport</td>
<td>third</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>6</td>
<td>Material resources, movement and transport</td>
<td>second</td>
<td>12</td>
<td>11</td>
</tr>
</tbody>
</table>

Source: Authors

The research was carried out in three stages:

- First stage – examination of the literature and selection of the research methodology;
- Second stage – The study was conducted. The empirical information was collected using the inquiry method in the format of a direct group questionnaire, comprising all the members of the examined community;
- Third stage – analysis of the obtained results and the drawing of conclusions.

A methodology for the identification of the personally possessed management competences, their abilities, and the grade of their display was used in the research. The methodology comprised 50 questions, each of them having two possible answers to choose from. Having analyzed the given answers of the examined people, a conclusion is drawn whether they possess the required personal competencies and the skills of a good manager. In accordance with the given key, the total sum of the obtained points is determined. For the evaluation, the following points result is used:

- up to 25 points - incomplete and less pronounced management competencies and skills;
- from 26 up to 35 points – well expressed management competencies and skills;
- from 36 up to 40 points – highly expressed management competencies and skills;
- more than 40 points - authoritarian management style.

Results

The results of the conducted research show that a large part of the examined people demonstrate incomplete or less expressed management competences and skills – 26.5%. The fact, which is disturbing, is that only 8.2% of the cadets possess highly expressed management competences and skills. The main task of the education and training process in the Vasil Levski National Military University is to increase the share of cadets with well or highly expressed management competences and skills. 65.3% of all respondents have shown such competences and skills. The results of the conducted research are shown in Table 2. The percentage of the levels of management competences and skills of the whole group is illustrated in Figure 1. The formation of well and highly expressed management abilities and skills in the students from different years of training in the Vasil Levski National Military University is illustrated in Figure 2.
Table 2: Levels of management competencies and skills in the examined subgroups

<table>
<thead>
<tr>
<th>Levels of management competencies and skills</th>
<th>SG 1</th>
<th>SG 2</th>
<th>SG 3</th>
<th>SG 4</th>
<th>SG 5</th>
<th>SG 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>incomplete and less expressed</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>well expressed</td>
<td>4</td>
<td>3</td>
<td>5</td>
<td>6</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>highly expressed</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>authoritarian style</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

Source: Authors

Figure 1: Percentage ration of the levels of management competencies and skills of the whole examined group

Source: Authors

Figure 2: Results from the examined well and highly expressed management competencies and skills according to curriculum and years of training

Source: Authors

The results show that the decrease of the highly expressed management competencies and skills of cadets during their fifth year of training is compensated by the increase of the share (17%) of the authoritarian style of management.

As a general regularity of all examined sub-groups is the high share of the incomplete and less expressed management competencies and skills. Most probably this fact is due to the preferred subjects for general military and technical training of the military specialty and due to training subjects with emphasized logistic themes and the learning of a smaller number of management disciplines during the civilian specialization.
Discussion

Effectiveness in its common meaning shows the relation of the achieved result to the goal. Effectiveness is connected with the expediency of the activity. The higher the grade of achievement of a goal is, the more effective the activities and undertakings are. According to the Bulgarian legislation, effectiveness is defined as the grade of achievement of a goal, comparing the real and the expected results of the activity. Management effectiveness is the degree of achievement by the manager in the organization implementation of the set-up targets and the solution of related tasks. Management effectiveness is directly connected with the availability of certain management competences and skills. Independence is a cognitive and volitional property, where the ability of the person to plan, systemize, regulate and actively perform his/her own activity, based on a personal life experience, is formed — knowledge in the form of ideas and notions, skills, convictions and habits without any management or direct practical assistance from other persons.

The methodology of Vasiliy Pugachev was used in the Research of Management Effectiveness (Pugachev, 2003). The methodology doesn’t evaluate the management skills of an individual, but his/her practical activity in the role of the manager, as well as management style. The examined person replied to 40 questions choosing from the answers “yes” or “no,” getting one point for each “yes” and zero points for each negative answer. The results of the performed research of the management style of the examined cadets are shown in Table 3.

<table>
<thead>
<tr>
<th>Subgroup</th>
<th>SG 1</th>
<th>SG 2</th>
<th>SG 3</th>
<th>SG 4</th>
<th>SG 5</th>
<th>SG 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highly effective</td>
<td>7</td>
<td>6</td>
<td>3</td>
<td>6</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Medium effective</td>
<td>2</td>
<td>-</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>Less effective</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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</tr>
</tbody>
</table>

Source: Authors

The percentage of the management style of the whole examined group is shown in Figure 3. The answers of the responding cadets from all years of training show, that 73% of the students have a highly effective management style, while 27% possess a medium effective one. A good indicator is the absence of students with a less effective management style. The forming of a highly effective management style in the students from different education years in the Vasil Levski National Military University and its development tendency are shown in Figure 4. The analysis of the management competencies and skills shows that the existing system for professional training of the future non-combatant officers allows the formation of appropriate management abilities and skills in the students. It is necessary to direct the efforts of the academic staff at the elaboration of the obtained abilities of the cadets from the specialty “Organization and management of military formations at a tactical level” and the military specialization “Material resources, movement and transport.”

Figure 3: Management style of the examined cadets

Source: Authors
Conclusion

The training of future con-combatant officers for management activity is an integral part of professional military education and is carried out during the whole period of their training. It must take into consideration the specifics of the professional military activity of the future logistic officers. The acquisition of management competencies and skills in the cadets during their professional military training is predetermined by many factors, among which an important place is occupied by the obtaining of knowledge of the management competencies and skills in the process of the professional military training and by the stimulating of the practical training for the improvement of the management effectiveness in order to meet the requirement of the first logistic officer position. It is advisable to direct the efforts of the educative work towards the developing of the obtained management abilities paying special attention to the following competencies: determination, responsibility, persistency, self-confidence and accuracy.

References


MATH AND ART CONVERGENCE FOR EDUCATION

Michela Tramonti,1 Desislava Paneva-Marinova,2 Radoslav Pavlov3

Abstract: According to worldwide surveys (such as PISA and TIMSS), European students often lack both mathematical and key basic competencies in science and technology. The mean scores for mathematics obtained by students are below the Organisation for Economic Co-operation and Development average (OECD). The learning of the mathematics literacy enables students to contribute effectively in actual society, enhancing their employment prospects. This paper intends to describe an innovative learning and teaching approach, actually in the development phase, in the field of mathematics for 14-16 years old students through the combination of current approaches used in Europe (such as inquiry based learning and technology-enhanced learning) and the Asian one, the Singapore’s method based on three phases, concrete-pictorial-abstract, through the use of artworks. This intends to allow the development of a more effective educational and training environment for teachers and their students who will benefit from the use of more attractive and fun pedagogical tools in the study of mathematics.

UDC Classification: 373, 37.02, 7.063; DOI: http://dx.doi.org/10.12955/cbup.v5.i037

Keywords: mathematics education, learning by doing, inquiry-based learning, arts, technology-enhanced learning

Introduction

The globalized labor world market requires knowledge based on solid basic skills such as literacy in mathematics. For the development of math skills, teaching strategies and practices become primary for educational growth during all the school years. Taking into account the “Mathematics, Science & Technology Education Report” (ERT, 2009), where education has been acknowledged as the cornerstone of Europe’s success and will continue to be a determining factor in the prosperity of Europe’s citizens and economy for the foreseeable future, competency in mathematics, science and technology is becoming more and more fundamental. For Europe as a whole, mathematics, science, and technology education plays a key role in adequately growing the research and development capacity, and ensuring economic and productivity growth that are crucial to Europe’s future competitive position. The learning of the mathematics and science literacy enables students to contribute effectively in actual society, improving their employment prospects.

New strategies for mathematics teaching and learning and the deployment of workable learning methods for a better understanding and creative thinking are required for the engagement of learners in more active participation during the perceiving of knowledge. This paper presents a research model and a technology-oriented solution that could provide a capstone experience in which students synthesize exact precise math principles with arts. Our research aims to investigate and analyse how the combination between meaningful learning and mastery learning produces an increase of motivation and interest for the study of mathematics as to obtain a meaningful improvement in students’ final performances. In addition, since European students often lack mathematical and key basic competencies in science and technology, while the Asian students achieve the highest place in the ranking (OECD, 2014) (Mullis et al. 2012), we also exploit the combination between European teaching approach such as inquiry based learning and the potentialities of Singapore’s method, used in some Asian countries, to improve the performances in math learning. This will allow students to improve and develop their learning skills with a creative and innovative study through an appropriate development of creativity-based approach in learning and problem-solving skills.

Math and Art Convergence

The human body and the related dimensional proportionality have always been among the basic cornerstones in the history of fine arts (Gombrich, 2006). But, in order to be more realistic, they had to also devote themselves to the in-depth studies of geometry, anatomy, and architecture. One of the best

1 Michela Tramonti, PhD student, Institute of Mathematics and Informatics, Bulgarian Academy of Sciences, Sofia, Bulgaria, tramonti.michela@gmail.com
2 Assoc. Prof. Desislava Paneva-Marinova, PhD, Institute of Mathematics and Informatics, Bulgarian Academy of Sciences, Sofia, Bulgaria, dessi@cc.bas.bg
3 Prof. Radoslav Pavlov, PhD, Institute of Mathematics and Informatics, Bulgarian Academy of Sciences, Sofia, Bulgaria, radko@cc.bas.bg
known artists who used mathematics was the outstanding artist Maurtius Cornelis Escher (1898-1972). In arts, we find other examples such as the perspective in painting, the harmonic series in music (Fibonacci numbers), the physics principles in dancing (the symmetry of the body that allows to find the so-called "center of gravity" and so to maintain stability (Maletic, 1987)), etc. In addition, there are numerous examples of art that have evidence of the relation between math and popular culture as well:

- math in popular movies (imaginary travel through the collections of video clips, where math issues are involved);
- math and music (games, where are learning math concepts like patterns, shapes and comparative sizes through guided play as performers);
- math and textile arts (collections of puzzles).

Moreover, there are recent studies on the role of arts in promoting innovations in science (Lamb, 2012; Schwartz, 2015), and the chances to identify “exceptional talent” in children, which shall enable their success in the research and innovation field in future. Amongst such exceptional talents are mathmatic ability, imagination, creativity and problem solving skills by facing math problem with variations. This last element will allow students to reinforce their mathematics knowledge systematically through the concrete phase to pictorial up to reach the abstract of a math concept.

In this context, the use of art in the framework of the proposed research model will let students discover how mathematics and scientific roles have an impact on all aspects of the reality by showing that arts provide innovations through analogies, models, skills, structures, techniques, methods, and knowledge. Laboratories developed in this research aim to provide a virtual space for discovering and enhancing such talents among young people.

Thus, the research aims to test a combination of European and Asian (Singapore’s method) learning methods and teaching approaches in the field of mathematics through the arts’ and the application of technology as described in the paragraph below.

**Didactic framework**

The model proposed in this research work is the result of the integration of the three types of didactical situations identified by Brousseau (2002). Therefore, the learning/teaching situation developed according to the three phases of Singapore’s method applied to the mathematics learning and teaching - concrete, pictorial and abstract phases (Gu et al., 2004; Clements, 1999), will be A-didactical, Non-didactical, Didactical.

In detail, the designed learning environment will be:

- A-didactical, because the students will learn mathematical topics by discovering that different relationships exist among things or math concepts (even if they cannot be so explicit) and by developing, accordingly, problem solving skills yet avoiding just memorizing the solution procedure.
- Didactical, because several worksheets will be prepared for the students before starting the experimentation phase. These will contain instructions to lead the student from the concrete phase to the pictorial, and up to the abstract one.
- Non-didactical, because the teacher will have the function to mediate and support the learning process through the creativity and the imagination of their students. The use of the creativity from students will be free, especially when they will produce their own artworks on the basis of the math concepts studied.

Therefore, considering the Didactics Hexagon proposed by Guy Brousseau (Brousseau, 2002) from the proposed model point of view, the art will be identified as the “context” or better the “milieu” to be used to reach knowledge. Knowledge achieved by students will be “constructed,” implying that students will go systematically through the concrete phase to pictorial up to reach the abstract of a math concept.

This will allow students to reinforce their mathematics knowledge using the specific artworks to develop systems thinking based on applicable knowledge, imagination, creativity and problem-solving skills by facing math problem with variations. This last element is used systematically in Chinese mathematics teaching and it means that even if the mathematics formula/concept to be studied remains constant, the background/the contest or, adopting Brousseau’s term, milieu, referring to them can be
different. In our specific research the artwork, as *milieu*, represents a changeable context in which the students will gain an approach and learn in depth mathematical concepts. Specifically, on the base of the Singapore’s method, students will proceed through the three phases as described below.

Firstly, during the concrete phase of the proposed method, students will learn and familiarize themselves with the specific objects’ construction, e.g. a dodecahedron. Secondly, students will learn to recognize mathematics in the art, working in groups and individually during the pictorial phase. Finally, they will create their artwork starting from the math formula studied.

Moreover, in order to reinforce the learning process during the phases, the technology of modeling programs will be used for objects and the creation of 3D virtual environments (Zheleva & Tramonti, 2015). For this aim, one of the possible technical solutions could be the virtual platform “Math Art Café.”

**Virtual Platform “Math Art Café”**

The platform “Math Art Café” is an example of the virtual environment integrating art and science learning used mainly a communication tool for learning, practicing, and sharing of experiences (Senka, et al., 2016). The platform “Math Art Café” will cover the following virtual components:

- Lab Gates – this area will provide entrances to the virtual laboratory. In these immersive spaces participants acting via their avatars will be able to:
  - a. Create different art performances using their Mathematics and Science knowledge and skills;
  - b. Present their works of art to the other 2D/3D world inhabitancies – exhibitions, theatres, concerts, and other stage performances;
  - c. Receive feedback from the audience by means of textual instant messages (group messages or private ones), voice communications, and non-verbal communications (applauses, avatars’ mimics and gestures, etc.).

- Application Pool – all registered users will be able to publish documents, applications and/or links for downloading applications, which they consider interesting, useful, and cheerful. In this area, the platform users will be able to vote, comment, and evaluate all the published materials;

- Meeting point – a place where users will be able to meet each other, to exchange contact information, and to form groups of interests;

- Agora – a place where users will be able to exchange ideas and opinions concerning the thematic areas of common interest.

The “Math Art Café” will have a wide range of users: teachers and students, artists and scientists, involved in arts and science integration activities, and facilitators such as education planners, public authorities, etc. The target community will have an interest in innovative arts and science representation. The platform is oriented to scientists, artists and teachers leading similar learning projects or have experience in such projects. Learning-by-authoring and doing are base learning methods in this research. The digital art content in the “Math Art Café” will be delivered by the ecosystems for digital cultural assets, digital collections, archives, virtual museums, digital libraries, cultural heritage sites, etc.

The “Math Art Café” platform is in a stage of design and technological development. Applications will be managed as an open source platform, which means, that all references and training/workshop materials will be available to its users for free. No commercial exploitation is foreseen.

**Conclusion**

In conclusion, the research intends to be an actual contribution in the mathematics didactics field due to innovational exploiting of European and Asian (Singapore’s method) learning and teaching approaches combined with the arts. Seen as two sides of the same coin, their combination through “artworks” can enrich both, making young students more familiar with math concepts. Moreover, the above described involvement of technology during the whole learning and teaching approach can amplify, in an effective way, the skills and creativity development.
Acknowledgements

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References

UNDERGRADUATE HEALTHCARE STUDENTS’ ATTITUDE TO E-LEARNING AT MEDICAL UNIVERSITY - PLOVDIV

Yordanka Tsokova,¹ Tanya Taneva,² Biyanka Tornyova,³ Todor Cherkezov⁴

Abstract: E-learning is seen as a possible solution to the problem of modernization of the university education in response to the changing needs of the society. In undergraduate healthcare training, e-learning is implemented predominantly as blended learning in addition to the traditional classroom teaching. A major factor in the success of e-learning are learners’ attitudes, beliefs and concerns. The aim of the present study was to investigate undergraduate healthcare students’ attitude to e-learning at Medical University – Plovdiv. In this case, e-learning is considered to be electronic educational resources organized as an interactive e-learning unit or course, provided through a learning content management system. The survey was carried out in 2016 through a self-reported questionnaire among 270 first year students from ten healthcare specialties. Participants were asked to express a degree of agreement with nine statements on a five point Likert scale. The influence of gender, age, specialty and previous e-learning experience on the opinion of students was investigated. The results showed that students’ attitudes towards e-learning were positive, but learners were not enthusiastic about it. Genders have different views about e-learning implementation – women are more likely to accept it. The experience first year students had did not allow them to judge if e-learning supports better time-management or life-long learning skills. Students agreed that implementation of e-learning depends on the subjects and there are disciplines that can be provided as distant courses within the learning management system.

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Keywords: e-learning, healthcare, students

Introduction

The rapid development of technologies and their essential impact on almost all human activities change the way we live and work. Institutions of higher education are under pressure to transform to respond to the growing needs of the society. They function in a reality of vast amounts of information, global connectivity and increased mobility. Significant factors imposing change are increasing quality requirements and competition for students. Moreover, the students’ pedagogical characteristics have changed – a generation with cognitive, emotional and psychomotor abilities influenced by gaming and social networking currently sits in the university benches.

Medical schools are not aside from this tendency. They face additional specific issues as changes in healthcare delivery, emerging new medical science areas, avalanche growth of medical information and access to hospital settings that result in a reduction of the time for teaching. E-learning is envisaged as a possible solution. Students are major participants in learning, so the aim of the present study was to investigate undergraduate healthcare students’ attitude to e-learning at Medical University – Plovdiv.

Literature review

E-learning is a response to the problem of modernization of university education in the spirit of educational, technological and economic trends in the global information society (Kirkova-Bogdanova et al., 2016). One of the most productive initiatives related to e-learning is the one in the health sector (Cheng, et al., 2014) due to its advantages, some of which are:

- the educational process is realized through technologies that today’s students are accustomed to and which are a part of their daily lives (Cazan et al., 2016);
- e-learning improves the skill to use information and communication technologies which is necessary for a successful career in healthcare (Abdelaziz et al., 2011, Hegarty & Stewart, 2007);
- e-learning encourages the development of critical thinking, time management skills, self-pacing and self-reflection (Abdelaziz et al., 2011, Williams, et al., 2011).

Institutional rationales for implementation of e-learning are contextualized and specific for each institution (Sharpe et al., 2006).

¹ Medical University - Plovdiv, Bulgaria, Faculty of Public Health, dani_tsokova@abv.bg
² Thracian University - Stara Zagora, Bulgaria, Faculty of Economics, ttaneva1@abv.bg
³ Medical University - Plovdiv, Bulgaria, Faculty of Public Health, btornyova@abv.bg
⁴ Medical University - Sofia, Bulgaria, Faculty of Public Health, dr_tcherkezov@abv.bg
Different notions and therefore definitions exist for e-learning. Khan considers the concept of e-learning as synonymous to web-based learning (WBL), internet-based learning (IBL), advanced distributed learning (ADL), web-based instruction (WBI), on-line learning (OL) and open/flexible learning (OFL) (Khan, 2005). According to other authors, e-learning is much more than teaching and learning via a computer (Pollard & Hillage, 2001, Ruiz et al., 2006). Apart from access to educational material, it includes management and monitoring of the study process. The learning management systems used today have all functionality to deliver and manage training. After comments, debates and arguments of experts in the field, Sangra et al. (2012) proposed the following definition: “E-learning is an approach to teaching and learning, representing all or part of the educational model applied, that is based on the use of electronic media and devices as tools for improving access to training, communication and interaction and that facilitates the adoption of new ways of understanding and developing learning.”, acknowledging that the definition does not exhaust all aspects of the concept. Medical and health education is traditionally carried out face-to-face. In many countries, including Bulgaria, regulations do not allow distant training in these areas at the undergraduate level. Studies conclude that e-learning is supplementary to university healthcare education (Ruiz et al., 2006), (WHO, 2015). In medical and health education e-learning is implemented in its blended modality (Sharpe et al., 2006) (WHO, 2015) – properly integrated into the traditional face-to-face curricula.

Because of the vague notion of e-learning, we feel it is important to clarify the idea of e-learning behind the present study. For the purpose of this research, e-learning is considered to be electronic educational resources organized as an interactive e-learning unit or course, provided through a learning content management system (LCMS). It consists of passive resources (readings, images, video, etc.), assignments, tests and teacher-students communication. It may be used in class, as well as for self-preparation.

Quite often in planning e-learning more attention is paid to technologies rather to education. Sometimes in our efforts to create a high-tech miracle, we tend to forget the needs and concerns of the participants – teachers and students. The most important issue in the design and implementation of e-learning is the focus on achieving the learning goals by the trainees. The instructional design models (Instructional Design Central, 2012) start with an analysis of auditory. Without students’ understanding, wishes and willingness to be trained by technologies, expensive and time-taking activities for e-learning adoption are not justified. Taking learners’ characteristics, attitudes, beliefs, and concerns into consideration is a major factor in the e-learning success. E-learning in healthcare education has no bigger priority than traditional training, but it should be used as an alternative only with a good understanding of the students’ needs (Lahti et al., 2014). This is the rationale behind the present study.

Information and communication technologies (ICT) have been used for teaching healthcare students in various ways for many years at Medical University – Plovdiv. PowerPoint presentations, electronic materials, video clips, web resources, e-mail are widely spread. In the recent years, new technologies like interactive boards and electronic simulation mannequins have been installed. An e-learning site developed on the basis of LCMS Moodle has been open since 2010 (http://eomk.medcollege-plovdiv.org) as a joint project with “Pastel Studios” software company. A few e-courses with different degree of interactivity for compulsory and optional subjects have been created and used. Research suggests that this form of training is well accepted by our students (Kirkova-Bogdanova et al., 2015), they are satisfied with e-learning because of its advantages and an appropriately designed e-course favors students’ learning (Kirkova et al., 2014).

Data and Methodology
The survey was carried out in 2016 through a self-reported questionnaire among 270 first year students from ten healthcare specialities – nurses, midwives, rehabilators, radio-laboratory assistants, medical laboratory assistants, dental mechanics, health inspectors, pharmacy assistants, medical cosmetics and instructors in nutrition and safety of food. Participants were asked to express a degree of agreement with nine statements, which as in “e-learning” account the e-courses eventually undertaken on the e-learning site or any other similar experience. Students registered their responses on a five point Likert scale from 1, which stands for “strongly disagree” to 5, which is interpreted as “strongly agree.”
The statements included in the questionnaire were:
S1. E-learning is just posting lectures and other readings on the site.
S2. E-learning should be interactive and must provide activities for the students.
S3. To be effective, the e-course should be interesting, friendly with easy navigation.
S4. Some subjects can be learned from a distance on the e-learning site.
S5. E-learning is just a supplement to traditional training.
S6. The extent to which e-learning could be used depends on the subject.
S7. I would prefer to study in an electronic environment because this way I can better manage my time.
S8. I am afraid my computer skills are not good enough to study in an electronic environment.
S9. E-learning in pre-graduate training helps the development of life-long learning skills.
S10. E-learning is not applicable in my specialty.

Students were also asked if they have prior experience with forms of e-learning either during their secondary studies or with the LCMS of the university. Gathered data were processed statistically with SPSS v.19. Students’ agreement with the statements is presented through mean values. Dependencies of students’ attitudes on gender, speciality, prior experience with e-learning and age were analyzed with nonparametric tests of Mann-Whitney and Kruskal-Wallis.

Results and Discussion

Participants were mostly women – 211 (78.15%) to 59 (21.85%) men. The age range is from 18 to 50 years with \( \bar{x}=22.44 \), \( Me=20.00 \), \( Mo=19 \) years.

Students’ attitudes expressed by their responses are described with mean, SEM, STD and mode and presented in Table 1:

<table>
<thead>
<tr>
<th>Statements</th>
<th>S1</th>
<th>S2</th>
<th>S3</th>
<th>S4</th>
<th>S5</th>
<th>S6</th>
<th>S7</th>
<th>S8</th>
<th>S9</th>
<th>S10</th>
</tr>
</thead>
<tbody>
<tr>
<td>N Valid</td>
<td>267</td>
<td>266</td>
<td>265</td>
<td>265</td>
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<td>264</td>
<td>265</td>
<td>264</td>
<td>266</td>
<td>266</td>
</tr>
<tr>
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<td>4</td>
<td>5</td>
<td>4</td>
<td>6</td>
<td>5</td>
<td>6</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>2.87</td>
<td>3.98</td>
<td>4.41</td>
<td>3.47</td>
<td>3.56</td>
<td>4.10</td>
<td>2.77</td>
<td>2.17</td>
<td>3.39</td>
<td>2.21</td>
</tr>
<tr>
<td>Std. Error</td>
<td>0.078</td>
<td>0.077</td>
<td>0.068</td>
<td>0.093</td>
<td>0.078</td>
<td>0.071</td>
<td>0.080</td>
<td>0.087</td>
<td>0.074</td>
<td>0.081</td>
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<td>Mode</td>
<td>3</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Deviation</td>
<td>1.272</td>
<td>1.254</td>
<td>1.112</td>
<td>1.508</td>
<td>1.270</td>
<td>1.156</td>
<td>1.304</td>
<td>1.418</td>
<td>1.206</td>
<td>1.324</td>
</tr>
</tbody>
</table>

Source: Authors

Statements S1, S2, S3 investigate students’ impressions and understanding of e-learning. The level of agreement with the first statement \( \bar{x}_1=2.87 \) indicates that though 38.89% show disagreement, many learners cannot decide what e-learning is, taking into consideration the e-courses they have been registered to. Nearly one third (31.11%, \( Mo=3 \)) indicate “neutral”. There is no statistically significant relation between responses to this item and gender – \( p=0.948 \), age – \( p=0.169 \) and previous experience – \( p=0.062 \), but speciality affects students’ impressions at \( p=0.046 \). This can be expected due to unequal distribution of e-courses with various qualities in the specialities.

Students, however, have clear idea about the active nature of this modern educational method and they agree with the statement that e-learning should be interactive – \( \bar{x}_2=3.98 \), \( Mo_2=5 \), given by 48.52%. Answers were not affected by age – \( p=0.907 \), but we found a statistically significant impact of gender – \( p=0.009 \), speciality – \( p=0.012 \) and previous experience – \( p=0.039 \). Women had more accurate judgement – \( \bar{x}_2 \)women=4.07 than men – \( \bar{x}_2 \)men=3.66. Those who have been assigned to e-courses agree to a greater extent about necessity of interactivity – \( \bar{x}_{2 \text{exp}}=4.07 \) than those who have not – \( \bar{x}_{2 \text{noexp}}=3.75 \). The influence of speciality can be explained with the different ratio of men/women and the different number of e-courses available in each speciality.

There was even higher consensus on the third statement – \( \bar{x}_3=4.41 \), \( Mo_3=5 \) – 70.57% strongly agree that factors for the effectiveness of e-learning are usability, friendliness, easy navigation and interest.
Students’ opinion about this e-learning feature did not depend on gender – p=0.070, speciality – p=0.462, age – p=0.360 and previous experience – p=0.361.

Different notions of genders about interactivity are interesting, but we can only speculate about the reasons. Interactivity is a typical feature of e-learning. A quality e-course incorporates various activities for the trainees. This is one way to provide active student-oriented learning. Julie & Fakude emphasize the need for interactive instructional media in the learning environment because of students’ active participation and different learning styles (Julie & Fakude, 2006). However, sometimes when e-learning supports classroom teaching as in our case, a tendency to employ LCMS mainly to publish readings and other passive resources can be noticed (Moule et al., 2011) (Kirkova-Bogdanova et al., 2016), while pedagogical interaction takes place only in class. Unfortunately, not all e-courses in the university platform integrate activities, and this is why students cannot judge about their purpose. Though they do not see many good practices (Kirkova-Bogdanova et al., 2016), trainees are aware of the need for interactivity. As e-learning experience largely determines students’ views (Figure 1), interactivity should be a highlight in planning and developing of e-learning.

Like all young people, our students are acquainted with computers well enough, but technologies are not in the scope of their interests – they have chosen the humanitarian profession of the healthcare specialist. Teachers and e-learning designers must keep the e-learning units as simple as possible in the meaning of computer-students interaction so that students focus on content and make least efforts to cope with the technology.

Figure 1: Students’ agreement with the statement that e-learning should be interactive

<table>
<thead>
<tr>
<th></th>
<th>strongly disagree</th>
<th>disagree</th>
<th>neutral</th>
<th>agree</th>
<th>strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>4</td>
<td>5</td>
<td>37</td>
<td>20</td>
<td>23</td>
</tr>
</tbody>
</table>

Source: Authors

The next group of statements S4, S5 and S6 identifies the place of e-learning from the students’ perspective. We did not find any statistically significant relationship between students’ reactions to these propositions and gender, specialty, age or prior e-learning experience. The level of agreement with the provoking statement about disciplines that allow distant learning was positive – $\bar{x}_{4}=3.47$, most (38.15%) responded with “strongly agree” – Mo=5. Undergraduate healthcare education in Bulgaria is conducted face-to-face only. The presence on lectures and practical classes in all subjects is compulsory. However, this result indicates that soon policy makers will face the need to reconsider the regulations.

The degree of agreement to S6 was higher – $\bar{x}_{5}=4.10$, 51.11% answered with “strongly agree” – Mo=5, which shows that our students have a clear and realistic judgement that the extent of the e-learning component differs in each subject. There is a common understanding that e-learning is supplementary to traditional undergraduate healthcare education (Rigby, et al., 2012) (WHO, 2015) (Sharpe, Benfield, Roberts, & Francis, 2006). The results of our survey showed that also our students considered e-learning in this manner – $\bar{x}_{6}=3.56$, Mo=5, but they were not unanimous in their thinking – the highest percentage is of those who strongly agree – 29.63%, followed by freshmen, who still have no opinion – 26.67%. In the light of the responses to S4 and S6 we may conclude that to a considerable number of students, e-learning is not compatible with the notion of being only supplemental – it could be a significant and valuable training component in itself (Figure 2).
One of the biggest advantages of e-learning, especially its distant form is its availability, that allows learners to study when and where they wish. This is one of the drivers for the success of e-learning in postgraduate healthcare education (Cheng, et al., 2014). Organization of everyday tasks and time management are crucially important for students to cope with their commitments at the university. This is why we asked our first-year students for a feedback whether e-learning, offered at the university helps them to manage their time better. The results we received were not positive (Figure 3). The average level of agreement with S7 is $\bar{x}_7=2.77$, $\text{Mo}_7=3$. Students’ evaluation did not depend on gender – $p=0.943$, speciality – $p=0.248$, age – $p=0.363$ and previous experience – $p=0.061$. More than a quarter of the investigated students could not judge, and the majority of students did not agree that the e-learning they were exposed to did not contribute to their better time management. The reason for this reaction may be the compulsory face-to-face training that does not allow benefit from the e-learning platform by saving time from non-attendance. Moreover, students clearly indicated, that there were disciplines that can be taught through distance learning.

S9 studies students’ views about e-learning and its connection with long-life learning. The level of agreement is positive – $x_9=3.39$, $\text{Mo}_9=3$. Though 44.36% agree or strongly agree with this position, many of our students – 31.58% – feel that they cannot judge whether e-learning experience at the university may help them to create long-life learning skills (Figure 4). Students’ opinion is not affected by gender – $p=0.512$, age – $p=0.370$ and previous experience – $p=0.505$. Students from different specialties have different notions about this advantage of e-learning – $p=0.008$. Future health inspectors agreed at $x_9=4.05\pm1.026$, while rehabilitators did not consider e-learning experience would influence any future education – $\bar{x}_9=2.74\pm1.109$.

Computer literacy is essential for ICT enhanced training. According to Abdelaziz et al. (Abdelaziz, Kamel, & Karam, 2011) a disadvantage of e-learning is the need for good computer skills. Students should focus on content and not make efforts to study how to work with the computer or the platform. Students in Bulgaria receive good training in ICT in secondary school and healthcare students continue studying informatics at the university. The respondents were not afraid that their computer skills were insufficient for e-learning experience – $\bar{x}_8=2.17$, $\text{Mo}_8=1$. Their self-assessment did not depend on gender – $p=0.145$, speciality – $p=0.180$ and previous experience – 0.410, but there was statistically significant difference – $p=0.019$ in the mean age of trainees, who demonstrate disagreement (64.82%) – 21-22 years and those, who indicate agreement (20.45%) – 24-25 years (Figure 5). We may conclude that inadequate computer skills cannot be an obstacle to implementation e-learning for healthcare students.

The overall students’ attitude to the place of e-learning in healthcare education was in favor of this form of training. The level of agreement that e-learning has no application in their studies was low – $\bar{x}_{10}=2.21$, $\text{Mo}_{10}=1$. The majority of students – 62.41% consider e-learning appropriate, 14.54% - do not. The attitude of the future healthcare specialists to the place of e-learning did not depend on speciality – $p=0.226$, age – $p=0.793$ and previous experience – $p=0.098$. Genders showed statistically significant difference in their views about e-learning application – $p=0.002$ (Figure 6). As about interactivity in e-learning, predominantly male healthcare students found it difficult to decide whether e-learning is an adequate form of training. This might be due to the personal characteristics of men choosing healthcare as a career, but could be a result of that women tend to be more active in internet usage for academic purposes than men (Kirkova-Bogdanova, Tsokova, Taneva, Katsarska, &
Marchev, 2016).

Results demonstrated that students’ attitudes towards e-learning were positive, but learners were not enthusiastic about it. This is confirmed by Stoyanova and Kilova (2016). Research outside Bulgaria also shows a similar tendency (Abdelaziz et al., 2011, Moule et al., 2011).

![Figure 3: Students’ agreement with the statement that e-learning is not applicable in their training](image)

Source: Author

**Conclusion**

The investigation of attitudes of first year healthcare students to e-learning at Medical University – Plovdiv allow the following conclusions to be made.

More than half of the students agree that e-learning is an appropriate form of training in the specialty, genders have different views about e-learning implementation;

The experience first year students have does not allow them to judge if e-learning supports better time-management or life-long learning skills;

Students feel their computer skills are good enough to manage with e-learning, older students express greater uncertainty;

Interactivity, friendliness and ease of use are important e-course characteristics;

Students agree that implementation of e-learning depends on the subjects and some disciplines can be provided as distant courses within the learning management system.

The success of e-learning strongly depends on students’ acceptance and attitudes. E-learning has a future if it is carefully planned and consistent with the requirements of students.

**References**


Abstract: Paul Evdokimov endeavored to bring into a secularized and desecrated world the solution of the Russian mystics as a means for transfiguring the bland and gray ‘reality’ of a world focused only on material values in which everything ends now and here without referral to the transcendent. In this mindset, only a different approach will resound in the soul and consciousness of the contemporary person and the old approaches, which appealed to fear and terror, have long lost any power of persuasion. Evdokimov believed that only a God of love could speak to the contemporary world. This paper aims to reveal the details of Paul Evdokimov’s vision and solution for the moral crisis of contemporary society.

UDC Classification: 1(17); DOI: http://dx.doi.org/10.12955/cbup.v5.1039

Keywords: God, Orthodox, Eastern, perfection

Introduction

The works of Paul Evdokimov may be considered prolegomena that contribute to a spiritual awakening, and thus, he may be regarded as an apostle of the contemporary world, especially by youth.

Evdokimov presented, in an almost atheist Western society of deepening moral dissolution, the great themes that constituted Russian Messianism: ‘The Russian Christ,’ ‘the mystical experience of the absolute,’ and ‘the Russian maximalism.’ These illuminate, like similar spiritual beacons in a world influenced by boredom, a world of nonsense and absurdity, founded on profound disillusionment. The disposition of this world is captured in the works of Sartre (1997, p. 319) and Camus (1993, p. 177).

Evdokimov originated from a traditionalist style Russia, where a priest’s word was law with the great dignitaries of the Empire, even with the Emperor, who sought a priest’s advice on crucial political decisions. In contrast, a liberal France with a cosmopolitan Paris today is dominated by a strong individualism that one could say has drifted towards frivolity and recklessness in moral values.

The image of a thinker was once that of a person who risked being ridiculed, ostracized, and banished from the world that represented false emancipation. The interwar period was a time when profound reversals took place in the consciousness of the westerners. As one realm was setting, another was born. The old order fell apart to allow another access. With the vehemence and senselessness of youth, Evdokimov wished to change all existing order from its foundations and generate a new beginning in history.

This paper aims to reveal the details of Paul Evdokimov’s vision and solution for the moral crisis of contemporary society.

The Russian Messianism

The free thinking of Paul Evdokimov makes his ideas difficult to organize. Nonetheless, his thinking was neither incoherent nor scattered. Concepts were united by the recurrence of important ideas and themes. Certain methodological directions for interpreting the works of Evdokimov were needed (Klofft, 2005, p. 70). ‘The Russian Christ,’ ‘the Russian maximalism,’ and ‘the mystical experience of the absolute’ are some of the core work of Paul Evdokimov. Clement (1985) believed that psychoanalysis does not reduce enigmas, but rather because of the mystery of our destiny, people are attracted to God. Psychoanalysis introduced Evdokimov to the great recurrent theological themes in the last years of his life, which Clement perceived as the most prolific: those of the sacrificial love of the Father and “of the smile on the father’s face” on which to contemplate for all eternity (Clément, 1985, p. 106).

A philosopher is a person of equilibrium, a pacifistic and ecumenical spirit. Love and peace cover their entire work. What is striking about Evdokimov’s work is the love for others, of all creation, including demons and saints alike. He also holds an inner hope of universal rehabilitation, of an ‘apocatastasis’, which will emerge at the end of times. He gives the example of saints that would pray for demons. He defines the intense desire to see everyone redeemed, to be in communion with everyone.

1 Faculty of Philosophy and Social Political Sciences, AIC University, Romania, iuliatutuianu333@yahoo.ro
Evdokimov proposed that baptism and catechism, and the liturgy and holy icons, are what build the national ethos, i.e., through introducing Christian values. His Slavic speech had roots in the biblical and liturgical language. The entire Russian culture was permeated by a thirst for the absolute, for the timeless and constant aspiration of the Russian spirit, by the mystical nature. He considered that the essential mystical background of the Russian soul enters into resonance with Orthodoxy, which is the less normative form of Christianity, and expresses very little in concepts. According to Evdokimov (2001, p. 47), “the Orthodox have never had a special affinity for ‘theological sums,’ nor for scholastic systems. Any excessive wording or definition causes an immediate distrust. Orthodoxy does not need someone to phrase; it needs no phrasing.”

Evdokimov considered the mysteries of the church as part of the apophatic regime. He regarded the Fathers of the Church as having a conviction that it was inappropriate to speculate on mysteries, that it was better to contemplate them and be enlightened by their light. The Orthodox spirituality was much more liturgical and iconographic than discursive, conceptual, and doctrinaire (Evdokimov, 2001, p. 47). Evdokimov viewed this as a feature of Eastern theology, which distinguished the Orthodox spirituality from Western theology. Especially, the Russian mystics unlike the theologians of the West insisted on subjective existence, on emotion, and on feeling. Even the metaphysics of Berdiaev (1999) appeared rather like that of Dostoevsky, Kierkegaard, Nietzsche, Pascal, Jakob Bohme, and St. Augustine, i.e., existential metaphysics.

According to Evdokimov (2001, p. 50), the renown Russian ‘maximalism’ is but a desire to transgress limitation and view the abyss of nothingness except the constant and quenchless thirst for the absolute: “For a Russian, the root of the soul, as in Plato, is suspended into infinity. Dostoievski is assertive: without the necessary uniqueness, without eternity, without infinity and without the absolute, sooner or later the Russian man shall refuse the accessory, the temporary, the relative; when in need, he will destroy history and shall willingly throw himself into nothingness.”

Evdokimov linked maximalism to the geography of a steppe projected without limitation in the interior landscape of a Russian soul, resistant to boundaries and compartmentalizations. He also wrote about the ‘apocalyptic mindset’ of the Russians that consists of people’s defiance against the governing spirit, all administration that remains foreign to the soul, and tries to reduce its liberties. This mindset is a manner of being, directed towards daily life and the immanent habits of the Russian spiritual matrix that views all issues through the idea of an end to the purpose of existence.

After baptism, Russian people are self-titled Saint Russia, contrary to all usages. For Dostoievski (2004), the ideal of the absolute is the only force that moves people and expresses the principle of their history. This thinking is not about the actual holiness of the Russians, who could be regarded as one of the greatest sinners on earth due to their excessive, contradictory, and passionate nature. The Russian spirit is illustrated in the novel, The Brothers Karamazov, by their heritage that verges on the pathological, their disposition for the mental malady, and their inner conflicts that lead them into extreme and tense situations (Dostoievski, 2004, p. 126). A great discrepancy grips people of other nations when they direct their focus towards Russia. Although Russians may be considered great sinners, they never appear to lose from their mind and soul their ideal of holiness, which is maximal, endless, and without compromise. The immensity and profundness of the Russian spirit allow them always to be aware of the state they are in. The Russian soul, in its incomprehensible abysses, appears as a deep, insurgent, and threatening sea due to its unpredictability. The Russian imperialism is the worldly, mundane expression of their tumultuous soul, of the deepest anxieties that affect it. In this sense, Russians may be everything or nothing in history, but never in the middle, because this would mean their own annihilation, i.e., suicide. While they are alive, they create upsurge, outbursts, and extreme antitheses with the rational and even-minded Westerners, who could not exist more than a few moments in the carousel of feelings that animates the Russians.

The Actuality of Paul Evdokimov

To the contemporary person, the image of an almighty, tyrannical, and oppressive God has little effect. The image of the divine almightiness has been replaced by the image of a humble God, of the beggar who knocks at the door of our soul. For example: “Here I am! I stand at the door and knock. If anyone hears my voice and opens the door, I will come in and eat with that person, and they with me” (Revelation 3, 20). From the Russians’ point of view, God is the poor and humble brother, the one that is always with the poor, the disabled, and those in pain. In the painting, ‘Christ and Saint Russia,’ by
the painter Nesterov, Christ is depicted surrounded by beggars, the disabled, and the minorities of this world. Evdokimov (2001, p. 53) described how Sojenițin considered that “Russian literature is always pointed towards the ones in pain,” just as Christ who granted mercy to, healed, and comforted them. The mercy of the Russians manifested towards convicts and criminals is well-known.

Evdokimov (2001, p. 54) argued that “Christ is never depicted as a judge, and any human judgment must follow the model of Christ’s love, to look for the Pravda, untranslatable word in which justice is achieved in mercy.” He wrote how the name of ‘Johannine Christianity’ signifies that the divine is never a principle of righteousness or of power, but a fountain of fatherly love.

For many consecutive years, the image of the divine force was overbearing. In this sense, God was everything; a person was nothing before Him. Now, the fear that had followed humans for centuries no longer has an effect, but rather leads to indifference, boredom, and an enormous ‘yawn.’ Throughout history, an individual was subjected to a graphic inferring, that being sinful or not, that the individual would be put through the ‘Caudine Forks.’ Most times, a person was condemned without mercy, without the right of appeal, and this led to hostility towards the Church, followed by indifference, no longer relevant today.

Evdokimov’s emphasis on God’s love for the being, on a person’s unlimited freedom, is striking given he is known for displaying the traditionalist, conservative, rigid character of the Russian Church. This appears to be the influence of the Western spirit; it is unlikely that such a liberal vision originated in Holy Russia.

Evdokimov considers the viewpoint of a young person who is tempted to break the rules to seek solutions. He delves into specific issues, such as abortion, the control of birth, divorce, homosexuality, self-satisfaction, and adultery and prioritizes them according to their gravity. He aims to inject religious concepts into a level of society. He endeavors to institute a Christian society. He understands that all sins, i.e., all failures to meet the divine law, even subconsciously, are a consequence of human weaknesses, since the fall of Adam from heaven’s realm. In other words, people do not sin because they want to, but because they are weak.

Both Russian thinkers and existentialists believe that individuals create their destiny through the choices they make. In both philosophies, the human in flesh and bones, the living, a concrete individual that is subjected to transformation, is considered this way. For Evdokimov, theology was the experimental path to the union of an individual with God. For existentialists, the lived experiences that create the human being are what matter. An individual with a will, affections, reasoning, and instincts, i.e., the individual as a whole, is considered.

Evdokimov wrote how the contemporary person is called to perfection, feeling the calling of God. A recent inquiry in Russia brings attention to Evdokimov’s word as a younger Christian: “Christianity is everywhere, at the heart of existence, in the sacrality of motherhood, in the challenges of daily life, in the gratuitousness of love and friendship” (Evdokimov, 1993, p. 25).

In Evdokimov works, the analogy between the inflexible, rigid Church and the Old Testament becomes clear. With Paul Evdokimov, there comes a breaking point that is the gateway leading to the New Testament. The paradigm of the New Testament is creative and brings content that is completely new in comparison with the Old Testament. Paul Evdokimov is a genius who created a new individual; the Christian of today is different. What might seem a weakness and a fall in religion at first could also be viewed as the reason to consider him a creative genius. In this sense, only faith created in a completely different form might enliven the modern individual. This faith has the power to transfigure the individual. The metanoia of contemporary humans, the change in their absolute assumptions, may only be created in another thinking paradigm (Collingwood, 1998).

The following is a comparison that may seem bizarre but aims to illustrate the wealth in transforming capital of Paul Evdokimov’s works. In traditionalist Russia, religion was governed by the principle of righteousness, which also applied in the Old Testament, and activities were carried out in the classical behavior of the effect following the cause. These were well-established laws where processes were carried out with no element of surprise, unlike quantum physics where the classic laws of physics are questioned, and everything seems possible. In the later, there is the great freedom that is similar to the worldview of the New Testament, which has the principle of love as a foundation. Nevertheless, the New Testament has been forgotten by the official Orthodox Church of Russia, which is ruled mostly
by the principle of righteousness, before the coming of Christ. The statements must be regarded with care in the sense that they bear in mind the spirit of the Old Testament that hovers over the Russian Church rather than the churches doctrine and teachings that belong to the New Testament and are often forgotten. The principle of love for fellow humans is greatly emphasized by Evdokimov in following the line of the great Russian mystics who did not have a strong connection with the official Church, which supposedly built the New Deified Man. Evdokimov mentions the human being who is in various ranks of moral perfection and achieves huge leaps due only to one ingredient, called love, without which the spiritual ascent would be challenging and arduous. With the help of love and sacrifice, individuals are relieved of their sins, they are purified and evolve spiritually. Astonishment emerges because, despite this issue, the Russian Orthodox Church has an entire list of punishments and endless lists of sins, interdictions, and sanctions, that are all expediently applied. With each contact with the church, an individual receives a review that is most often negative. Due to the harshness and opacity of its treatments and methods, the church mostly succeeds in bearing its way. The contemporary atheist society is the result of its techniques, which were considered invincible throughout the previous centuries. The philosopher of the Russian exile understands that the therapy must be changed. The old methods and techniques are outworn and are no longer efficient. Most of the time they exacerbate, similar to obtrusive melodies. The system that drastically penalized all deviations has a church correspondent in psychology, in the image of the sadistic father, i.e., Freud, who was in fear of castration (Freud, 1995, pp. 53–54). The Church was the one that forbade pleasure. A fleshless asceticism was vehemently preached, “at the beginning of the Great Lent, Christians were warned of the fact that the devil does not drink, does not eat, does not marry and nonetheless, he is not less of a devil” (Evdokimov, 2003, p. 59). Evdokimov had the special ability to reduce sexual sin to its true dimensions after it was obsessively hyperbolized and repeated throughout centuries. This mindset reached a hilarious situation during the Middle Ages when serious sins were elevated to a secondary level as a consequence of an exaggerated concern about the sexual sin and subsequently, exposed many details at confession. This discernment of Evdokimov is not about justifying his failing, because he led an exemplary life from a moral point of view, but is the product of his objective, even-minded thought.

Evdokimov (1993, p. 89) refers to an ascetic saying “the sun has never seen me eating, to which another answered that it has never seen me upset.” It is considered that the greatest sin in the eyes of God is hate for one’s neighbor. In this sense, one may love in vain where one cannot love their fellow human beings; any ascension without love is pointless.

The benefits brought by science and technology may contribute toward the spiritual crisis for the contemporary person. The imperfect human being thrown into the world is like a child who runs towards its parent when there are obstacles that the child alone cannot overcome. In some cases, technology and science may provide only a momentary, superficial solution, which leaves the fundamental issues unresolved and offers the contemporary individual a hubris unequaled through time.

Some philosophers consider, that regardless of how emancipated people consider themselves, today, people remain nostalgic about a world permeated by sacredness, a lost paradise, an Eden from which they were banished and continually try to recover (Eliade, 1995, pp. 180–181). That is, it is the essential need of a human being to escape the finite, the quotidian, and the profane. According to Evdokimov (2003), the German philosopher, Schopenhauer, called a human being, ‘a metaphysical animal’, and considered that even the atheist needed an entity superior to the physical world. Thus, regardless of a person’s efforts, they would remain on the material, concrete level, in crowded situations with disease, death, and love, with the appeal of divinity imminent. These Evdokimov (2003) considered brought forward the realization of the Christ-like message in a desecrated, secularized world:

“The great tragedy of our era is neither the pain, nor the misery, or the fear, but the feeling of a huge absence. People and especially youngsters desperately look for something, often going into dangerous lands, where all kinds of servants of the ‘depth’ offer them the most bizarre and dangerous solutions” (p. 6)

Thus, the huge absence felt in this era translates to a lack of true breakthroughs where the moral benchmarks must remain alive, animated by the divine presence because otherwise, they become
meaningless words. One must have an animated connection with ethics or else it becomes a foreign concept where, in a crowded life, choosing between good and evil the formal ethics has no relevance.

Conclusions

Essentially, Christianity is Messianic, revolutionary, and explosive, with people encouraged to observe the Kingdom of Caesar or the Kingdom of God. People are called to be ‘apostles’ that change the world into the Kingdom of God; to sanctify and transfigure it and prefigure it for the next age. The works of Evdokimov bring to light the internalized asceticism of the layperson to which people are called, and that can be achieved in all societies and historical eras. Evdokimov (2004, p.133) wrote that Saint Ecumenius referred to “Emperors due the domination over our passions, priests for the sacrifice of our bodies, prophets nourished with the teachings of the great mysteries.” This is the ideal for a Christian to embody. Saints are used in an endeavor to familiarize the congregation with the qualities of the Kingdom and show how this relates to the individual. Saint Cyril of Alexandria has replaced the Greek dialectics of ‘master’ to ‘slave’ with the dialectics in the Gospel of ‘father’ to ‘son.’ By adoption, Christians are considered ‘all God’s children’ and thus, equal to Him. Sooner or later, the contemporary person, regardless of how emancipated they consider themselves, they feel the nostalgia for divinity, we have in us the longing for the Absolute, as we are bearers of the divine archetype (Jung, 1997, p. 447), which may be activated in us at any moment, like a volcano which was dormant for too long, by being potent, it has accumulated unknown energies and tensions and in one moment it may become active and we may witness an unprecedented burst of the religious sentiment, of the mystical experience. Although Paul Evdokimov did not succeed in instituting a Christian society as he intended through his efforts to bring everyone to God, he managed to attract the attention of the West and the entire world to the Orthodox East. By proposing a solution to the moral crisis with which the contemporary world is confronted, he managed to illuminate a beacon in the tumultuous 20th century, marked by the two world wars and multiple cataclysms.

References


PUBLIC FUNDING OF ICT IN BULGARIAN SCHOOL EDUCATION (2012-2015)
Teodora Varbanova

Abstract: This article aims to present state policy in respect of the provision of ICT in schools and more specifically – computerized workplaces. The definition of the author for computerized workplaces: desktop, laptop, terminal or (hybrid) tablet. For this purpose, the presented and analyzed data are from the implementation of the Ministry of Education and Science in Bulgaria National Program "Information and communication technologies (ICT) in the schools" for the period: school years 2012/2013, 2013/2014 and 2014/2015. The data are obtained from the Ministry of education and science in February 2015 in response to a request for access to public information by the author. In this article some of the analyzed data give objective information about the state funding for securing computerized workplaces and the total amount of investments, and effectively covered schools, for the survey period.

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UDC Classification: 35; 37
Keywords: ICT, education, public funds, schools, computers, students

Introduction
The introduction of new technologies, such as broadband internet and personal devices with access to the global network has had a most noteworthy effect on education. A large number of students are connected to the global network either via computers at home or via personal devices – primarily cell phones with access to the Internet. At present, schools are lagging behind with personalizing education and, more importantly, with providing a computerized workstation for each student. Recent studies pertaining to the use of ICT in schools are:

- The PISA survey in 2012 – Program for International Student Assessment of the Organization for Economic Co-operation and Development (OECD) intended as a periodical standardized assessment of 15-year-old students. This was the first time a computer – based problem-solving module was introduced. According to the survey, an average of 94% of students in OECD countries have computers at home which they also use for educational purposes. An average of 72% use computers at school, yet in some countries less than 50% of students have claimed so. An average of 94% of the surveyed students have at least one computer at home; 93% of Bulgarian students also have at least one computer at home (Petrova, 2013).

- The European Commission’s Survey of Schools: ICT in Education, conducted in the 2011/2012 academic year, which included 31 countries – the 27 EU members, Iceland, Norway, Croatia and Turkey, and a total of 190 000 respondents (teachers, students, principals). The survey defined ‘computer’ as ‘a PC or laptop, netbook or tablet, which is used for educational purposes at school, regardless of whether it is connected to the Internet or not. The survey was aimed at assessing the different aspects of ICT in schools among students in the fourth, eighth and eleventh (general and vocational education) grades.

The purpose of this article is to present the country’s policy regarding the provision of ICT in schools and computerized workstation in particular. The definition of the author for computerized workplaces is: desktop, laptop, terminal or (hybrid) tablet. The data from the National Program “Information and Communication Technologies (ICT) in Schools” for the academic years 2012/2013, 2013/2014 and 2014/2015 of the Bulgarian Ministry of Education and Science will be used for the purposes of this article. The data are obtained from the Ministry of education and science in February 2015 in response to a request for access to public information by the author. This article analyzes part of the data which presents objective information about the financial provision for computerized workstations, as well as the total amount of the investments made, as well as the schools which were and were not covered in the assessed period.

Bulgaria’s place in comparison with other European Union countries
As of now, no information has been released on the actual number of computerized workstations in Bulgarian schools and it is difficult to acquire such data since the presence of a computer does not guarantee that it is being used as a computerized workstation. Before the National Program

1 Faculty of Economics and Business Administration, Sofia University, tedche@hotmail.com
“Information and Communication Technologies (ICT) in Schools” of the Ministry of Education and Science, the only national provision of computers was in 2005-2007 when “more than 65,000 computers” were divided between all Bulgarian schools as a measure for the fulfillment of the National strategy for introducing ICT in Bulgarian schools. Since then, there have not been any centralized deliveries, and it has been up to the schools to decide how much of their delegated budgets should be spent on ICT. Numerous businesses and non-governmental organizations supposedly took up the initiative to give ICT equipment to schools for the period 2008-2012 but there is no consolidated information. The only official information released about the provision of computers in schools is the one from the aforementioned survey of the European Commission Survey of Schools: ICT in Education (European Schoolnet, University of Liège, 2012). Table 1, in which the results for Bulgaria are compared to averaged results for the EU countries, shows the ratio of computerized workstations to 100 students. The EU results show a decrease in the ratio in the higher grades. Even though Bulgaria is significantly lagging behind compared to the other EU countries, the data show a compliance with European tendencies: elementary school pupils have the least access to ICT in schools and students in vocational education have the largest number of computerized workstations at their disposal. Bulgaria rates among the last five countries in the survey, together with Italy, Romania, Greece and Turkey. There are primarily PCs, and the ratio of a student to a workstation connected to the Internet is 1 to 13, the EU standard being 1 to 7. Laptops are a scarcity, with a ratio of 1 to 125. More than 80% of computers are placed in computer labs. As for broadband internet access, Bulgaria is among the leading countries, with a mere 4-5% of students attending schools not connected to the Internet.

Table 1: The ratio of computerized workstations to 100 pupils

<table>
<thead>
<tr>
<th>Country</th>
<th>4th grade</th>
<th>8th grade</th>
<th>11th grade – General education</th>
<th>11th grade – Vocational education</th>
</tr>
</thead>
<tbody>
<tr>
<td>BULGARIA</td>
<td>6.5</td>
<td>9.4</td>
<td>8.7</td>
<td>15.6</td>
</tr>
<tr>
<td>EU Average</td>
<td>14.5</td>
<td>21.1</td>
<td>23.2</td>
<td>33.6</td>
</tr>
</tbody>
</table>

Source: Authors

8th -11th grade students fall in the scope of the survey which assesses the usage of technology in class (shown in Table 2). Between 65% and 71% of students utilize school computers while between 19% and 22% use personal laptops. The results concerning cell phone usage are most curious, with 40% to 46% having claimed that they use one. Compared to other EU countries, the percentage is significantly higher. Despite the negative tendencies concerning the student-computer ratio, Bulgaria rates high among the countries using ICT at school for educational purposes, particularly via cell phones.

Table 2: Using technology in class

<table>
<thead>
<tr>
<th>Level of education</th>
<th>Country</th>
<th>Personal cell phone</th>
<th>Personal laptop</th>
<th>School computer</th>
</tr>
</thead>
<tbody>
<tr>
<td>8th grade</td>
<td>BULGARIA</td>
<td>39.5%</td>
<td>19.3%</td>
<td>70.6%</td>
</tr>
<tr>
<td></td>
<td>EU average</td>
<td>28%</td>
<td>11.2%</td>
<td>53.3%</td>
</tr>
<tr>
<td>11th grade – General education</td>
<td>BULGARIA</td>
<td>46.1%</td>
<td>21.6%</td>
<td>67.5%</td>
</tr>
<tr>
<td></td>
<td>EU average</td>
<td>34.6%</td>
<td>10.7%</td>
<td>50.5%</td>
</tr>
<tr>
<td>11th grade – Vocational education</td>
<td>BULGARIA</td>
<td>44.8%</td>
<td>21.9%</td>
<td>65.2%</td>
</tr>
<tr>
<td></td>
<td>EU average</td>
<td>45.6%</td>
<td>15.5%</td>
<td>64.3%</td>
</tr>
</tbody>
</table>

Source: Authors

Based on a number of criteria the European Commission Survey of Schools: ICT in education divides schools in three levels of digital provision, defined as follows: the school has broadband connection to the Internet (more than 10 mbps), as well as one of the following: a website, an e-mail for students and teachers, a local web, a virtual educational environment.

- Schools with a high level of digital provision
- Schools with partial digital provision
- Schools with a low level of digital provision that have little or no Internet access

19% of 4th grade Bulgarian schools and 14% of 8th grade Bulgarian schools fall in the last category. Only 11th grade schools are anywhere near close to the average EU levels.
1. National ICT in Schools Program

The data cited above concerns the academic 2011/2012 year. In 2012, a National Program “Information and Communication Technologies (ICT) in schools” of the Bulgarian Ministry of Education and Science was introduced and approved. Its primary aim was to financially aid schools in renewing ICT equipment by “guaranteeing a minimum of technological provision by facilitating each school with computer terminal solutions” (National Program “Information and Communication technologies (ICT) in the schools” for the school year 2012-2013, 2013). In the four years that the program covers, the schools are to utilize the financial aid given and to renovate ICT equipment. As of 2012, the program fixes an opportunity for providing computerized workstations, namely terminal work stations. The program lists the following benefits:

- Obtaining and renovating terminal based workstations is cheaper: one server caters for numerous workstations; the only expenses have to do with renovating only the server since the other components last longer
- The cost of maintenance is lower: this is an important argument when it is taken into consideration the fact that most schools in the country cannot afford the services of professionals and the role of ICT support and maintenance is often taken up by Informatics and/or IT teachers.
- The technology is easily applicable to the learning process.

The criteria the program requires are clear: at least 3 servers per school, or at least one server per 13 pupils, both of which provide a maximum of 39 workstations per school. The budget is 6 500 000 BGN, of which up to 5 000 000 BGN is designated for renovating the present technologies. Each school in the country applies for centralized financing by stating in advance the number of workstations needed and the amount for co-funding. The maximum price per workstation allowed by the Ministry of Education and Science is 750 BGN. Should a school manage to provide a workstation at a lower price, the rest of the money can be used for purchasing more workstations or for other ICT related expenses. The process is completed on a school level but the Ministry of Education and Science provides two specifications for minimal technical requirements for terminal solutions of a high-end and a low-end performance.

During the first year of the program a total of 1168 schools applied. In order to fit the financial restrictions, only 496 schools were approved (see Table 3).

During the second year – school year 2013/2014 – the requirements were slightly altered. Schools which had a pre-existing network received 700 BGN per workstation while schools which required building a network received 750 BGN, and it was expected of the Internet providers to include setting up the network in the final price. Whether a school was approved or not depended on what percentage of the sum they co-funded 836 schools applied and 516 were approved (see Table 3).

During the third year – the school year 2014/2015 – the program was significantly changed regarding ICT equipment. In addition to the initial “terminal solutions,” “personal and portable computers,” tablets and various hardware, such as multimedia projectors, interactive whiteboards and software products were included (National Program “Information and Communication technologies (ICT) in the schools” for the school year 2014-2015, 2015). The maximum price allowed was increased for the following:

- Terminal – 850 BGN (app. 430 EUR)
- Computer – 800 BGN (app. 400 EUR)
- Laptop – 800 BGN (app. 400 EUR)
- Tablet – 500 BGN (app. 250 EUR)
- Projector – 1000 BGN (app. 500 EUR)
- Interactive whiteboard – 1000 BGN (app. 500 EUR)

Each school could apply for additional hardware and software products, again providing exact co-funding. Schools were required to fill out a survey in which they had to sort out their priorities – the priority of each product they were applying for if it were to be bought. Two additional components were added when considering a school:
Innovative capacity of the school, which was defined by the school’s readiness to measure its e-maturity by filling out an international survey conducted by a European Union project.

A school action plan – filled in a form provided by the Ministry of Education and Science.

The final rating was by component and not by school as it has been in the previous two years, i.e. a school could receive funding for some of the components it had applied for but not necessarily for all of them. For the first time there was separate funding for all applied Protected Schools and all the components they applied for were funded. Totally 1171 schools applied in the school year 2014/2015 but only 623 were approved (see Table 3).

The data for the schools which applied and those which were funded by the National program “ICT in schools” give precise information about the interest toward the program - a program which allows schools to facilitate computerized workstations according to the latest educational standards. For the first three years of the programs, which are analyzed in this article, the number of schools is 2479 – elementary schools, secondary schools, high schools, vocational schools, evening high schools and prison schools. Table 3 shows the percentage of schools which took part in the program and were funded compared to the total number of schools in the country for each year of the program.

<table>
<thead>
<tr>
<th>School Year</th>
<th>2012/2013</th>
<th>School Year</th>
<th>2013/2014</th>
<th>School Year</th>
<th>2014/2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Totally Applied Schools</td>
<td>1168</td>
<td>836</td>
<td>1171</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approved for funding</td>
<td>496</td>
<td>516</td>
<td>623</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage of schools approved for funding from all applied schools</td>
<td>42.47%</td>
<td>61.72%</td>
<td>53.20%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage of applied schools compared to all the schools in the country</td>
<td>47.12%</td>
<td>33.72%</td>
<td>47.24%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage of funded schools compared to all the schools in the country</td>
<td>20.01%</td>
<td>20.81%</td>
<td>25.13%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Authors

Taking into account the information in Table 3, the following conclusions can be made:

- Fewer than 50% of all the schools in the country applied for the program. The main conclusion that can be made is that the schools that did not apply is due to lack of delegated budget funding and cannot afford to spend money on renovating or purchasing computerized workstations. IT in secondary schools and Informatics and IT in high schools are compulsory subjects in Bulgarian schools. Since the last national program that facilitated schools with computers was in 2005-2007, it is logical to deduce that obsolete technology is being used in computer labs throughout the country. Even if some of the schools renovated their ICT equipment through special programs or with their own budget, they do not represent 50% of Bulgarian schools. The second, and more unpleasant by far, conclusion is that more than 50% of the schools in Bulgaria are not interested in updating their computer labs.

- Interest in the program significantly dropped in the second year. A logical explanation is that what schools want for technology is different from the pre-defined “terminal solutions”. This is probably why the program was opened for different types of technology in its third year when the number of applicants was the same as the first year.

- Even though the program’s budget of 5 000 000 BGN remained unchanged for the first three years, the number of approved schools increased. Due to increase of co-funding in 3rd year.

- A detailed analysis shows the following:
  - In the school year 2012/2013 the following areas have the highest percentage of approved schools: Shumen (39%), Varna (36%) and Vidin (31%). Ruse (10%), Pazardzhik (8%) and Kardzhali (4%) have the lowest.
  - In the school year 2013/2014 40% of all the schools in the Yambol area were funded, as well as 39% of schools in the Varna area and 30% in the Burgas area.
  - In the school year 2014/2015 42% of Yambol schools, as well as 36% of Sliven, Vratsa and Pleven schools, were funded. Lovech (11%), Veliko Tarnovo (15%) and Vidin (15%) are among the areas which received the least funding.
For the entire duration of the program, 77% of all the schools in the Vratsa area were funded, as were 66% of the schools in the Pleven and Shumen areas. Pazardzhik (26%), Kardzhali (35%) and Stara Zagora (35%) are at the bottom of the rating.

More than 50% of all the schools in 15 areas in the country were funded.

It is important to note that the total number of funded schools does not mean: funded unique schools. 35 schools received funding for all three years of the program. A lot of schools were part of the program for two of the three years. 1227 out of 2479 schools were funded.

**Figure 1:** Schools which took part in the program and schools which did not for the first three years of the program

**Source:** Authors

**Public funding of ICT in school education**

The National program “ICT in Schools” supports schools in purchasing computerized workstations by co-funding. The final sum of a computerized workstation is defined by the Bulgarian Ministry of Education and Science, and each school applies for a number of computerized workstations, stating the percentage of the co-funded sum it can cover. The program provides the rest of the money for any number of schools until reaching the financial limit. For the first three years of the program the Ministry of Education and Science has provided a total of 22 522 849 BGN.

**Figure 2:** Money invested in the National program ICT in schools

**Source:** Authors
As can be seen, there is a sudden decrease in the second year of the program but in the third year there is a pronounced increase. This results from the increase in the budget (courtesy of the Ministry of Education and Science and achieved by using additional unused funds from other programs) and proves that there is more interest in the program when schools have a variety of technologies to choose from.

A detailed analysis shows the following:

- In the school year 2012/2013 schools in the Sofia area (38.41%), in the Targovishte area (38.08%) and the Kyustendil area (37.97%) give the greatest percentage of co-funding. The smallest percentage is in the Gabrovo area (24.52%). 30.24% is the average percentage of co-funding.
- During the second year of the program there is little to no change in the aforementioned percentages. Schools in the Kyustendil area (34.48%) give the greatest percentage of co-funding. The smallest percentage is in the Silistra area (26.77%). 29.45% is the average percentage of co-funding.
- The percentage of co-funding is greatest in the third year, with an average of 37.43%. Schools in the Stara Zagora area contributed 49.24%, a stark contrast with the Pernik area where schools contributed the least – 30.94%.

**Conclusion**

The analysis of the National program “ICT in schools” (2012 – 2015) shows that the program fails to achieve its goals – namely, renovating the ICT equipment, computerized workstations in particular, in all schools in the country for the entire duration of the analyzed period. More than 50% of the schools have not taken advantage of the program in the past three years. Despite the great interest in the program in the first year, applicants decreased in the second, perhaps because of the fixed prerequisite – “terminal workstations”. This called for a change in the conditions – personal computers, laptops and tablets were included in the list of components to be financed. Hardware and software were also included even though they cost money but do not provide new computerized workstations.

Another thing that might have contributed to the failure of the program is the prerequisite for co-funding, because of which only schools with a great number of students and large budgets were able to benefit from the program. Schools with fewer students and thus smaller delegated budgets would have had considerable difficulties for co-funding. If all students cannot have access to modern technology and education, it can be seen as financial discrimination. In order to fix that, in the third year all protected schools who applied were approved, regardless of the percentage of co-funding, but they were only 47.

In the 3rd year of the National program, it remains to be proven that the schools funded have achieved the ratio of 1 computer to 12 students (per computerized workstation) which is a prerequisite of the program since there has been no information about the number of the already available computerized workstations, prior to the National program.

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INTERCULTURAL HERMENEUTIC DIALOGUE BETWEEN CHILD AND ADULT IN DIVERSE EDUCATIONAL ENVIRONMENTS: THEORETICAL INSIGHTS

Inesa Vietienė

Abstract: As economic, social, and political conditions are rapidly changing in modern society and the development of information and communication technologies is constantly in progress, attitudes toward children and their education are also transforming. Childhood education takes place in various environments through intercultural dialogue between child and adult, which is often interpreted in the context of communication theory. A dialogue between child and adult is also supplemented and enriched by hermeneutics in various environments. This dialogue enables the disclosure and understanding of the diversity of experiences of child and adult, learner and educator. Hermeneutics provides circumstances for childhood education to be perceived as a multidimensional and unique process. From the hermeneutic perspective, the intercultural dialogue between child and adult focuses on the problem of understanding in which the awareness of the whole, rather than participation and interaction, has particular importance in interpreting one’s own experience and perception.

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Keywords: intercultural dialogue between child and adult, hermeneutics, diversity of educational environments.

Introduction

Childhood has a special meaning in today’s society as children are the youngest and most socially dependent social group by age. They are fully dependent on adults who decide on the conditions that affect their life and education.

Modern childhood education, according to Monkevičienė (2009), is perceived as depending ever more clearly on the socio-cultural field between child and family, child and educator, family and educational institution, educational institution and community, child and social, as well as the cultural environment. Therefore, the quality of education is guaranteed by the complete intercultural hermeneutic dialogue between child and adult, and its expressions in various educational backgrounds. Various aspects of this process have been investigated and analysed by a number of foreign scholars from different perspectives (Sotirou, 2012, 1993; Schröer, 2009; Freire, 2009; Tanaka, 2005; Gillett, 2003; Yoshida & Matsumoto, 2002; Schachinger, 2000; Sterfeldt & Mathiasen, 1999; McLaughlin, 1997) and Lithuanian scholars and practitioners (Garšvė, 2014, 2012, 2011; Čičelis, 2013; Lukočiūtė, Mickutė, & Mažeikis, 2009; Mažeikis & Lenkauskaite, 2008; Martišauskienė, 2008; Duoblienė, 2006; Kontautienė, 2006; Juodaitytė, 2007, 2004, 2002; Bitinas, et al., 2004).

As a result of the rapid change of social life, childhood education depends on the mutual intercultural dialogue between child and adult in modern society.

The object of this research is the intercultural dialogue between child and adult in diverse educational environments.

The aim of the research is to reveal the intercultural dialogue between child and adult in diverse educational settings.

The objectives of the research are the following:

1. To provide the definition of hermeneutic dialogue by analyzing scientific literature; and
2. To reveal possibilities of intercultural dialogue between child and adult in diverse educational environments.

Methods

The methods in this research involved an analysis of scientific literature and meta-analysis.

Hermeneutics and Dialogue

Hermeneutics literary means ‘interpretation and understanding’. In philosophy, this concept is treated as a doctrine for the conditions in interpreting meaning and the objects of the interpretation and their meanings (Juodaitytė & Savickis, 2013). According to Heidegger (1988), hermeneutics encompasses the combination of objects interpreted as well as the practical application of interpretation.

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1 Šiauliai University, Lithuania, inesa.w@gmail.com
Hermeneutics, on the one hand, is educational philosophy, while on the other hand, it refers to the method of education, which may be revealed in various ways, depending on the circumstances. It is the philosophy of understanding that explains the evolution of human understanding. Hermeneutics is focused on the revelation of meaning in the actions of an individual (Garšvė, 2014). Understanding actions and plans is an objective of one of its features. Hermeneutics is based on the objectivity of understanding actions as well as pragmatism and dialogism. Understanding only appears as a result of constant interpretation of experience. Only when a shift from false images to that which are ‘right’ is understanding reached. In this case, ‘right’ understanding is perceived pragmatically as properness and functionality, as opposed to the normal meaning (Mažeikis & Lenkauskaitė, 2008).

Hermeneutics refers to dialogue as providing the possibility for two subjects to communicate. Understanding refers to interpretation and hermeneutics refers to a method to discover conditions in which understanding takes place (Gadamer, 2004).

Dialogue is a phenomenon that enables a person to interpret the world, by instinctively looking for another individual with whom to communicate or transfer past experience, accumulated emotions, render experiences, or express one’s opinion. Dialogue takes place not only verbally, but also through body language, facial expressions, movements, and forms (Čičelis, 2013).

According to Gutauskas (2010), dialogue is an essential part of human existence that has major significance. This concept can be encountered in politics, science, work, meetings, conferences, and daily life. Dialogue is understood as a linking unit that allows people to understand each other better, to reach agreements, and to work together. Dialogue, as a process, is a conversation between two or more people; it is a meeting situation, with physical interaction, and a presence in front of one or more others in which something is discussed. Shared meanings appear in the conversation, as well as the sphere of understanding and agreement. Dialogue involves two or more partners talking, addressing each other, understanding something in a common way and reaching agreement on a subject. In relation to these aspects, dialogue is communication, mutual understanding, and agreement.

Rau (2005) claims that dialogue is a way of communicating that creates conditions for common understanding and gives meaning to human relationships. When writing about cultural dialogue, the author emphasizes the process of dialogue where the participants view each other sincerely. It starts when the feeling of self-esteem and self-respect between them is consciously the same. There is no dialogue between the ‘strong’ and the ‘weak’ participants because the ‘strong’ participant tries to ignore the ‘weak’ one and impose their own worldview on the other. Participants of dialogue need to know who they are, on whose behalf they are speaking, what their story is, and how they are perceived by others. This process is impossible without tolerance, which helps people of entirely different ethnic, cultural, religious, or political origins who want to live together too, not only be together, but also arrive at a mutual agreement in today’s society.

Mažeikis and Lenkauskaitė (2008) noticed that dialogue has a logic of evolution and goes beyond the boundaries of personal attitudes, thus widening the horizons of understanding and explanation. Dialogue in itself, without the recognition of its development and conclusions, is not a sufficient act of understanding, as it is only fulfilled upon recognition. Sotirou (1993) claimed that the most important feature of dialogue is its interpretation, which is analyzed by at least two persons. The author notes that understanding only appears upon partnership and dialogue.

In can be concluded that dialogue is frequently considered in the theory of communication by questioning the ways and forms information is transmitted to find the correct and effective communication potentially. However, dialogue is one of the most universal and interesting experiences. From the hermeneutic perspective, dialogue has become the completion of meaning and the acquisition of understanding rather than the opening of meaning.

**Expression of Dialogue Between Child and Adult in Informal Educational Environment**

Under the current conditions of constant change where one needs to adapt to the post-modern existence, the understanding of childhood requires “the new post-modern knowing and understanding” (Gellner, 1993, p. 93), which can be revealed using hermeneutics. Not only does hermeneutics clarify the meanings of childhood, but it also forms the understanding (Klawki, 1991).

A family is an integral factor of education and the closest environment surrounding the child where his or her attitude towards people, environment, world, and himself or herself is formed. The child’s
features, talents, and preferences come to light, and sense and sensibility are formed. The child gains his or her first experience, first impressions, acquires first knowledge, abilities, and skills in his or her way (Žilionis, 2003; Matulienė, 1997). According to Martišauskiene (2008), the family is the first educator of the child. The child learns many phenomena in the family before he or she starts attending a pre-school establishment. Not only do children gain their first skills, first knowledge and abilities here, but also, they form their emotions and communication experiences here.

Education in childhood centers around children’s social cognitive experience, and children become the context of the constantly evolving social interaction with the environment. Such education is vital not only for the children but also for the family because people perceive it as a dialogue between two cultures (children and adults). Dialogue refers to the development of a joint project in the social life of adults and children, titled ‘here and now.’ People direct it towards solving social tasks essential for the child in the micro-environment, as a habit of solving by interaction between both groups of individuals, namely adults and children who have a different experience. It, thus, establishes their training in solidarity for dealing with human problems. The intercultural dialogue between children and adults (parents) gives meaning to their interconnection (Juodaitytė, 2003).

Glebuvienė, Grigaitė, and Monkevičienė (2002) emphasize that the dialogue interaction between an adult and a child should enable the revelation of the child’s self-image and self-respect. Also, it should encourage harmonious relationships of the child with the environment, the surrounding people, and him- or herself, rather than the child’s cognitive development. According to the authors, the basis for this interaction is the rapid response of the adult to the child’s needs, desires, and requests. This response includes the adult’s constant focus on his or her own activities, provision of circumstances for the child to communicate, the development of emotional contact in recognizing the child, by no way, or rarely, emphasizing the child’s improper behavior.

Therefore, cultural, social, and spiritual development in childhood is relevant in the post-modern society. Hence, it becomes particularly significant in childhood education. The family is the closest environment surrounding the child where he or she learns values, attitudes, and ideals as well as key social competencies and skills. Childhood education in the informal environment takes place by maintaining an open dialogue between the two cultures, i.e., the dialogue between child and adult, where the most important custom is to focus on the child’s experience constantly.

**Expression of Dialogue Between Child and Adult in Formal Educational Environment**

Following the post-modern ideas, education needs an entirely new thinking regarding its theory and the relationship between theory and practice. There is no clear situation, plan, or results in the education process (Fullan, 1998). An undefined movement where the plan is corrected is also possible when the action is already in progress, and the result is not the most important element of this process. The meaning of self-creation is apparent in the post-modern context (Rubavičius, 2003). According to Juodaitytė (2003), reconsidering the complex relations of the child-adult system is possible.

According to Duoblienė (2006), modern childhood education is based on the principle of dialogue by emphasizing the reconsideration of one’s own position and assumptions as well as power games. Where dialogue is based on questions and answers it is important to acknowledge differences and treat each other as partners in achieving equal intercultural dialogue in the education process.

Once education perceives different intercultural experiences, the most common obstacle is the lack of knowledge and inability of participants to accept others. This result creates a dearth of conditions for intercultural dialogue. As noticed by Godon (2004), hermeneutics encompasses three main elements in education that are among the most important factors in educating children when reflecting on different experiences: understanding, personal identity, and learning. It makes it possible to understand and analyze the education of ‘different’ children as well as issues that arise from the absence of bilateral dialogue between the educator and learners. Therefore, hermeneutics in education would serve to help individuals understand the differences between children of varying cultures and for organizing education in a way that the child and the adult are equal partners rather having an inequitable standpoint. Hermeneutics facilitates the change needed in understanding learners and educators in education (Garšvė, 2011; Lukočiūtė et al., 2009).

Intercultural dialogue in a formal education environment facilitates an understanding of differences among educators and learners, i.e., moving away from the educator as the subject and the learner as
the object. Two models were chosen to understand this relationship: The typology of ethnics by Banks (1994) and the model of intercultural sensitivity by Milton Bennett (1993). Both focus on education. The process-oriented model of Bennet (1993) shows how perceiving the cultural identity of other changes the participants and how dialogue creates favorable conditions in education. The process-oriented model also helps structure the educator’s behavior, habits, and relationship with the learner (Freire, 2009). As claimed by Banks (1994), a variety of experiences progress, i.e., interactive education methods are used. These methods include simulation and communication with representatives of another culture for reflection of experiences.

According to Garšvé (2014), education in a formal environment is not static; it is a dynamic process that hermeneutics can enrich. According to the author, education does not reflect superstitions and stereotypes and thus, contains illusions. Hermeneutics focuses on analyzing superstitions, habits, and illusions by trying to perceive them critically instead of rejecting them. It also emphasizes the search and revelation of meaning for participants of education who reflect on different experiences. As well, it emphasizes the importance of the child in formal education, constantly focusing on the child’s experience, and encourages the child to become involved in improving his or her experience (Juodaitytė, 2003).

Hermeneutics, according to Garšvé (2014), is a method for understanding and explaining experience. The explanation of meanings is relatively lively and undefined. The sphere of the hermeneutic strategy is extensive, and it opens broad horizons. The strategy is based on the principle that education is the synthesis of horizons where it is important to hear the voice of another upon an encounter with traditions. The encounter is perceived as one between the individual who knows and the points the individual learns; the learner and his or her object of learning. Knowledge and language play a major role in this synthesis of horizons (Fairfield, 2011).

The role of a hermeneutic educator in formal education encompasses three major layers: a) the change in the position of the educator in the learning process; b) a critical dialogue relationship within the sociocultural, political, economic, and technological environments; and c) the constant need of the educator to learn and improve. First, the hermeneutic educator, the former traditional educator, i.e., the educator as the organizer of education, becomes the assistant of learners and moves towards self-understanding. In this, the educator is an assistant establishing a link between the experiences of learners in order for them to be understood. This relationship is directed towards openness, risk taking, misunderstandings, and surprise, which influence the dialectical link between knowing and otherness. Second, the role of the hermeneutic educator allows use of new information technologies in education, as well as the critical, creative relationship with misinformation, addictions, and social abnormalities (for instance, personal isolation). The role of educator as the interpreter of cultures is paramount. Third, the role of the hermeneutic educator should be based on creative self-education. This can be achieved by focusing on literature, bodily movements, artistic expression, improvisation, to help interpret and develop cognitive abilities to accept the revelation of otherness in the context of existentialism (Garšvé, 2014; Duobliënë, 2006a; Fullan, 1998).

The hermeneutic method explains the multiplicity of human existence in the world as well as the multiplicity of education, and it paves the way to dialogue between ‘I’ and ‘You,’ e.g., the child and the adult. Dialogue makes it possible to gradually overcome miscommunication (Juodaitytė & Savickis, 2013). Hermeneutics involves interpreting and adapting the experience of education and its practical application in a particular context. The educator can transfer an understanding of an object using reflection as well as broaden a previous understanding, since it is constantly improved through reflection (Mažeikis & Lenkauskaitė, 2008).

According to Duobliënë (2006), hermeneutics actualizes the principle of improving interpretation skills in education. The interpretative act is not based on role models; it is a free, playful process that maintains dialogue to achieve a different understanding of reality. There is no final word in such an environment. Dialogue helps avoid obligatory consensus and increases involvement (Mažeikis & Lenkauskaitė, 2008).

Therefore, modern childhood education in the formal environment is based on a principle of international dialogue that is supplemented and enriched by hermeneutics. Hermeneutics creates conditions in a formal environment for childhood education to be perceived as a unique
multidimensional process from the perspective of various cultures in the context of current global developments.

Conclusions
Dialogue is one of the most universal and interesting experiences, established and developed to alter and discover new meanings and to interpret experiences using communication. The hermeneutic dialogue focuses on the problem of understanding, where awareness of the whole, rather than participating and interacting, has particular significance. Dialogue, as the main form of communication between a child and an adult, occurs in various educational environments, both formal and informal, where a constant focus on the child’s experience is considered crucial.

Modern childhood education involves intercultural dialogue, which hermeneutics enriches. Hermeneutics enables the revelation of change in the understanding of child and adult, learner and educator, and reflecting on different experiences. In applying the hermeneutic method, dialogue becomes a scheme of questions and answers where recognizing differences and the treatment of another as an equal partner become important. Therefore, the intercultural dialogue between a child and an adult in various educational environments enables the revelation and understanding of diversity in experiences of child and adult, learner and educator.

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MOTIVATING FACTORS FOR SCIENCE COMMUNICATION IN LATVIA

Justīne Vīķe

Abstract: There is a public demand for communication of scientific findings that account for fragmentary expression of activities included in different science communication models. This study identifies factors facilitating the involvement of the scientific community in science communication. The primary data were obtained by a qualitative method of in-depth, semi-structured, expert interviews involving ten representatives of the Latvian scientific community relating to exact sciences, life sciences, and humanities and social sciences. The study distinguishes two categories for engaging the scientific community in science communication: a formally recognized approach and one involving a third party for organizing the communication.

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Keywords: Science communication, motivation, public engagement of science.

Introduction

Apart from the traditional responsibility, i.e., the creation of knowledge and education, the contemporary scientific community has several obligations relating to dissemination and sharing of knowledge. These activities include communication within the framework of the scientific community, so that exchange of knowledge is effective. However, one of the greatest challenges of science communication is with the lay audience. Over the last thirty years, science communication has become a topic of discourse in Europe. In this time, science communication has transformed from an initial monolog of the scientific community (informative function) into a dialogue with society, with society a participant of the scientific development. Nevertheless, numerous studies have concluded that in most cases, societies of Europe and the United States of America have no information about scientific discoveries and theories, although their interest in scientific activities is high. This study focuses on identifying factors that motivate the scientific community of Latvia into systematically participating in science communication.

Literature Review

Science communication is continually evolving. As indicated by Massimiano Bucchi (2008, p. 68), “In many countries, and at the European level, funding schemes and policy documents shifted their keywords from ‘public awareness of Science’ to ‘citizen engagement’; from ‘communication’ to ‘dialogue’; from ‘science and society’ to ‘science in society’.” These changes can be divided into three models: the deficit model, the dialogue model, and the participation model, which can coexist as policy instruments and do not exclude each other (Hetland, 2014). As admitted by Jenni Metcalfe (2014), the theoretical models of science communication demonstrate different interactive levels and directions. The deficit model needs the least interactivity between participants, as it involves one-way science communication by the scientific community. The dialogue model facilitates greater interactivity because two-way communication between scientists and society is organized. However, the participation model foresees the highest level of interactivity between participants, because it predicts involvement of all stakeholders in solving and developing a particular issue. Nevertheless, the question of how to motivate the scientific community to participate in dialogue with the lay audience remains open. Several hypotheses for organizing science communication have been proposed. According to Bauer and Jensen (2011), scientists live in a ‘golden cage’ and do not see the necessity (demand) for any involvement in public activities. They considered that activities targeting public participation differ with the type and intensity of approach used by scientists at the center of the scientific world as well as those in the periphery, and public engagement activities result from the institutional hierarchy. This hierarchy is the area of activity of senior participants from scientific institutions. These authors also argue that public participation reflects a model characterized by a particular scientific discipline; that public engagement and intensity in the scientific world has generally increased, and public involvement represents imaginary rather than actual changes in the culture of scientific research institutions. As well, they considered there existed a compromise between the engagement in research and that in pursuing public involvement because scientists who are active in one area will be less active in another. Also, they regarded there existed a compromise between public participation activities and professional growth perspectives, since the activities that are targeted at public engagement do not facilitate the development

1 Rīga Stradiņš University, Latvia, justine.vike@rsu.lv
of a scientific career and the structure of public engagement activities has changed from knowledge distribution (outreach) to dialogue.

As emphasized by Bårstad (2011, p. 18), “Academic culture is to some extent reflected in the scientist's motivations, or the lack of them, to engage in public communication.” To develop the communication between the scientific community and the rest of society, the Royal Society of Great Britain together with Research Councils United Kingdom (UK) and Welcome Trust conducted a study: Factors Affecting Science Communication (The Royal Society, Research Councils UK, Wellcome Trust, 2006). This study identified initiatives for facilitating the involvement of the scientific community in science communication. These initiatives included additional funding for organizing science communication, particularly to cover the costs of working hours of persons involved. The study also found that scientists are willing to participate in science communication events organized by other institutions. As well, they considered that science communicators would attract scientists in the process and support from the management of scientific organizations or structural units would be recognized as a bonus for one’s career. The research conducted by the Royal Society, Research Councils UK, and Wellcome Trust (2006) resulted in the following three recommendations. First, the sponsors of science and institutions organizing higher education should develop a definition and define the goals of science communication and public engagement for a uniform understanding. Second, it is necessary to raise the awareness of young scientists about the involvement in science communication. Third, there is a need to establish agencies organizing science communication that would encourage scientists to participate, mainly for the purpose of centralized coordination of the process.

To facilitate implementation of strategic communication, in the case of Latvia, it is necessary to identify factors promoting the involvement of the scientific community in science communication.

Data and Methodology
The study was based on primary and secondary data. The secondary data involved research and regulatory enactments. Primary data were obtained using a qualitative method of in-depth, semi-structured, expert interviews of 10 Latvian representatives of the science community from fields of exact sciences, life sciences, humanities and social sciences. No limitations of the data collected or its processing were identified during the study. The acquired data were analyzed according to the qualitative method of content analysis. Based on theory, categories were formed in the course of the deductive analysis to reflect factors that would facilitate the involvement of the scientific community in science communication.

Results and Discussion
The Sustainable Development Strategy of Latvia until 2030 (Cross-Sectoral Coordination Centre, 2010, p. 40) addresses the rate of knowledge sharing and availability to the local population, indicating that the outcomes of state-funded research should be made publicly available through the Internet, in addition to that facilitating access to knowledge. What concerns knowledge sharing to lay audience, according to the Guidelines for the Development of Science, Technology, and Innovation for 2014–2020 (Ministry of Education and Science, 2013, p. 27), public presence of science is relatively small because science popularization is not purposefully planned. Thus, the importance of science and technological development as a factor of economic development at the level of public opinion and decision-takers is undermined. It should be highlighted that at the decision-making level particularly the development of science and technology is associated with economic growth, bearing in mind the guiding principle of the National Development Plan of Latvia for 2014–2020 (Cross-Sectoral Coordination Centre, 2012, p.12-13). This guiding principle is ‘Economic breakthrough,’ which is associated with three priorities: ‘Growth of the National Economy,’ ‘Human Securitability,’ and ‘Growth for Regions.’ Thus, the role of social sciences and humanities in Latvia in this period of science commercialization, considering that the Smart Specialization Areas (2015, p.3) defines fields with potential for cooperation between the industry and universities, foresees economic transformation aimed at increasing financial knowledge by investing in research, innovation, and promotional activities. The strategy involves all industry, science and education representatives who create smart specializations in the areas of biomedicine, medical technology, bio-pharmacy, and biotechnology where knowledge is crucial for profitability, as well as involving those providing education on such knowledge (Smart Specialization Areas, 2015, p. 3). The Social Sciences and Humanities (SSH) Ecosystem Analysis (Jaunrades Laboratory, 2016) determines
the need to implement a communication strategy by singling out several target groups. These groups include entrepreneurs, society as a whole, and SSH specialists who are informed of their relevant contribution. By involving them as a target group in the formation of such contribution, the most significant benefit is their mutual understanding, desire to cooperate, and development of common projects (Jaunrades Laboratory, 2016, p. 39). Research projects should include a component of active communication that clearly demonstrates the contribution to a specific target audience or societal group (Jaunrades Laboratory, 2016, p 41). This component could be ensured by SSH representatives. At this point, the question arises as to whether scientists, including SSH representatives, associate themselves with new responsibilities or are informed of such, considering the existing legal basis and societal impetus.

In the study, two categories were identified to facilitate the involvement of the scientific community in science communication: 1) a formally recognized practice and 2) one involving a third party for organizing the science communication. The first category was substantiated by a respondent:

“Lack of formal recognition, in my opinion, is among fundamental hindrances, if science communication were a formally recognized practice, this definitely would be a facilitating factor.”

However, the question of how to introduce this as a formal practice remains open. There were also opposing opinions from respondents, e.g., indicating that science communication should be monitored by the Ministry of Education and Science in Latvia.

“In the absence of good will there must be control, and in the case of Latvia, there is no scientists’ good will to communicate with the society. Maybe that is not because of lack of willingness but rather because of lack of understanding of such a necessity. For example, upon electing in the position of associate professor, assistant professor, or researcher, the criteria assessment form should include a criterion that the outcome of applicant’s research should be discussed not only among specialists but also in public.”

Another aspect resulting from this argument was the raising of awareness regarding the importance of science communication and the stakeholders involved. The average and long-term science planning documents of Latvia do not define the goals of science communication where no educational activities of the scientific community are possible. On the one hand, it is important to acknowledge that, above all, it is necessary to develop an understanding of science communication opportunities for doctoral students who are prospective members of the scientific community. On the other hand, there was the opinion that motivation for the involvement in science communication was not required for the entire scientific community, for example: “This would be excessive. There must be some evaluation, and probably we should highlight issues which are truly outstanding and unique”. Another respondent added that instead of serving the purpose of motivation, it is rather a reminder:

“For the scientists to remind that in the absence of involvement in science communication no funding for future or new research will be available. The public must be informed about research. No additional motivation, for example, in the form of specific funding, etc. is necessary. This is an obligation, and no stimulus is required accordingly.”

In pursuing science promotion, the duty prescribed under the Law on Scientific Activity of Latvia, Article 6, defines general responsibilities of a scientist in Paragraphs 2 and 3 referring to science communication (indicating a one-way communication approach), without public involvement in the creation of new knowledge.

The second category, identifying the participation of a third party in the organization of science communication, was substantiated by respondents’ opinions about educating scientists on the role and goals of science communication and involvement of communication specialists. According to responses to this category, there is a need to involve a third party acting as an intermediary among the scientists and society in general. One respondent noted:

“The larger the gap between public knowledge and that of the scientific community, the smaller the public willingness to support science funding using public taxes. Science communication should facilitate the willingness to obtain education. Scientists are involved in educating the society; perhaps, this is also the only way for ensuring funding for science. At the same time, there must be an audience for such a communication – the society requires critical thinking.”
Concerning involvement of a third party in organizing science communication, the respondents highlighted the problem of Latvia’s scientists having an adverse experience, e.g., occasionally experiencing low standards of journalism with communication media. It should be noted that organizing science communication and being involved in such, or both, requires additional time; as recognized by one of the respondents: “Communication is a joint effort. It is not a one-person show. It requires extra time for both stakeholders: the scientist and the media representative to reach an understanding.” One possible incentive for compensating the time devoted to science communication, as indicated in Survey of Factors Affecting Science Communication by Scientists and Engineers (The Royal Society, Research Councils UK, & Wellcome Trust, 2006, p. 17), is to fund the organization of science communication. However, salary is not always a qualifying factor for the scientific community with the raising of scientific reputation possibly more important.

**Conclusion**

As a result of this study, it is concluded that, in the case of Latvia, the factors that would facilitate the involvement of the scientific community in science communication overall, are a formally recognized and appreciated approach. The assessment distinguished differing positions: starting with the concept of public communication of research outcomes using a selection process to one of communicating all research outcomes to the public where such research was publicly funded. It is emphasized that the level of interactivity needs to be taken into account when assessing the model of science communication. Furthermore, it is recommended that science communication involve a third party to facilitate the awareness of the scientific community about their responsibilities to the rest of society. Nevertheless, it is important for the institutions overseeing science in Latvia to agree upon and communicate to the scientific community the definition and strategic goals of science communication.

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INFLUENCE OF THE EU INSTRUMENTS ON HIGHER EDUCATION AND SCIENCE IN BULGARIA

Albena Vutsova

Abstract: The European instruments have started acting adequately in Bulgaria since 1991, when the country was accepted as a member of a number of initiatives and pre-accession instruments were introduced. At a later stage commenced the action of the principal European instruments: the framework programs (1998) and structural funds (2003). They intervened the research and education area as real tools in the late 1990 and are acting up to now, being either options from new programing period of Structural funds functioning or as initiatives of new generation Framework programs (Horizon 2020 and Erasmus+, etc.)

This article considers the positive effects of these instruments in three directions consecutively: Financially, as a source of additional resources; Science Metrics-wise, as a volume of scientific production, created with their financial support, and evaluation of this production by the world scientific community; Other benefits.

The effect of realizations of this instruments has been explored and achieved results have been analyzed as a fundament for further improvement of their effective absorption and bettering the system of research and education.

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Keywords: education, research, knowledge, EU, instruments, Bulgaria

The European instruments – pre-accession instruments

The European instruments have started acting in Bulgaria since 1991, when the country was accepted as a member of a number of initiatives and pre-accession instruments were introduced. At a later stage commenced the action of the principal European instruments: the framework programs (1998) and structural funds (2003).

PHARE Programme was the first program, applied to Candidate-States for EU membership, in order to prepare their institutions for full membership in the Community. PHARE was directed to almost all sectors of the economy. Later supplemental pre-accession instruments were introduced - the programs ISPA (Instrument for Structural Policies for Pre-accession) and SAPARD (Special Accession Programme for Agricultural and Rural Development). PHARE program began to act in Bulgaria in 1991 with total financial support in the first stage (1993-2001) - Euro 11.0 million. During 2004-2006 Euro 14.0 million were provided to units of the system for the Education activity. As indirect support, according Borras (2012) for the scientific-innovative activities can be considered the development of the National Innovation Strategy, described by Freeman (1995), and the National Innovation Fund to support the innovation activities of SMEs, in a partnership with scientific organisations and universities presented by Bendis and Byler (2009). Total financial value of this scheme was Euro 1,179 million. For the period 2005-2007 the funds, provided to higher education system and Bulgarian Academy of Sciences (BAS) under the PHARE program, were insignificant (1%) relative to the means, provided by the state budget.

Bulgaria joined the TEMPUS program officially in 1991. From the beginning of the action of this program (1990-2006) it has provided the participating countries a total of Euro 300 million. The program had a positive effect with respect to the development of project culture and sustainable partnerships. During the active participation of the country, 1993-2001 (second program period), the universities received Euro 68,930 million. If we compare the data about the support received by the other countries, which were also in the pre-accession stage, Bulgaria ranks a good fourth position after Poland, Romania, and Hungary.

The program Erasmus emphasizes on the university structures and supports the mobility of lecturers and students. Since the beginning of its action in 1987 more than 3 millions of people have used the opportunities for academic exchange. It is a principal instrument for the realization of the educational priorities of the Community. Bulgaria joined the program in 1999. During the first academic year of activity of the ERASMUS program in Bulgaria (1999-2000) only 10 Bulgarian high schools received

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1 Prof., Faculty of Economics and Business Administration, Sofia University “St. Kliment Ohridski”, avutsova@yahoo.com
financing for mobility, but partnerships were developed with 42 European universities. The development of the program leads to systematic increase of the funds provided for mobility.

**European instruments used by NMS**

The basic instruments of the harmonization policy are the structural funds – the European Regional Development Fund (ERDF) and the European Social Fund (ESF). The means provided for science and education during 2007-2013 by the structural funds amount to Euro 557,740 million, where these financial resources also include the funds provided for secondary education. The principal measures, supporting higher education and science, are initiated in three of the operational programs – “Development of the Competitiveness of the Bulgarian Economy” Operational program (DCBEOP), “Development of the Human Resources” (DHROP) Operational program, and the “Regional Development” Operational program (RDOP). 120.747 million Euros of the resources for the priority axis 1 (development of the economy, based on knowledge and innovation activities) of DCBEOP is directed to the development of scientific organizations, research and infrastructure, bound to the business and economic development of the country. 8,446 million Euros was provided to support the research infrastructure of scientific organizations - only BAS institutes. Euro 42.825 million or 25.19% of the total Euro 105.386 million support were allocated specifically for innovative scientific activities.

HRDOP has provided directly to its beneficiaries a total of 32.876 million Euros. In the program period 2007-2013 various procedures have been carried out.

RDOP is focused on improving the infrastructure of universities. The funds provided via RDOP (Euro 18.402 million) went to 15 universities only and the actions of the OP have completed entirely. Since these funds were oriented to subjects of higher education, it is considered correctly this amount to be accounted for financial income and indirect contribution regarding the improvement of the educational and research process.

The framework programs for research and innovation are primary instrument of ERA (European Research Area) as per COM (2012) and COMPET 174(2008, May 16). They guarantee the execution of the Community policy in this area. Bulgaria started its participation in the limited activities of the third framework program. In the last program period of the framework programs Bulgaria has received Euro 11.4 per capita. For comparison, the Czech Republic has received Euro 19 per capita, Hungary – Euro 22.2, Romania – Euro 5.6. The average value for the new Member States is Euro 13.5 according to Knee et al. (2011).

The ratio between the amount paid by the country as a member of the EU, and the income from the framework programme for one year shows, that through this instrument the country gets back 4.3% of the “membership fee” Eurada (2014), which is not high, but combined with the resources from other similar instruments, creates conditions for a sustainable synergy.

INTERREG program was comparatively new to Bulgaria. Its beginning was in 2002 as a regional program, operating with financial support from the EU. The participation of Bulgaria in the first period was limited to a number of projects with no leadership. The overall contribution is Euro 10 178 million.

First European program for science and technology COST supports primarily horizontal and coordination activities. During the last several years the financial support, received by Bulgaria for the above mentioned activities, has grown steadily.

**EU instruments - Influence and benefits**

Since the GDP of the country is a fundamental characteristic of the national economy, and the latter in its turn is a reliable financial resource for science and education, a simplified mathematical model for its forecasted development in time has been elaborated.

The expenditure of the government and businesses for research as a percentage of the GDP are illustrated in Figure 1.
The reduction of government expenditure and the sustainable trend with the expenditure of businesses are obvious. The trend of the reduction of the government expenditure must not necessarily fall below 0.15% of GDP, as shown in the graphic, but the sustainable trend of reduction will obviously continue, and without any specific efforts the government expenditure will remain at the current levels. It means that the importance of EU instruments as steady resources are growing.

**Scientometric data and effect**

PHARE and TEMPUS, created the first effective partnerships with European scientific institutions for carrying out joint research, obtaining and publishing of a considerable number of high value results. Bulgaria has tried to use both instruments actively. Greece and Ireland exhibit similar behavior, but they do not combine the two instruments. During the same period the Czech Republic uses the instruments significantly less, and Spain does not use them for this purpose at all probably because the national financing of science in these countries is much better.
Obtaining the right for full access to the Framework programs and the COST program the Bulgarian scientific community became more active. The evaluation in this work covers FPs 5, 6, and 7, since these are the FPs, in which Bulgaria has full access to all types of activities. During each program the scientific community gathered expertise and by also using the opportunities of the other European instruments achieved a synergic effect (such an example was the parallel participation in the COST program, financed via FP). The bibliographic data of Bulgaria are compared to the same reference countries, as above.

The results for FP 5 show clearly, that for Bulgaria all parameters have low values because at this stage the experience was very small. FP 6 observed some positive changes. By a total number of scientific publications Bulgaria prevails over the Czech Republic and approaches the achievement of Austria, i.e., the publication activity is at an acceptable level, especially bearing in mind the above observations. According to this graphic, Bulgaria has improved part of its metrics. With respect to the percentile however (the values are reversed, as pointed out in the note about the network graphics), Bulgaria's characteristic is still the lowest.

**FP 7 influence upon scientific productivity**

With FP 7 the picture changed with respect to some of the characteristics, reflecting the gained experience and created more sustainable partnerships with leading European research centers. The noticeable improvement of the scientometric data was due, to the provision of constant access to Elsevier’s and Clarivate Analytics’ (ex Thomson Reuters) science metric databases. Following long years of practically discontinued conventional library access to scientific literature and information, another, new culture of their intensive use was created, and the Bulgarian scientists joined actively in this efficient avenue of knowledge exchange.

The use of the Internet platforms for scientific information provides an opportunity to trace also any individual publication activity and to produce a ranking of the researchers. An analysis of the bibliometric data shows, that the participants in European projects are among the best and most active researchers in their universities and research centers.
Bilateral cooperation - influence upon scientific productivity

With respect to the Hirsch-index (h), according Toshev 2011, of the number of publications, which according to quote a few authors is a sign of the development of the scientific sector for the period since the beginning of operation of the European instruments to this day, Bulgaria is ranked 21-st in EU-27 with an h index of 154 (for the sake of comparison: Great Britain has 934, and the Netherlands – 636; data SCOPUS, Science in European Union 2013). Lower ranking countries include Romania, Estonia, and Malta.

Figure 4: Number of publications by country for a period of five years – results from various financial instruments

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In the context of Europe 2020 the target is the financing of science to reach 3% of GDP, and, moreover, the prevailing contribution (2/3) is to come from businesses. Exactly businesses finance their own research, which quite often do not lead to publications, but due to the growing competitiveness of the environment – mostly to patents. E.g., only two corporations in Germany (SIEMENS and DAIMLER) invest in proprietary research 5 times more funds, than the financed primarily by the government research organization Max Planck, doing primarily basic research.

Benefits from EU instruments – general, as per SEC (2010) and EUCO 13/10 (2010, June 17)

Under the action of the pre-accession instruments in Bulgaria were created conditions for:

- development and consolidation of the administrative capacity of the government bodies, and educational and scientific institutions, so that the administration to be capable of operating in the EU environment;
- harmonization of the legislation in the higher education and science system, in order to shorten the transition periods according to Simeonova-Ganeva and Ganev (2013);
- progress in the development of institutions, to allow the creation and development of structures, strategies, human and managerial resources for strengthening the economic, social, and legislative capacity studied by Horvat (2013);
- introduction and use of specific instruments, like, e.g., the Twinning initiative, oriented to direct acquiring of good practices and experience in specific directions from similar institutions in the EU. This instrument provides technical and expert support, resulting in increased capacity of the human resources described by Ahrens (2006);
- introduction to specific instruments, complementing the primary ones, like the “Trans-border collaboration” programs, supporting the active development of capacity of the institutions, preparing them for participation in the European programs.

TEMPUS and ERASMUS programs influence the partial restructuring of the higher education system according to Inayatullan and Gidley (2000) as a whole – changes of the general network of HSs, as well as changes in the internal structure of some HSs. Supplemental contributions according to
Jongsma (2002) are: creation of strategic documents for the development of the higher education system based on partnerships; long-term effect in the universities as partners in the knowledge triangle; long-term effect on the internal-institutional structure: chairs, departments, faculties; introduction to internal and national systems for quality assurance.

Thus conditions are created for: higher quality and better efficiency of the educational process, which, in turn, influences the raising of a generation with new knowledge and skills; introduction of the European credit system; introduction of innovative and/or non-traditional methods of teaching and training described by Keegan (1990), which creates opportunities for the development of key competencies in various groups trainers and trainees; consolidation of the social harmonization at various levels;

The accumulation of knowledge as a result of the operation of various types of instruments for science and innovation can be considered also as a specific “warehouse/reservoir” for new knowledge or a “depository”, which according to the World Bank (2003) is a set of the following specific activities: creation of knowledge; application of knowledge; sharing of knowledge with partners and peers by new products and services.

With the creation of innovation products, representing an integrated result of the creation of new or improved processes, products, and services based on new or improved know-how, a positive trend is observed. This is an important result of the action of European instruments, since the innovation product is one of the criteria for a functioning innovation system. For the last 10 years a growth of almost 20% is observed with respect to the registration of trademarks.

References


Jongsma, A. (2002). TEMPUS @ 10 A Decade of University Cooperation, DG Education and culture.
Abstract: The present European context challenges us to approach the issues of Romanian dignity, humanity and humanism. The purpose of this essay is to emphasize the interpretative and explanatory dimensions of Constantin Micu Stavila’s philosophical thinking focused on the meaning of life and the human destiny, no less on the significance of the Christian personalism that the Romanian-French philosopher has cultivated it. Some questions arise: What is the role of philosophy and religion in understanding the meaning of life? How do we have to consider the human being and by especially the characteristics defining the Human within the Romanian culture? Trying to provide an honest, coherent and enlightening response, the paper is organized into two parts: 1. The mission of Romanian philosophy – attempting to demonstrate that the Romanian culture is integrating itself in the world-wide one seeing that there is an intimate complementarity of philosophy and religion; and 2. Romanian cultural messianism – developing an interpretation of the Romanian folklore according to the topic of the paper.

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Keywords: Constantin Micu Stavila, Romanian humanism, dignity, (the) Human

Introduction
Too little known in the present Romanian philosophical field, Constantin Micu Stavila (1914-2003) was a PhD Professor at the Faculties of Philosophy and Theology in Bucharest (1942-1947). Since 1969 he settled in France where he continued his philosophical activity. We briefly mention some details of his activity related to the French culture and area: between 1970 and 1975, he was a cultural counselor at the Society of French Protestantism, and he taught General Philosophy at the Faculty of Protestant Theology in Paris. He organized the well-known Round-Tables of the American Cultural Centre in cooperation with Paul Ricoeur, Gabriel Marcel, Jean Brun, André Dumas, Octavian Vuiu, Pierre Emmanuel, Jacques Ellul, and Hans-Georg Gadamer. He was a member of the Philosophy Committee at the National Centre of Scientific Research (1975-1980). During his life Constantin Micu Stavila published over 25 books in the fields of philosophy, history, ethics, and social culture.

The mission of the Romanian philosophy
We approach the issues of Romanian dignity, humanity and humanism in the vision of Constantin Micu Stavila using his anthumous and posthumous works published in Romania and abroad, in France, USA, Germany, Italy, and no less his manuscripts of Paris and Bucharest known as “Constantin Micu Stavila in Ștefan Delureanu Fund” including 9,238 pages as well as tapes and rolls.

Usually unnoticed, the difference between the state of a people and that of a nation forces the researcher studying the contemporary social phenomenon to accept and follow it. What do we mean by the fact that people tend to assert themselves as nations? Beyond of “undertaking a missionary vision of creation, people want to “prove freedom and a specific life attitude” (Micu Stavila, 1945a, p.71). We could define the nation as a social community having the conscience of its role in the world and the people as a simple community with the same language, religion and history, on the same territory, but lacking “self-consciousness, lacking the consciousness of the specific mission it would have to fulfil in this world” (Gusti, 1935/1946). Thus, we shall never face a nation as long as communities merely exist, without being enlivened by a vital passion coming from within, “without feeling the vibration of the consciousness of a nation and its mission” (Micu Stavila, 1945a, p.72). All the peoples have a destiny in creation, but we can call nations only those which succeed in representing something in the end, in understanding their destiny, in taking an active part and consciously working. In other words, only those who ignore the material, transitory interests and become aware of their own existence, of what is long-lasting and permanent in them. Consequently, knowing your destiny would be directly involved in the “act by which people would become aware of one another, an act of probing their specific individuality, their spiritual essence” (Micu Stavila, 1945a, p.75). For a people to get to know its destiny it is necessary that endowed human-beings should have the availability and intelligence to read the best hidden and unreached depths of his soul, but also to be able to manifest itself as a nation. This actually means, as a whole, a body enlivened by a single will and a common faith, the only ones which could give a people

1 PhD Student, „Alexandru Ioan Cuza” University of Iași, Romania, fragizaha@yahoo.com
an authentic and personal affirmation of its features. People are free by moving toward a nation status and succeeding to understand what is its own and genuine. Knowing yourself means being free but also going beyond your own limits and accomplishing yourself. Thus, the individual or the people acquire, at the same time with self-consciousness, a dynamic element, a principle of progress and freedom which is precisely the awareness of human dignity. Thus, particular nations change themselves into creators of culture.

Having a clear idea about the features they had been endowed with, the nations consciously take part in the unveiling of their destiny, behaving like beings who know what to want. Starting from this moment only, that nation becomes a culture creator. The human existence is characterized by the fact that it is part of the cultural, spiritual world. None society was deprived of arts or, even more, of religion. Everywhere man undertakes a social activity we notice the need for a spiritual manifestation which is intertwined. The culture is a primordial datum of human life, but the possibility to develop an original, strong and long-lasting culture is possible only for a people that experience a deep messianic feeling, a creative will. Hence, to reaching a cultural achievement remains an obligation for any people; it is a condition of living, a vital imperative. What does it mean to put one people’s desire for creation under favorable conditions? It means to make it become the constant aspiration of the national consciousness, to determine it to identify oneself with the consciousness of a people’s mission, to be part of the nation’s being. Lacking the nation consciousness, a people can’t create, they lose their identity and weakens the historical being, consequently being prone to extinction. In order to settle and maintain culture, a high consciousness of the nation’s mission and human dignity is required. All the energy of a nation keeps its sources in the spiritual resources.

Constantin Micu Stavila believes that the most important function of any people is to make an analysis of the conditions and premises of a spiritual life of the superior human type and to be a forerunner and a revealing actor for the self-consciousness of the nation. For the universal thinking, the highest preoccupation is to discover the hidden premises of man’s spiritual existence of all times and to establish the meaning of his presence in the world. Consequently, for the Romanian philosophy, this preoccupation should be associated to that of seeing if the spiritual premises of the Romanian have a value of universality, if they express the true and constant essence of the man or if they are not only precarious or relative forms of consciousness. Following this path and undertaking such a task, the Romanian philosophy of the future could fulfill two desiderata: to go on the line of the Romanian reality and at the same time, to be in accordance with the special concern of time, namely that of seeing the man as the capital issue of existence.

Concerned with the mission of philosophy, Micu Stavila shows that there is a mistake to drawing slashing lines between religion and philosophy, between science and faith. Science is not content with the mere quantitative gathering of facts, but it searches to explain them, to uncover their reasoning or meaning by means of hypotheses, which are even the result of an act of faith, a leap of reason beyond its limits. The parallelism between philosophy and religion is seen in the fact that religion is interested about the purpose and value of existence, and both of them try to offer answers to human being as regards life, stimulating the aspiration toward perfection and ideal.

The quintessence of the deepest philosophical issue of all times remains the rapport between knowledge and existence, on one side and knowledge and redemption, on the other. The first question man has ever asked himself, for the practice of his knowledgeable activity, was that of knowledge value, of its purpose. But philosophy as science of universality should not leave anything without being studied. Some metaphysical systems – not deprived of mysticism, in agreement with the religious allegory of falling into temptation – pretend that humans, by rebelling, have been taken apart from divinity, thus losing the right to everlasting happiness. If there is a way to have a relationship with divinity, as Micu Stavila states, than it can only be that of the intellect. Without the intellect, none creative activity of spiritual values is possible, nor any means of transcending nature and communicating to pure spirituality, to God. Christianity admits the existence of sin in the world, but it does not attribute the exercise of knowledge to it. The light in which sin is presented by Jesus in his preaches is similar to a greater extent to instinct, to non-reflection, to a blind, non-rational acceptance of life. Getting freed from sin is nothing else but getting free from instinct, by no means from reason. Jesus demands to “renouncing oneself,” not rationality – in the contracted form, rationality means individuality. As an instrument of individual conservation, it serves more to the fight for spiritual survival, in other words, for immortality and not
for physical existence, it tends not only to preserve but also to expand and perfect individuality. Evil is the blind, selfish, brutal existence, lacking knowledge, while good represents the broken existence, enlightened, ennobled and overcome by knowledge.

Between real and ideal, man feels the need to unify these two terms. Revealing for the over-sensitive dimension, ideal to existence, reason will uselessly be denounced as a knowledge function opposed to the spiritual synthesis of faith. Faith separates from reason in the same way as theology separates from philosophy, more precisely: not by the ideas they postulate as the highest ideal to be reached, but by means it conveys in order to reach it. Reason is limited to indicating the existence of the over-sensitivity, the divine, while faith demands getting close to the divine by means of love. Reason can contradict the necessity to love divinity as much or as less as faith can exclude the necessity to understand and rationally comprehend. We can love only what we know and if it seems we love before knowing, that is because the “zeal for knowledge flies more quickly than that of love and it indicates us the reasons for love even earlier than we could have realized it clearly. The love for divinity itself cannot be excluded from this rule and it could have never happened on the absence of some knowledge about the divine being, be it called revelation or in another way” (Micu Stavila, 1943, p.23). Love is the most direct corollary of knowledge, what it does, is only to end a circuit the latter opens. It is the essence of love to overcome any duality and conflict. The consciousness of this fact precedes and justifies the superior, unifying zeal of love. After all, love, as well as knowledge, means being fond of something. In order to know that this something exists, knowledge should have been given from the beginning. This is the reason why faith in God cannot be separated neither by love for, nor by his knowledge. In reality, the scientific and religion fields are co-extensive: knowledge precedes and determines faith, and the other way around is also possible.

**Application: on the Romanian humanism**

By humanism, we usually understand the movement focused on the idea of human being as a central one in the Universe, manifested in Renaissance against the theocentric spirituality from the Middle Ages. The blame casted on the Christian civilization for having disregarded the dignity and the value of the human being is greatly justified by the fact that it uses the thesis which states that the essence of man is touched by evil as a consequence of disrespected divine order. Christianity is responsible for getting down the human being from the pedestal the Greek and Roman civilizations put him on. The latter not only gives the human-being the greatest importance in the world, but also considers him able to share the use of reason together with the gods; man becoming the carrier of political, aesthetical and ethical values. Under the influence of the original sin, the two fundamental human features – ability to learn and to work – are qualified by Christianity as punishment and deficiency. However, the progress made in all fields will give back to the human being the trust in the superiority and dignity of the spirit. In *Oratio de hominis dignitate*, Pico della Mirandola states that the human-being is perfectible, free to create his own destiny using reason, capable of imposing rules on reality and enrich on spiritual level. The man, the only owner of the spirit in the world, regains the trust in the spirit in contradiction to Rousseau’s naturalism, Darwin’s evolution, Haeckel’s biological monism and Marx’s historical materialism that canceled any difference between human beings and other beings.

Still, beside the thesis of the original sin, Christianity also comes with the idea of “rebirth, baptism and repentance, together with the dynamic idea of a new world and a new human-being, once Christ was born, a world free of sin, capable to get accomplished and progress, a man reconciled with Divinity” (Micu Stavila, 1945a, p.4). In fact, the conflict between Christianity and the humanist elements of Greek-Roman culture is fortuitous: it does not exclude, but it involves the trust in man’s dignity. In Europe, the rebirth of humanism is nothing but the rebirth of man in the new Christian spirit. As a novelty, Christianity introduces the concept of transcendent, postulating both an ideal world, essentially and radically different from the limits of the sensitive world, and the idea of Divinity outside the human world, not present and mainly incorporeal. The human being can have access to divinity by means of the ideal, the invisible part which is the basis of spiritual deeds and leads him to his self-accomplishment and frees him from the impulses and desires of the physical world. The antagonism man-world can be felt with such an intensity in the consciousness of the peoples who embraced Christianity and as the Romanian folk lyrics confess: “Should the world be of paper / I would set it on fire when angry / Should the world be a branch, / I would cut it with an axe” (Jarnik & Bărseanu, p.202).
How do we see the Romanian humanism in the historical dispute between Christianity and Classicism and what origin could it have? Together with the philosopher Constantin Micu Stavila, we appreciate that due to the old age of the Thracian culture and the parallel to the Greek-Roman culture, the Romanian humanism is included in the classical sphere. And the twist of the situation operated by Christianity (of which the Romanian people is fully aware) in the religious representations of humanity by introducing the idea of an imperfect world, the conscious – world dualism and antagonism, the concept of human dignity has a Christian origin. The scientific proofs establish not only the existence of a relationship between the main centers in antiquity – Greek and Roman on one side and Thracian on the other – but there is also the possibility of a descent in our classical culture in the part of the latter. In *Die Geburt der Tragödie aus dem Geiste der Musik* (1872) Nietzsche derives the birth of music and the tragedy from Dionysus’s cult, the Greek deity borrowed from the Thracians. The latter also had the first impulse for poetry, in Orpheus, The German researcher specialized in mythology Hermann Güntert insists on the descent of the myth of the savior god of the world from the Thracian religious concept, on its mediating role between Iran, India and Europe in his work entitled *Der arische Weltkönig und Heiland* (1923). Analysing the relations between the German and the Thracian - in *Walhall. Studien über germanischen Jenseitsglauben* (1913) and in *Die Überlieferungen vom Gotte Balder* (1920) - , Gustav Neckel sees the possibility of deriving old religious representations of the Thracian gods. These statements are also supported by O. Weinreich in *Neue Urkunden zur Sarapis-Religion* (1919). Thus, the result of the scientific research brings to light the depth of the relationship between the old elements in our Thracian culture and that Roman-Greek one, but also the contribution of the former in elaborating the classical miracle. Some interesting suggestions regarding the active existence of the relationships between our Thracian culture and the Greek-Roman culture can also be found in our historical literature, underlining the role of a matrix played by the former. Nicolae Densusianu, in *Dacia preistorică*, places the cradle of the Indo-European culture in Dacia, and gives to the Getae culture the role of a constitutive element for the Greek-Roman culture.

The results of the contemporary history research give arguments for the old age of spirituality, implicitly of Romanian humanism, based on the idea that any culture is the basis of the original spirituality and it is fulfilled by the conception about the man and his role in the world. If we understand by humanism the totality of the representations a people might have about the superior human type, we further aim to present in detail the specific way in which the human being is seen and how it is pictured in the Romanian culture, more precisely, in the Romanian folklore. We let the people – by means of the permanent and universal elements of the self-consciousness reflected in myths, proverbs, ballads, legends – to give an answer to the following question: How does the Romanian man perceive and what features give him the quality of a Human Being so as to account for his dignity and humanity? One condition for discovering the truth, scientific and philosophical knowledge and progress usually is originality and personal inventive action, in the philosophy of culture it is needed to go beyond subjectivity and identify itself to the over-individual reality of the national ethos. In the Romanian vision, the human being, a different being in the natural world ranking is endowed with moral and intellectual special traits. “The Romanian does not give the human-being another role but to exteriorize his own humanity and to behave in the world with all dignity, moral eminence of a spirit which loves justice, beauty, love and truth and goodness” (Jarnik & Bârseanu, 1968, p.8). Man’s right to get above the other creatures, to aspire at the cosmic hegemony, consciousness of the human spirit’s responsibility and last but not least, the special message of goodness can be seen from the folklore lyrics: “God, let me be a rainbow/ To go high up to your sky / As I mean no harm”, but also in the Romanian’s refusal to be part of the general pessimism which refers to the evil essence of man. To live according to the spirit, not the natural instincts, remains the religious ideal of the Romanian.

Traits of moral consciousness such as kindness, love, justice and mercy are frequently sung in ballads and folk songs and in the name of the spiritual values, the Romanian rebels against the ignorant, conformist and inert nature of things: “Fight, you heart, / Don’t stay as a bull in the shed. / Go on, fight / Do not stay like the bull in the pond” (Bologa, 1936, p.186). The rebellion against the conservation instinct, the routine and usual things sends to the proclamation of progressive, dynamic, fighting ethics and a life lived dangerously which considers the need for moral perfection above any other material comfort. This consciousness of necessary progress, the superiority of the ideal on the real, of what it could be and should be on what it is, sometimes is rendered in expressions with a deep meaning: “A
man is sad / when his bull goes for a heifer / and his daughters after servants” (Onișor, 1892, p.44). In other words, that imperative on human perfectibility which means the aspiration to getting noble, overcome the existence and not only simply preserving it or even degrading it. The following lyrics also speak about the sense of hierarchy which guarantees perfectibility and losing it is seen as a catastrophe as it influences existence in its mere reason of being: “It is the end of time/ The end of Earth / when the son strikes the father / and the daughter strikes the mother / younger brother hits the older / Younger sister in the older” (Bologa, 1937, p.62). The respect for the idea of “good family” and the sense of hierarchy are an expression of the conviction that life should bring more, not only be lived. Human beings aim to accomplish values and purposes at maximum, due to the qualities of a superior development, imposing himself as a noble man due to his personality and intelligence. To be of good family actually means to fulfill the maximum requirements of human personality. “Say dear to your mum / That I don’t need. / Straws and yellow flowers in the windows / Yellow and white flowers, / I don’t need any of your family / Yellow, white flowers and wormseed, / I don’t need any of your kin” (Bărlea, 1968, p.108).

The moral beauty of the soul, not the material one of the body is seen as important as expressed in the lyrics: “Handsome is not he who lasts / But handsome is he who suits well.”, and this “suits well” refers to what suits good deeds, what entails goodness in life, there is always a moral attitude of the spirit which lies above the physical beauty. As it is right coming from: “Even the ugly looks well / When he walks as it is right” underlines the idea that beauty and ugliness are decided upon moral and not material criteria. As in the conception of the Romanian people, beauty is only a manifestation of goodness, and ugliness the deviation from the condition of humanity – the inherent obligation of man to be consequent to the spiritual human condition, to keep up to the moral demands of social life based on meritocracy and hierarchy. “Man is not ugly for being unpleasant / But he is ugly for being out of order” (Bărlea, 1968, p.306). Deprived of order, of a family, he will also be deprived of the element which characterizes the real human personality, only if he aspires to a continuous development of the spiritual possibilities, only then, a human being will remain a human being. Avoiding the moral desideratum of trying to be better than he is, it deprives the human being from the noblesse which is characteristic to his being. “It is noble that who gets better than himself, that who is capable of going over the limits of his being, continuously searching to be something different and even more than he already is. The proud stillness in self-content feeling is a disqualifying attitude for a human being” (Micu Stavila, 1943, p.12).

The movement toward an area of non-determination, unifying real and possible, usual and ideal, what is and what it should be, is part of the human essence. Only the human being has science, art, religion and morals and can look beyond himself. He feels there is something beyond being and having, something which goes beyond any limit and attribute of existence, something beyond which is pure and virtually to be touched by the nobility of the human spirit and which gives it the real moral beauty and unique presence in the world. Being aware of the imperative of trying to become better, the folk poet blames self-sufficiency, being interested only in the current day, ignoring the ideal and what the individual might become. Avoiding making an effort to discover a new self, in the view of the Romanian people it equals evil, sin; or as Micu Stavila stated: “a selfish appearance of being against the will to self-improvement” (1943, p.13). The Romanian man / woman knows too well that life should not only be lived, but making more noble by sacrificing the current limits of the human being. The imperative prescribed to any individual as a rule of moral behavior by Goethe in Selige Sehnsucht is deeply rooted in his consciousness: “Stirb und werde!” (“Die and become!”). The Romanian people clearly know that ideally, making life more valuable requires an ethics of giving up and away, of sacrifice and that is why they despise a life dedicated to utility and pleasure. They will always prefer to fulfill the essential condition of their spiritual dignity, namely the ability to be a denier of life, that “der Neinsagenkönne” according to Max Scheler in his 1928 Die Stellung des Menschen im Kosmos. The moral ideal of the Romanian lies in looking for danger, hardship, next to giving up frivolous pleasures. Tudor Argehei, in Psalms, underlines the value of pain and effort against philistinism: „In my bowl, as in my thought / I have got used the poisonous taste./ I bathe in ice and I sleep on rock./ Where there is darkness I make sparks,/ Where there is silence I shake the cuffs/ I bring down the door with the chains./ When I am on the peak/ I’m searching for danger./ I choose the narrow path to go ahead/ Carrying the whole mountain on my back“ (Argehei, 1960), in agreement with an anonymous folk song: “The man who is a man / Does not sleep in bed at night,/ Only on dry ground.” (Bologa, 1936, p.99); or: “The young man, who
is a young man? He sleeps on bare ground.” (Jarnik & Bârseanu, 1968, p.382) We cannot speak by far of any inability to adapt to the civilized conditions or primitivism, but about a scale of values and ideals. Keeping awake the competitive force of the spirit gives pride to the man who arduously strives to be a Man. Without the power to say no to the hedonistic demands, the man loses his independence and gains distance to the world, finally reaching freedom. By practicing it – a guarantee of getting above the requirements of necessity – is reached real human dignity. To be free means to appeal as little as possible to the pleasure given by things; an austere life in which the moral and soul demands for knowledge, goodness, beauty, love, in the vision of our people acquires the sign of superiority. The way to perfection requires generosity but also the knowledge to take the best out of himself using the fulfilling power of love. “That my dear brought to me / Sweet milk in bead / And we both ate / And there was still some left / For a bird to eat as well.”

The preference for beauty, the desire to make the useful things pleasant, to give them a meaning, value, spiritual significance is one of the most important features of the Romanian. The tendency to garnish things, to give them a festive look, to make them suitable for contemplation, not only to be useful, that aesthetic drive has been long mentioned as a feature of Romanian spirituality. A constant effort to increase beauty in detail and to change their look into an aesthetic way is nothing but the expression of good will and the generous drive of the spirit scattered around things aiming to enrich and make them much nobler following the model of inner perfection. The one who searches beauty will know how to avoid evil, choosing goodness. “Oh, my God, I expect nothing / But merely what is right and good.” (Jarnik & Bârseanu, 1968, p.199) Because the sense of beauty cannot be detached from the power of love and goodness of the heart, the Romanian will create an ideal world of the art to adjust reality. The aesthetic emotion, a medicine against evil, but also a principle of adjusting existence, might train the soul to serenity, giving the man the power to stand any blow. “God, give only good to those who envy / And me to endure what is rightful for me. / And give them good chance / And to endure what chance is. / Give them as much good as they might want / And I endure as much as I can.” (Bârlea, 1968, p.168)

**Conclusion**

According to Constantin Micu Stavila, we can conclude that the inner features examined above are included in the picture of the Romanian ideal man. Self-control, drive for perfection, an ethics of generosity, modesty, sacrifice and giving away, the cult of goodness, the sense of beauty and the power of love, all under one name which represents Romanian humanity. The key of the Romanian humanism lies in this original attitude – kindness – which is to be understood in terms of the relation between the notions of human being and Romanian, on the one hand, and the word Human as describing the moral endeavor, on the other hand. Still, Romanian humanism is not reduced only to goodness it corresponds to moral features of the human spirit and it also has an intellectual function of knowledge. The Romanian creates a link between the exercise of knowledge and that of moral power. Reason plays a part determined by his inner life as well as by his acts; for example, when he expresses his feelings, he speaks with the whole language of reason. Decency and shame explain the moderating interference of the intellect on feelings. The predilection of the Romanian for a reason goes so far, that its absence is seen as cause for suffering and obstacle which cannot be surpassed in the way to love. “Why are you crying, my sister? / How could I not cry / As I married a dull man” (Jarnik & Bârseanu, 1968, p.171) or: “I liked you for nothing / If you had no mind” (Bibicescu, 1893, p.74). This application gives all the reasons to appreciate the Romanian people as inheriting the noble traditions of the Gets and Thracians, and keeper of the Christian spiritual tradition, with a high moral value of life which should be known and positively included in the cultural heritage. As an active, insurrectional, and creative being, a man / woman is able to change the reality and to shape it after his / her own pattern.

**References**


EMOTIONALLY EVALUATING THE ATTITUDE OF CONSUMERS TOWARD SUPERVISION SERVICE

Maija Zakrizevska

Abstract: This study is conducted because organization supervision in Latvia tends to rapidly take its proper place among other professions recognized on the national level and has become an inseparable part of professional activities, in particular in the areas focused on humans, for example: health care, art therapies, social and educational services, and the business environment. Given that the demand for supervisors continues to increase, the purpose of this study is the identification of the popularity and treatment of supervision service by consumers for the subsequent presentation of proposals to the administration of the Business Art and Technologies University RISEBA concerning the popularization of supervision services and improvement towards the Master Program “Management Psychology and Supervision”. 111 respondents participated in the study, including respondents who have participated in supervision (n=47) and respondents who have never participated in supervision (n=64).

The study has led to the conclusion that the attitude of consumers toward supervision is generally positive. Most of the respondents have never been parties to supervision, yet a majority of the respondents would like to experience it. There are statistically significant differences between the attitudes toward supervision in the co-

Introduction

Supervision is developing rapidly in Latvia and every year the Latvian Association of Supervisors certifies more supervisors who will work in various environments, and also as educators, to facilitate development of science in supervision. Three Latvian institutions of higher education offer a Master’s Degree program for becoming a supervisor: The University of Business Arts and Technology RISEBA, Riga Stradins University, and the Latvian Christian Academy. All study programs comply with the standards applicable to the profession however, each of them is different in terms of the content, the degree awarded, and the annual tuition fee. It should be noted that the Latvian Union of Supervisors (www.supervizija.lv) includes 57 certified supervisors, has published three books and numerous articles about supervision, and two doctoral dissertations related to supervision have been defended. The only summarising collection of papers available in Latvian, titled “Supervizija teorija un prakse” (“Supervision Theory and Practice”), has been published (Mārtinsone, 2016). This is because in several professions nowadays, supervision has become a component of the professional practice and also education, whereas there is insufficient information about it in business. This is evidenced by the previously conducted study into the attitude of students and employers toward supervision already (Zakrizevska, 2016), which also explains the topicality of this study. The results of the study showed that, when hearing the words “supervision, supervisor,” many employers have different emotionally evaluating attitudes and, for many of them, these may associate with in-service training, monitoring, and mentoring. It should also be noted that many consumers, including company managers and personnel managers, are still not informed about the actual benefits supervision provides in a business environment.

Literature review

Attitudes of consumers are widely being researched not only in social psychology, but also in business and marketing. This can be seen well in the following papers: Event Marketing and Attitude Changes (Nufer, 2016), Attitude of Latvian Consumers Toward Genetically Modified Organisms (Aleksejeva, 2016), Situational Influences on Consumers’ Attitudes and Behaviour (Foxall, Yani-de-Soriano, 2005), Customers’ Attitude Towards Plastic Money (Jain, 2016).

Attitude is a relatively stable, positively or negatively evaluating response which influences and motivates the behaviors associated with them (Olson, Maio, 2003). It may be targeted at a certain individual or events, at various things as well as at abstract objects, it helps the individual carry out an evaluation of an object or event, adapt to the environment and express their feelings or beliefs to others (Nevid, 2014). Attitude has an evaluating tendency, and it is this evaluating element which distinguishes attitude from belief (Davey G., 2006), which can be measured by contrast signs: good – bad, pleasant –

1 University of Business, Arts and Technology RISEBA, maija.zakrizevska@riseba.lv
unpleasant (Ajzen 2001). Attitude has three dimensions, they show in a wide spectrum the ways attitude may manifest in an individual (Smith, 1947, Rosenberg, Hovland C.I., 1960, Ya Hui, Petty, 2013). The three dimensions (or components) of attitude are formed by cognitive (knowledge about an environment object), emotional (emotional evaluation of the object) and behavioral reactions to an object (purposeful action with regard to the object) (Chaiken S, Pomerantz E.M., Giner-Sorolla R. 1995). Thus, attitude is defined as views regarding the achievement of certain targets, including understanding them, evaluation and a readiness to act (Schwarz, Böhner, 2001). Emotional attitude largely differs from, for instance, cognitive attitude, because it may often not be logical or based on facts. Behavioural reaction, in its turn, may vary depending on the actions of the surrounding people, because the individual may go with the majority and act the way they do despite their knowledge and emotions being in contrast to the behavior. It may be assumed that attitude can also be caused by false knowledge about an object.

Considering that studies of attitude are popular and particularly widespread in business and in science. This study into attitudes towards supervision may the attitudes of consumers towards supervision in all three dimensions (emotional, cognitive and behavioral), which might help to find out not only the emotionally evaluating attitudes, but also knowledge and readiness to use the service of supervision.

The aim of the study is to explore the attitudes of consumers towards supervision in order to give recommendations to the administration of RISEBA University of Business, Arts and Technology to popularise the supervision service and improve the Master’s Degree program “Management Psychology and Supervision.”

The research questions were the following: What is the emotionally evaluating attitude of consumers towards supervision? Are there statistically significant differences in the attitudes towards supervision between consumers with experience in supervision and consumers with no experience in supervision?

A reason for negative attitudes is frequently a lack of information, and it is therefore essential to study the attitudes of consumers and provide consumers with information through the questioning of individual views and values. Communication and types of communication are essential, as they assure positive attitudes among the beneficiaries. The creation of new needs and expectations by justifying it with the benefits to be achieved and assuring, and understanding that change of attitudes may change the current environment. Also, to change the attitudes of consumers it is necessary to understand the individual influencing factors. Change of attitudes may be used to popularise supervision in the business environment, which is a determinant of the topicality of this study.

**Methodology**

All three dimensions of attitude towards supervision are compared in the study: emotional, cognitive, and behavioral the links between each of them. Thus, it is possible to find out the effective attitude towards supervision, what the knowledge of both research samples about supervision is, and what behaviors in association with supervision each of the research samples has, simultaneously finding out whether there are any differences between the results of both samples and what these differences are. The survey consisted of 23 statements which were evaluated on a Likert-type scale with four values. (Likert-type scales)

142 questionnaires were obtained in total, of which 111 questionnaires were suitable for data processing. 31 questionnaires were incompletely filled in and, therefore, were not included in the mathematical and statistical analysis. No supervisors or supervision students were involved in the study.

The survey was completed by a total of 47 respondents who had participated in supervision and 64 respondents who have never taken part in supervision. Most of the respondents were from social work (29%) and the state and local government sector (12%), which totals to 40 %. The next largest group with 21 % is the business sector, 18% represent the sector of education, 8% represent project management, 4% represent psychology, and 18% represent other, unspecified areas. In terms of the length of service, the job experience of 62% of the respondents exceeds 6 years, and this is the majority of the respondents, the job experience of 22% of the respondents is up to 4 years, and, for 16% of the respondents, their job experience is between 4 and 6 years. In terms of the position, 68% of the respondents, which is the majority, do not have managerial positions, while 32% of the respondents do have managerial positions.
The questionnaire of the survey was created on the “webrpoolsurveys” platform and sent out to the respondents electronically as a link. The respondents could complete the survey questionnaire in November and December 2016.

The data collected during the survey were analyzed using Microsoft Excel and IBM SPSS 23.0 statistical data processing software.

**Results**

The data collected during the survey were analyzed using quantitative statistical research methods as well as methods of mathematic statistics to calculate data credibility or the Cronbach’s alpha coefficient, correspondence of the data to normal distribution and determine the central tendency indicators for the data as well as the statistically significant differences.

To verify the credibility of the designed questionnaire regarding supervision, the Cronbach’s alpha (or the Consistency Coefficient) was calculated. It shows whether the statements are adequately and mutually consistent within each particular scale and within the entire survey (see Table 1).

<table>
<thead>
<tr>
<th>Scale</th>
<th>Cronbach’s alpha</th>
<th>Number of statements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emotional dimension</td>
<td>0.707</td>
<td>6</td>
</tr>
<tr>
<td>Cognitive dimension</td>
<td>0.900</td>
<td>11</td>
</tr>
<tr>
<td>Behavioural dimension</td>
<td>0.716</td>
<td>6</td>
</tr>
<tr>
<td>All dimensions together</td>
<td>0.707</td>
<td>23</td>
</tr>
</tbody>
</table>

Source: Author

The aggregate Cronbach’s coefficient alpha for all the dimensions can be rated as very good (see Table 1), which means that the results obtained during the survey are credible and can be used for further data analysis and interpretation.

To determine the central tendency indicators, the Kolmogorov-Smirnov Z criterion was calculated, thus determining the significance of these scales. It shows the correspondence to the normal distribution and also what the methods to be used for the further processing of the data should be. The results of the calculation lead to the conclusion that the significance is below 0.05 for the emotional dimension and behavioral dimension scales, which means that the values of these scales do not correspond to the normal distribution, whereas the significance value for the cognitive scale is 0.200, and it corresponds to the normal distribution.

The survey was completed by the total of 47 respondents who had participated in supervision and 64 respondents who have never taken part in supervision. Since, based on the result of the T-test, the significance for these samples is below 0.05, it is confirmed that there are statistically significant differences in the cognitive or knowledge dimension between the respondents who have participated and those who have not participated in supervision (see Table 2).

<table>
<thead>
<tr>
<th>Cognitive dimension</th>
<th>Arithmetical mean</th>
<th>t</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have participated in the supervision</td>
<td>18.6170</td>
<td>-7.522</td>
<td>0.000</td>
</tr>
<tr>
<td>Have never taken part in supervision</td>
<td>26.6250</td>
<td>-7.399</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Source: Author

According to the Mann-Whitney U test, which was used to study the potential differences between the respondents in the above-mentioned groups (respondents who have participated in supervision and respondents who have not participated supervision), there are no statistically significant differences in the emotional and behavioural dimension (the significance is above 0.05) (see Table 3).
Table 3: Differences in attitudes towards supervision in the emotional and behavioral dimension: experience in supervision

<table>
<thead>
<tr>
<th>Scale</th>
<th>U</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emotional dimension</td>
<td>1,475.50</td>
<td>0.864</td>
</tr>
<tr>
<td>Behavioural dimension</td>
<td>1,469.50</td>
<td>0.836</td>
</tr>
</tbody>
</table>

Source: Author

All respondents were asked the question: Do you have a positive attitude towards supervision? The majority of the respondents (79%) have a positive emotionally evaluating attitude towards supervision. Still, 21% of the respondents had a negative emotionally evaluating attitude towards supervision, which suggests certain negative experience in association with supervision (see Figure 1).

The obtained results suggest that attitudes towards supervision are more negative among those who have participated (28%) in supervision (see Figure 2). This might mean negative experience with regard to the supervision service.

The results of the survey show positive emotionally evaluating attitudes of consumers towards supervision and also that supervision is popular among consumers, as 71% of the respondents know what supervision is, 64% of the respondents know where to find information about supervision, and the majority of the respondents (73%) would be able to explain what supervision is if asked by a friend. 42% of the respondents have participated in supervision.

The results of the survey also show that the majority or 63.6% of the respondents claim that they understand the process of supervision; approximately one half or 49% of the respondents have no knowledge about how to organise a supervision session; 85.6% of the respondents are ready to attend a supervision session if necessary, but others would most likely not do it; almost one half or 47.7% of the respondents are not ready to pay for supervisor services as part of their job.

The obtained results show positive tendencies in the development of the supervision service. Although the service is becoming more popular, almost one half of the respondents are not willing to pay for it themselves. This means that consumers have not been made aware of the benefits supervision provides.
Conclusions and Recommendations
The conducted survey is significant for the development of supervision as a sector, and the obtained results show the attitudes of consumers in two samples.

Although the emotionally evaluating attitudes of consumers are generally positive, there is knowledge about supervision and readiness to use the supervision service, consumers are not ready to pay for it and do not know how to organize a supervision session in case it was necessary.

There are statistically significant differences in the cognitive or knowledge dimension between the respondents who have participated in supervision and those who have not participated in supervision, and this suggests that those who have participated in supervision have knowledge about supervision.

When comparing the results of the two samples, i.e., the emotionally evaluating attitudes of the respondents who have participated in supervisions and the respondents who have not participated in supervisions, it can be concluded that those who have participated in supervisions (28%) have more negative attitudes, and this might be suggestive of negative experience with regard to the supervision service.

The obtained results and the conclusions drawn allow to give the following recommendations to the management of the Master’s Degree program “Management Psychology and Supervision” of RISEBA University of Business, Arts and Technology:

Attitudes are related to the experience with supervision one has had. It can be assumed that the consumers who have received the supervision service are not satisfied with it and, consequently, are avoiding or will be avoiding group and team supervisions. Therefore, it is essential to provide a quality supervision service by preparing highly qualified specialists – supervisors.

It is necessary to continue to promote the supervision service in mass media and social networks, laying particular emphasis on the benefits of supervision for employees and managers. For example, by giving interviews and preparing publications for various popular science magazines.

References
NOVICE TEACHERS’ BELIEFS ABOUT PROBLEM-BASED LEARNING APPROACH, AND TEACHING PRACTICES

Olena Zhukova¹

Abstract: This article presents the results of the pilot study conducted with the aim to examine novice teachers’ pedagogical beliefs and challenges regarding the implementation of a problem-based learning (PBL) approach in the EFL classroom. The relationship and discrepancies between novice teachers’ pedagogical beliefs and actual classroom practices were also investigated. In total, 25 novice teachers of English as a foreign language (EFL) with up to 3 years of teaching experience participated in the study. The data for the present study were collected from face-to-face semi-structured interviews and classroom observations. In total, 25 novice EFL teachers working in Latvian basic and secondary schools agreed to participate in the survey. The finding of the survey suggest that novice teachers’ beliefs are not always reflected in their actual classroom practices for a number of external and internal constraints, such as students’ expectations and perceptions, school administrators’ demands and lack of commitment, context of teaching, lack of professional skills and methodological support, and examination pressure. These findings of the present study might have implications for school administrators, EFL teacher educators, teacher training institutions and the institution that provide teacher professional development courses, as well as for education policy makers and for EFL teachers themselves.

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Keywords: novice teachers, efl, teacher’s beliefs, problem-based learning, PBL

Introduction

The current study focuses on novice EFL teachers’ beliefs about teaching and learning and about the PBL approach in particular, as well as the novice teachers’ actual classroom practices. Teachers’ beliefs about a problem-based learning approach to EFL teaching include three related components: pedagogical beliefs about teaching and learning, self-efficacy beliefs about the implementation of PBL in the classroom, and beliefs about the perceived value of this approach for student learning. A significant question is, how do teachers’ beliefs about teaching and learning compare with their classroom practices? This question is of great importance because, as Mishra & Mehta (2017:8) put it, “despite what the experts say and believe, the actual implementation of new approaches to teaching and learning in today’s schools and classrooms will be determined by the beliefs and knowledge of the practitioners themselves.” Although a wealth of literature points to the importance of investigating teachers’ beliefs and practices (e.g. Richards et al. 2001, and Fives & Gill 2014) in order to improve teacher preparation and teaching quality, empirical studies on novice teachers’ beliefs about teaching procedures and practices, particularly in foreign language teaching, are limited in Latvia. There is also little research on innovative non-directive teaching methods and techniques to promote 21st century skills in the EFL classroom, and particularly on the implementation of the PBL approach. Therefore, this study seeks to understand the novice EFL teachers’ beliefs about teaching and learning in general and about the use of a PBL approach in EFL teaching in particular compares to what teaching methods, techniques, and approaches the novice teachers actually apply in their practice. Answering this question could help experts and practitioners to understand better what teachers think about teaching in contrast to what they actually do in their classrooms and why.

The article includes the following sections: literature review on novice teachers’ beliefs and problem-based learning approach in EFL teaching, a description of the data and methods used in the study, the results and discussion, and finally the conclusions made.

Literature review

Novice teachers’ preparation, induction, professional development, classroom experiences and practices have received much attention especially in the last years. Recent studies demonstrate that the initial years of teaching determine novice teacher’s future career in that it influence their values, attitudes, professional competence, behavior, and motivation. Some studies also prove that novice teachers are often less effective than their more experienced colleagues due to lack of prior teaching

¹ Daugavpils University, The Faculty of Education and Management, Viņķiņas Str. 13, Daugavpils, LV-5401, Latvia, lerial2@inbox.lv
experience, professional knowledge and skills (Melnick & Meister 2008; Schwarzer & Grinberg 2016). Yet it is unarguable that teachers’ professionalism is the main factor to determine success and failure of education. Along with that, the nature, content, and objectives of education are undergoing dramatic changes recently due to the rapid advances and transformations of the world that we live in today (Misha & Mehta 2017). Many experts in education are highly concerned about the fact that current traditional pedagogical practices, models, methods and approaches have proven to be generally ineffective due to their inability to prepare students for the changes and demands of the 21st century global and knowledge-based economy. It is also true that today’s students are fundamentally different from students in the past; they have different learning goals and require different teaching approaches. Therefore, it is becoming obvious today that in order to be able to face the 21st century challenges, 21st century teachers are required to transform their educational practices, methods, approaches, and roles (Mishra & Mehta 2017; Johnson 2013; Kern 2012). Similarly, education in Latvia is also experiencing an evolutionary transformation and paradigm shift in order to increase its effectiveness and relevance to the needs and requirements of the globalized knowledge-based society. According to the report of the Latvian national center for education, the priority and key objective of the state general education in Latvia is to enhance and facilitate the development of students’ competencies, skills, and experiences that they need to succeed professionally, socially, and personally in today’s increasingly globalized, pluralized, diverse, information and knowledge-based world.

**Teachers’ beliefs**

There has been recently an increasing interest for the study of novice teachers’ beliefs, attitudes, practices, and experiences (e.g. McAninch 2003; Schwarzer & Grinberg 2016; Kersaint et al. 2007; Ingersoll et al. 2014). Teachers’ beliefs, being one of the key constructs in teacher cognition, have frequently been discussed in scientific literature for more than 50 years (Fives & Gill 2014). Many previous studies investigated teachers’ beliefs about the teacher’s and students’ roles, pedagogical practices, instruction, and the ways a certain subject or skill should be taught (Khader 2012; Erkmen 2014; Larenas et al. 2015; Phipps & Borg 2009). According to Kagan (1990), teaching beliefs are “highly personal ways in which a teacher understands classrooms, students, the nature of learning, the teachers’ role in the classroom, and the goals of education” (p.423). Various studies have shown that teachers’ pedagogical beliefs are important for understanding and improving teaching quality, teacher’s education, and the effectiveness. Teachers’ beliefs are considered to guide teachers’ actions, instructional decisions, judgments, and behavior in the classroom. In addition, teachers’ beliefs, attitudes and practices shape students’ learning environment and influence their learning motivation and outcomes (Subramanian 2014; McCoaghan 2008; OECD 2009; Richards et al. 2001; Patch 2008). Pajares (1992) also adds that the investigation of the beliefs of pre-service and in-service teachers should be a focus of educational research since it provides valuable data “in ways that prevailing research agendas have not and cannot.”

Two major opposed types of teachers’ beliefs about teaching and learning philosophy are commonly compared and contrasted in contemporary research, namely, the direct transmission philosophy (also referred to as traditional views or traditional pedagogical practices) and constructivist philosophy or views about teaching and learning (sometimes also referred to as 21st century teaching and learning or non-directive teaching). Direct transmission beliefs about teaching and learning implies that the factual knowledge is presented and conveyed by an active teacher to passive students; the teacher’s role is to transmit the knowledge and information in a clear and structured way, to give student clear problems and provide correct solutions to the problems, to tell students what they should and should not learn, know, memorize, and use, as well as to control the discipline in the classroom. The relationship between teacher and students are typically power-distance or power-based; the learning process is viewed as teacher-centred (OECD 2009; Carroll 2014; Leonard 2002; McCoaghan 2008). Contrastingly, constructivist views imply that a teacher’s role is to co-collaborate, guide, facilitate and coordinate the learning process, while the student’s role is to actively participate in the process of acquiring and constructing knowledge. Students actively create their own knowledge based on their previous and new experience through investigations, questioning, discussing, and reasoning. Students are encouraged to take responsibility for their learning and to choose what they are really interested in, as well to research and develop multiple solutions to authentic problems on their own and in collaboration with others (OECD, 2009; Reevy & Bursten 2015; McCoaghan 2008; Chow et al. 2015).
A number of studies report about the inconsistency between the teachers’ beliefs and their real classroom practices, which is often caused by various internal and external constraints (Erkmen, 2014; Phipps & Borg 2009). The urgent problem here is that, as Park & Ertmer (2007) put it, “encouraging teachers to develop new beliefs and stick with them is difficult.” The authors add that even teachers with a strong set of pedagogical beliefs are likely not to put their beliefs and ideas into practice because of “the conditions of the teaching environment.” Park & Ertmer (2007) claim that even if a teacher has student-centred learning beliefs, he/she may “quickly adopt a teacher-centred approach when faced with an overloaded schedule, lack of administrative support, or other barriers in the classroom.”

**Problem-based learning approach in EFL teaching**

Along with general education transformation, foreign language teaching has been undergoing dramatic shifts over the past few decades (Long & Doughty 2011; Kern 2012; Fleming & Stevens 2014). Problem-based learning (PBL) approach in foreign language teaching is one of the innovative constructivist teaching approaches in language classroom, which was first introduced in several American and Canadian medical universities in 1950s (Mathews-Aydinli 2007). Later PBL approach was adopted in teaching other subjects, including humanities; however, there is very limited research on the use of PBL in teaching language arts (Othman & Shah 2013). Nevertheless, PBL is gradually gaining its popularity among EFL educators nowadays as it has proven to be an effective means for advancing students’ content knowledge and higher-order thinking skills (Mathews-Aydinli 2007; Larsson 2001; Boothe 2011; Othman & Shah 2013). PBL has been defined as “revolutionary and radical teaching approach” (Cheong 2008), “educational reform” (McCaghman 2008), and a “constructivist method of instruction” (Pecore 2013; Subramanian 2014) that involves innovative teaching and learning methods and strategies, including teaching language in context, active and collaborative learning, trans-disciplinary learning, and inquiry-based learning. As Subramanian (2014) notes, the investigation of PBL implementation and effects in the school context is a relatively new topic in literature; however, recently, researchers have stressed the need for more PBL research that examines its effectiveness in the K-12 classrooms.

Barrows (1982) defines problem-based learning as a “learning method based on the principle of using problems as a starting point or stimulus for the acquisition and integration of new knowledge.” PBL differs considerably from the traditional lecture-tutorial approach as it involves a shift from the traditional teacher-centeredness, content-orientedness, knowledge transmission, and student passive learning to the student-centeredness, process-orientedness, knowledge construction, and active learning (Cheong 2008; Tan 2003). Within the problem-based learning, a teacher presents students with a problem to solve in order to engage them in a process that involves objectives, problems, research experiences, solution development activities, discussions, and assessments (Pecore 2013). Being involved in PBL in the EFL classroom, students face a complex authentic problem or an uncertain problematic situation they have to solve by analysing authentic materials and communicating in the target language. The authenticity of the problems and of the materials involved, as well as the integration of current real-life events and situations have a highly positive impact on the students’ motivation and stimulate development of higher-order thinking skills and intellectual processes such as problem solving, critical thinking, analysing, summarizing, hypothesizing, drawing conclusions, questioning, which leads to deeper understanding of the content and “enhanced retention and transferability of information and concepts” (Barell 2006; Williams & Paltridge 2016; Othman & Shah 2013; Larsson 2001). As Mathews-Aydinli (2007) puts it, “second language acquisition research and practice have long recognized the value of classroom interactions for promoting language acquisition, particularly when these interactions involve negotiation of meaning. When there is a focus on real-world issues and problems, the interactions that take place have been found to be more meaningful and authentic than interactions produced during activities such as assigned role plays or repetition of dialogues”. Mathews-Aydinli (2007) also adds that PBL approach contributes to the development of skills for self-directed autonomous learning, allowing students to practically use the skills obtained in the classroom in their lives outside the classroom.

**Data and methodology**

The purpose of the research is to examine novice EFL teachers’ beliefs and actual classroom practices regarding the use of a problem-based learning approach in EFL classroom. Specifically, the research
seeks to answer the following questions: (1) What are novice teachers’ teaching and learning beliefs and what are their actual classroom practices? (2) To what extent are novice EFL teachers comfortable with non-directive student-centred teaching practices and specifically with the PBL approach? (3) What challenges with their role do novice EFL teachers experience in regard to problem-based learning? To address the questions raised in the survey, qualitative data was obtained from face-to-face semi-structured interviews with novice EFL teachers (n=25), and classroom observations were taken. The data were collected between January 2016 and February 2017. Each teacher participating in the survey was observed twice during his/her EFL lesson. All the participants were interviewed orally and individually; each interview was held at school and lasted for 40-60 minutes. This study utilized qualitative data analysis. The interviews were recorded, transcribed, coded and further analyzed using a semantic content analysis method in order to identify categories and subcategories to describe the content (Corbetta, 2007:75). Initially, manual coding of each interview was conducted to identify words and phrases that correspond to the common themes for the purpose of this study. Then the data was analyzed for similarities and differences (research design adapted from Mahfoodh 2011:16 and Erkmen 2014:102-103).

Participants

25 novice EFL teachers, working in 19 Latvian comprehensive schools, agreed to take part in the survey. Table 1 below provides demographic information about the participants of the current survey. The participants were chosen on the basis of representativeness. All of them were teachers of English as a foreign language who have gone through at least four years of formal initial teacher training at a university level. Their full-time teaching experience varied from 4 months to 3 years. At the time of the survey they all worked in the urban public-school sector in either one of two of Latvia’s largest cities Riga and Daugavpils.

Table 1: Demographic information about the participants of the study

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<td>16</td>
<td>64</td>
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<td>Daugavpils</td>
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Source: Authors

Results and Discussion

1. Novice EFL teachers’ beliefs about the nature of teaching and learning and their classroom practices Barell (2006) claims that the frequency and effectiveness of the use of problem-based teaching and learning depends on various factors, including teachers’ beliefs about the nature of teaching and learning. Therefore, the participants were asked first to comment briefly on their views about the nature of foreign language teaching and learning. The study revealed that the majority of the teachers surveyed tend to believe that students have to be actively involved into the learning process and take responsibility for their learning; 78% of the novice EFL teachers affirmed that students’ achievements in language learning and their future success are largely dependent on their commitment, active involvement and participation in the learning process, as well as on teacher’s professionalism. When asked about student motivation, more than a half of the novice teachers pointed to the importance and necessity to create such learning environment where their students feel secure, supported, valued, and respected; according to the teachers, their role is not to force students to learn, but to help them discover their true interests and strengths, boost their curiosity and willingness to learn and create. Additionally, of the 25 novice teachers who took part in the survey, over 80% replied that they find it highly important to meet the diverse learning needs and expectations of their students, although this task is viewed by the teachers as one of the most challenging ones.
Nearly all of the participants declared that they have either mixed beliefs (traditional-constructivist) or constructivist beliefs about the nature of teaching and learning. Only 2 of the 25 teachers considered traditional pedagogical practices to be the most effective for students in terms of foreign language acquisition. However, the lesson observational data demonstrate that novice EFL teachers’ beliefs are not always reflected in their actual classroom practices and that there are differences between the surveyed teachers’ beliefs on the one hand, and their practices, on the other. This goes in line with OECD (2009), Larenas et al. (2013), Rajab et al. (2015), and a number of other scientists’ findings concerning the relationship and discrepancies between teachers’ beliefs about teaching and learning and their actual classroom practices.

Only less than a half of the teachers observed in this survey demonstrated the features of constructivist pedagogical practices, namely, student-centeredness, the use of problem-based learning activities and procedures, such as case studies, inquiry-based learning, etc. The observational data shows that most novice teachers demonstrate the features of more traditional lecture-based way of teaching and instruction, such as summarizing former lessons, homework review, checking the exercise book, presenting new material (facts, grammar rules, etc.), assigning activities, checking the solutions, and asking comprehension questions in every lesson, rather than those of the constructivist teaching. Specifically, the novice teachers, by and large, act as center of attention and provider of information in their classrooms. They typically attempt to control everything that the students do during the lesson. The interviews data also show that a lot of novice teachers report being afraid of losing control in the classroom and struggling with discipline and behavior issues. This might be caused by the novice teachers’ lack of prior teaching experience, lack of self-confidence, and practical skills to cope with challenging situations in the classroom, as well as with their inner need to prove themselves. These findings are consistent with earlier findings of Frederiksen et al. (2011), Wang & Schwille (2008), Melnick & Meister (2008); the researchers claim that novice teachers, especially in their first year of teaching, experience considerable challenges and concerns regarding classroom management, discipline, control over students, time management, etc. mostly due to the lack of confidence, as well as lack of practical experience, skills and knowledge.

Most novice teachers in this survey were likely to provide restricted information and instruct students what to do and what not to do with the information, how to use it, what to memorize and what not to memorize, rather than letting the students independently use information they need to construct their knowledge and understanding in a self-directed and not teacher-directed way. Also, the lesson observations revealed that more than a half of the teachers surveyed tend to use teachers-centred and direct teaching techniques more often. These teachers focus more on providing grammar rules, presenting clearly defined tasks and demonstrating correct solutions. It might be associated with the teachers’ desire to keep the learning process under control ensuring that the learning process is well structured and adherent to the requirements of the curriculum. It might be also because some novice teachers are inclined to largely perceive their students as unmotivated and passive learners therefore the teachers are likely to avoid student-centred and non-direct teaching which gives students more autonomy. Students typically have little freedom to choose the learning tools, information sources and content. Only a quarter of the novice teachers in the study started and finished their lessons by asking for students’ feedback. As to the academic environment of the classrooms being observed in the current study, the novice teachers tend to focus students’ attention mostly on the memorization of different usually unconnected facts and rules. Several teachers, however, tend to focus more on developing students’ language and communicative skills in different contexts taking into account their individual interests.

2. Novice EFL teachers’ beliefs and actual classroom practices in regard to PBL in language teaching

Surprisingly, for 44% of the novice teachers participating in the survey it was quite challenging to provide any sufficient definition to the problem-based teaching and learning approach, therefore they could not answer the question whether they implemented this approach in their teaching practice. However, after being provided a brief explanation of the PBL, the participants were able to comment on their experiences with PBL. Only 7 of the 25 participants (28%) indicated that they try to regularly use this approach in their practice; they also pointed that they would like to apply it more often provided that they have enough time and relevant resources. 8 of the participants (32%) reported that they implement this kind of teaching approach occasionally, and 10 participants (40%) indicated that
they normally use the PBL approach “very rarely” or “never” in their day-to-day practice. Interestingly, that the majority of those surveyed (72%) indicated that they acknowledge the importance of this approach in developing students’ core language competences, information literacy, communicative and other higher-order thinking skills. The novice teachers also generally agreed that the PBL approach, in contrast to more traditional lecture-based and teacher-centred pedagogical practices, has great potential to actively engage students into the learning process and to motivate them to learn. When asked about their beliefs regarding the advantages and effects of PBL for language teaching, the novice teacher commonly concurred that PBL provides students with the opportunity to learn foreign language in context and unconsciously, by fulfilling many other actions in many varied contexts such as searching for information, reading the information, questioning, summarizing facts, discussing results with their peers and presenting them. Furthermore, some novice teachers reported having noticed that “difficult” students are likely to become more motivated if they are provided opportunity to take responsibility of their own learning and make their own decision on what and how to learn. However, the teachers also noted that in the context of their schools non-direct teaching activities such as PBL or project-based learning are very difficult to implement because of various reasons such as the need to strictly control the discipline and follow the curriculum.

3. Challenges with PBL

More than a half of the participating in the survey admitted that they had tried using problem-based activities in their EFL classrooms, but they seemed to be of little effectiveness due to various reasons. Most often the teachers mentioned that (1) it is often difficult to control the students and maintain the discipline in the classroom (2) such activities required too much time for instruction and explanation of tasks and did not give the students sufficient opportunity to practice; (3) such activities might be inappropriate for mixed ability classes and for weak students or for students with lower levels of language skills; (4) it is often difficult to encourage students to use the target language rather than their native language in group discussions. These findings go in line with McCoaghan’s (2008) earlier findings that indicate that teachers’ professional background influences the success and failures with problem-based learning facilitation.

When asked about the major challenges and concerns with the non-direct teaching and the PBL approach in language teaching, the majority of the teachers (80%) especially emphasized the gap between theory and practice. These teachers share the opinion that theoretically today’s pedagogical practices have to be transformed to meet the demands of the 21st century; they also largely agreed that such innovative constructivist pedagogical practices as student-centeredness, mastery-orientedness (rather than performance-orientedness), knowledge construction, student self-directed active learning, as well as the integration of technology in teaching and learning should be predominant; however, practically there are many barriers that considerably hinder constructivist teaching in schools.

Classroom management and discipline problems, lack of school administrators’ commitment and support, lack of professional skills and prior experiences, lack of time, relevant teaching materials, pressure from the school administration and syllabus requirement, as well as poor classroom technical equipment were mentioned the most by the participants as the main challenges in terms of the implementation of PBL in foreign language classroom.

At least 50% of those interviewed indicated that they could not apply some of their pedagogical ideas and beliefs about teaching and learning in their classroom practice for a number of reasons including the contextual constraints and discipline problems in their classes. One of the most commonly mentioned constraints was “students’ expectations.” Some novice teachers claim that their students tend to prefer traditional instructions and activities. Interestingly, teachers commonly refer to students’ unwillingness to accept new teaching methods and techniques, rather than relate their inability to use innovative teaching due to their own lack of appropriate teaching skills and style. Another considerable challenge with PBL is that novice teachers do not feel themselves comfortable with this approach. According to some answers, they feel that they need too much time and effort to prepare for PBL lessons, and they are often afraid of losing control over their students especially in more “difficult” classes. Indeed, previous studies indicate that PBL can be rather controversial and even criticized by teachers, especially by those who successfully implements more traditional pedagogical practices. For example, Larsson (2001) argues that not all teachers feel comfortable with PBL and even those who favor PBL “are sometimes reluctant to implement it because of the tremendous
amount of work involved in fundamentally restructuring a course.” Furthermore, there are also students who are likely to prefer and be more effective learners in traditional rather than in PBL classroom. This assumption is supported by several earlier studies that indicate that while some students benefit from collaborative learning, active discussions and debates, other might have better learning outcomes only when provided with detailed instructions and well-defined assignments (Larsson 2001).

Another considerable concern for the novice teachers in terms of PBL is the pressure of the curriculum and the requirement to prepare students for standardized final exams. This is consistent with the findings reported in literature, for example, by Subramanian (2014), who claims that “pressure from the school district to increase students test scores in standardized tests, changes in the current curriculum, and low expectations in students’ ability and performance discouraged and dissuaded teachers from implementing any innovative reform-based instructional practices like PBL in the classroom”.

A number of teachers also reported about the lack of practical skills and prior experience required to search for relevant materials, as well as to design, plan, and successfully implement the PBL activities in the EFL classroom so that the desired learning outcomes are well achieved. They also added that in theory they are very well informed about the need and importance of innovative pedagogical practices, approaches and techniques; however, in practice and in particular school context it often seems impossible, therefore they have to “obey the rules” and do what they are expected to do but not what they believe should be done in the classroom. These findings are consistent with McCaughan (2008) who indicates that “the transition from traditional teaching to facilitating with a constructivist-like method as a bumpy, sometimes unsuccessful road. When constructivist beliefs are not well enough conceptualized during teacher training, they are subject to erosion during teaching. Although pre-service teachers applied constructivist principles during their teacher education coursework, these principles were abandoned in the first full time teaching job”. Also, the majority (78%) complained about the material shortage and lack of preparation time to design and adapt authentic materials to use them in a problem-based classroom so that they meet various students’ interests and learning needs on the one hand, and curriculum goals on the other hand. A large number of participants admitted that “preparing their student for the final English exam which is highly content-oriented” is the major barrier to the implementation of innovative teaching practices such as PBL. School administrators’ and policy-makers’ expectations from teachers was also quite frequently mentioned constrain in this survey. This is probably due to the fact that in Latvia, teacher’s performance is evaluated largely according to the final exam grades and academic achievements of their students.

Finally, the participants reported that one of the main concerns with the problem-based teaching is that it is difficult to determine the place of the PBL approach and activities in the English language curriculum.

Conclusion

To summarize, the study revealed that most teachers surveyed hold constructivist or mixed (traditional-constructivist) beliefs about teaching and learning. However, the observational data illustrated that most novice teachers in this study largely use traditional lecture-based and teacher-cantered pedagogical practices.

Based on the results, it is clear that on the one hand, almost all novice teachers are aware of the importance to transform today’s education and to use innovative student-centred pedagogical practices; however, at a closer look, it becomes obvious that not all novice teachers are actually prepared or ready to do so due because of a number of factors. Respondents admitted that they often have to choose more traditional forms of classroom practices and instruction which was contrary to their actual beliefs about the nature of teaching and learning. The transition from traditional direct teaching to a non-direct constructivist teaching philosophy might be a considerable challenge for them since most teachers tend to adopt the pedagogical practices that they observed in their early years while being learners themselves and also which they have applied because the traditional school system makes teachers believe that they have to work this way.
Furthermore, the present study revealed that novice EFL teachers require more specific professional training on the use of innovative student-centred teaching methods, techniques and approaches in EFL classrooms.

Although this study involves only 25 participants, and the results cannot be generalized, they might be useful for teacher educators, teacher education and professional development institutions, and school administrators as the study uncovers and provides insight into the realities of novice EFL teachers’ beliefs and classroom practices.

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INTERNATIONAL TERRORISM IN THE 21ST CENTURY – 16 YEARS AFTER 9/11 2001

Raluca Iulia Iulian

Abstract: After the end of the Cold War, the new European and global security environment has undergone profound changes. In the new security environment, international terrorism represents one of the main threats at a global level, the others being the proliferation of chemical, atomic, and bacteriological weapons of destruction and organized crime. Terrorism is difficult to define. Although it is an important issue today, there is no unanimously accepted scientific definition. There have been numerous attempts to define terrorism that complement each other. The paper focuses on Islamic terrorism which has undergone a certain evolution over time and has proliferated in recent years. Nowadays, it has some particularities which will be presented in the paper; they reflect the specificity of this phenomenon with a view to understanding its origin, the purposes, and its consequences. Samuel P. Huntington’s theory of the Clash of Civilization and Eric Neumayer and Thomas Plümper’s theory of the Strategic Logic of International Terrorism provide useful explanations. The aim of the paper is to examine the evolution of this phenomenon after 9/11 2001, which represents a turning point in the evolution of international terrorism.

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Keywords: security environment, international terrorism, fight against terrorism

Introduction

During the Cold War, which lasted around half a century, at the international level, a Third World War was about to start, with devastating effects on all the States, both the victorious and the defeated ones, for the entire human civilization. After1991, the possibility of confrontation between the two opposing blocks disappeared. Nevertheless, a new threat, with old origins, became an increasingly worrying problem for the European and global security and stability: the international terrorism. At the end of the 20th century and the beginning of the 21st century, the terrorist attacks on the Western world escalated, and their number has increased especially in recent years. The attacks of 9/11 2001 were particularly powerful, and they marked the beginning of a period of intensification of this social phenomenon. Consequently, the U.S.A. and its allies in the Western Europe created the international coalition against terrorism, which seeks to defeat terrorism anywhere on the globe. To this purpose, the military interventions in Afghanistan and Iraq were carried out.

16 years after 9/11, this paper aims to point out the main aspects in the evolution of the Islamic terrorism from 2001 until now and to analyze the reasons why terrorism is the main threat to global security and stability.

Attempts to Define Terrorism

From an etymological point of view, the concept of terrorism comes from the Latin “terror” (“terroris”) which means to “frighten” or to “tremble.” In the Greek mythology, the terror (phobos) and the fear (deimos) were the names of the two horses which drew the chariot of Ares, the God of the war (McInn, 1970, p.25). During the French revolution, an intensification of the “terreur” was noticed. At the end of the 19th century and the beginning of the 20th century the suffix “-ism” was added to the word “terror”; thus, “terrorism” refers “to practice the trembling” or “causing the frightening.”

It is difficult to establish with precision when and where terrorism appeared. The idea of terror is probably as old as the human society. The first who attempted to define terrorism and to regulate it from a legal point of view were the Romans who, in 103 B.C., in Lex Apuleia, called Crimen Majestatis any internal or external action directed against the integrity of the state.

Terrorism is a contested concept and, by its very nature, difficult to define. Throughout time, various interpretations were given. The experts do not agree on one definition. The scholars have not yet reached a commonly accepted definition of this phenomenon. Andrew Silke (2014, p. 5) attempted to explain the difficulty of defining terrorism in the sense of finding a commonly accepted operational definition. There are many national and regional definitions, but there is no universal legal definition approved by the General Assembly of the United Nations. The UN Security Council Resolution 1566,
which was adopted unanimously on 8 October 2004, stipulated that “terrorism is a serious threat to peace,” but it lacks legal authority in international law (UN Security Council Resolution 1566, 2004). Since the United States faced this phenomenon on 11 September 2001, several definitions have been elaborated by its state institutions. In accordance with the definition given by the United States Department of Defense: terrorism is “the calculated use of unlawful violence or threat of unlawful violence to inculcate fear; intended to coerce or to intimidate governments or societies in the pursuit of goals that are generally political, religious, or ideological” (International Terrorism and Security Research). The FBI considers that “terrorism is the unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives” (Ibidem). In the opinion of the Department of State, terrorism is “premeditated, politically-motivated violence perpetrated against non-combatant targets by sub-national groups or clandestine agents usually intended to influence an audience” (Pattern of global terrorism 2002, 2003, April). All these definitions complement each other, and they refer especially to the Islamic terrorism which represents the most flagrant form of terrorism nowadays.

The Islamic terrorism

Islamism is not a theological doctrine, but a concept which has the political use of Islam at its core. Islamism must be differentiated from fundamentalism, which is the desire to return to the basic texts of Islam. It is seen as a crusade against the unfaithful ones. It is meant to carry a religious message. The concept underlying the actions of this type of terrorism is “jihad” or “djihâd.” The Arab word means effort, fight, and punishment (Marcu & Georgescu, 2003, p. 205). It is used in order to express the effort with the aim of acquiring an objective. It also indicates the fight to defend Islam. The translation of “holy war,” which is often given to it, is highly disputed by the Islam representatives. In Arabic, this concept means to make greater efforts in order to reach the reign of God. As a Universalistic religion, Islam must be propagated by the Muslim community on any non-Muslim ground, until it extends to the whole world. According to traditional doctrine, to fight for the djihad is an act of pure devotion (ikhlas) and those who are sacrificed, those who die in this fight become martyrs (shuhada) and they benefit from an immediate place in the Paradise. This obligation is considered the sixth pillar of Islam. The objective is the restoration of the caliphate (symbiosis of the policy and the religious) and the reunification of the Muslim community (oumma).

At the moment, the phenomenon of radical Islam in its fighting form is the most important of all political movements inspired by religion. The terrorist threat represents a new type of threat, which differs from the traditional threat coming from a state or an alliance of states. The enemy was clearly named, “international terrorism,” but, at the same time, it is “not an identified enemy” because it is more difficult to establish it with precision, to detect it, and to envisage its actions.

Theoretical framework

Terrorism is an old, but a very topical phenomenon. There is no theory to explain it in its entirety. The theory of the Clash of Civilizations offers a starting point in the analysis of this phenomenon. Samuel P. Huntington analyzed the international situation after the end of the Cold War and he identified the explicative power of the cultural element in international relations. He estimated that “the most important distinctions among peoples are not ideological, political, or economic. They are cultural” (Huntington, 1996, p. 27). In his approach, “state” is replaced by “civilization.” He defines civilization as “the highest cultural grouping of people, and the broadest level of cultural identity people have,” being “differentiated from each other by history, language, culture, tradition, and, most important, religion” (Idem, 1993, p. 24).

The ideological differences disappeared, but confrontations between civilizations have emerged in the new international context. “In this new world the most pervasive, important, and dangerous conflicts” (...) are “between peoples belonging to different cultural entities” (Idem, 1996, p. 27). Between Islam and Christianity there was “continuing and deeply conflictual relation (...) more often the relation has been one of intense rivalry and of varying degrees of hot war” (Ibidem, p. 209) depending on “demographic growth and decline, economic developments, technological change, and intensity of religious commitment” (Ibidem, p. 211). John Esposito comments, “often found the two communities in competition, and locked at times in deadly combat, for power, land, and souls” (as cited in Huntington, 1996, p. 209).
Eric Neumayer and Thomas Plümper complete Huntington's theoretical framework and offer a theoretical approach to terrorism, the theory of the Strategic Logic of International Terrorism. According to the authors, the “theory builds on the rational approach to identifying and explaining the causes of international terrorism in conflict over political influence” (Neumayer & Plümper, 2009, p.8). A distinction is made between “terror group leaders” and the “followers” which are “the soldiers of the leaders.” The leaders have “a crucial, decisive position in the terror organization. They are the leaders and therefore behave predominantly strategically” (Ibidem). The soldiers “follow specified or unspecified commands, which may include the command of self-sacrifice in a suicide terror mission” (Ibidem, p. 10). Neumayer and Plümper point out that terrorism is not only a conflict between civilizations, but there are also other motivations: “the high strategic value of attacking Westerners” (Ibidem, p. 1) because the “terror leaders aim for political influence in their country or wider region” (Ibidem, p. 12). Thus, the connection between the internal and external policy presented by Bueno de Mesquita (2006, p. 637) in his new theory of international relations is realized.

11 September 2001 - a turning point in the history of terrorism
On September 11, 2001, four coordinated terrorist attacks, led by Osama bin Laden, were made by the Islamic terrorist group Al-Qaeda on the United States. The attacks were particularly destructive: the high cost in human lives (around 6,000 persons died and 9,000 were wounded) and the most significant material loss compared to the previous attacks. The U.S.A. considered that these attacks were directed against the American states because their essential components were concerned: the World Trade Center, a symbol of the economic power, the Pentagon, a symbol of the military force, and the White House, the symbol of the political power. In the case of the previous terrorist attacks the target was the civilian population, not the state.

Consequently, article 5 of the North Atlantic Treaty was invoked for the first time. Until that moment, it had referred to a traditional attack. After September, 11, it was extended to terrorist attacks. This is the first and only time that this article has been invoked until now. The international anti-terrorism coalition was created. The military campaigns in Afghanistan and Iraq took place. These campaigns did not have the expected success because terrorism could not be completely eradicated and democracy established. Instead, Al-Qaeda leader Osama bin Laden was captured in Pakistan.

Due to the European Union countries' participation in the military campaigns mentioned above, the result was a series of terrorist attacks on the European states, the U.S.A. allies in the fight against international terrorism. They targeted the peaceful civilian population. For example, the 11 March 2004 Madrid train bombings killing 192 people and injuring around 2,000; the 7 July 2005 London bombings on underground rail lines and bus when 56 people died and more than 700 were injured; the 21 July 2005 London bombings, with no victims. Other terrorist attacks that took place between 2005 and 2015: the 22 July 2011 Oslo attacks with 77 victims; Charlie Hebdo, the French satirical paper, attacks in Paris on 2 November 2011 and 7-9 January 2015, 14 people were killed, out of which 2 police officers; Toulouse and Montauban shootings on March 11 to 19 2012, London attacks on 22 May 2013, Brussels attacks on 24 May 2014, and Copenhagen attacks on 14 February 2015. (What major terrorist attacks have occurred in Europe in recent years, 2017). The frequency of the attacks has increased especially over the past three years due to the involvement of the Western states in the bombing of ISIS (the self-proclaimed Islamic State) targets in Iraq and Syria. In 2016, there were several attacks: in Brussels (22 March), Nice (14 July), and Berlin (19 December). In 2017, the most severe terrorist attacks in Europe were in Great Britain (March 22, May 22, June 3), Sweden-Stockholm (April 7), France (April 20), Catalonia attacks: Barcelona (16 August), and Cambrils (18 August). Some attacks involved vehicles plowing into crowds (Armed attacks and terrorist attempts committed in Europe in 2017, 2017). Italy has repeatedly been threatened by the ISIS.
In addition to the above mentioned attacks, smaller ones took place permanently in the European Union countries. The organization ISIS claimed responsibility for these attacks. They were directed against the civilian population to intimidate them by terror, and not against the state institutions. There were no motivations declared. The exception is the attack that took place at the editorial office of Paris. Some attacks were carried out on important days for the European civilization: public and religious holidays.

Discussion

Referring to the traditional attack, Carl von Clausewitz considered that the “war is a mere continuation of policy by other means” (von Clausewitz, 1873, chapter 1, para. 24). Terrorism is different from the traditional war where confrontation occurred between two or more visible enemies. Terrorism is an atypical, asymmetric kind of war, with its own specific characteristics. The enemy cannot be identified. It targets the national security of the aggressed states, and it causes material damage and human loss. It has reached an unprecedented peak. Terrorism is a war characterized by the lack of a defined operation theater, by the lack of a delineated battlefield, of some identification means (uniforms), of an ideology, institutions, by the usage of man as a weapon, by the usage of classical or artisanal weapons, by the usage of the surprise factor, rapid, complex and diverse actions, carried out anywhere and anytime, meant to bring terror, the lack of strategic coordination and the maintenance of strategic initiative, and especially, cyber spatiality.

Terrorism is a very complex phenomenon, with violent actions against some precise targets, which, in most cases, cannot defend themselves. It is the weapon of the religious extremist, of the one who intends to kill, to frighten, to dominate by means of terror. Essentially, the terrorism takes the form of a violent act, which often targets civilians, its purpose is political, it aims at publicity, the organization is clandestine, and the acts are likely to have psychological effects.

Terrorism proved to be a new type of enemy, which is very difficult to fight since Western states do not have efficient means to deal with it.

After September 11, the U.S.A. took a number of firm internal measures, and consequently there has been no terrorist attack on its territory since 2001, and those that have been initiated have been detected and annihilated in the early stages. This was possible due to the development of some new, effective anti-terrorist legislation. These measures concerned the internal policy. Regarding the external policy, the U.S.A. launched military campaigns in Afghanistan and Iraq in order to capture Osama Bin Laden and destroy the Al-Qaeda training camps. The immigrants from countries that host terrorist organizations from Asian and African states (Iran, Iraq, Libya, Somalia, Sudan, Syria, and Yemen) were denied access to the United States by the order of President Donald Trump. The disposition was considered undemocratic.

Unlike the U.S.A., the European countries did not take similar measures and, consequently, there was a host of terrorist attacks. Grégoire Lalieu (2016) considers that to avoid repeating attacks “it was necessary to situate the attacks in their political, social and historical context” (to analyze this phenomenon). He estimates “our governments have not done” this. Certain politics elaborated by states led to a series of secondary phenomena which made it easy for terrorists to enter European countries (Among the refugees who entered the EU, terrorists of the Islamic State slipped, 2016).

The instruments which can be used in the fight against international terrorism are diplomacy, criminal law, financial control, military force, and information. All these must act in synergy because, on its own, each of them has severe legislative limitations.

Huntington's theory of the Clash of Civilizations has been confirmed by the events after 1990. The conflicts have arisen between the Islam and the West. According to Neumayer and Plümper’s theory, the terrorist leaders choose their targets for maximum efficiency. On the 11th of September, the target of the attacks was the U.S.A., the only superpower at that time and the symbol of the Western civilization and then its allies, the countries that participated in the anti-terrorist coalition in Syria and Iraq by aerial bombardments.
Conclusion

After 9/11 terrorism is no longer a usual form of terrorism, it is deterritorialized, internationalized, it is fought between an individual or more, and the rest of the world. Terrorism acts by non-military means and unprecedented forms.

Terrorism is a new type of war, therefore one needs to act accordingly by modifying current standards of classic warfare. Some important elements of combating terrorism are: an adequate legislative framework and firm organizational measures. In order to fight this scourge, countries need to change the military strategy and tactics in order to render the fight efficient. In addition, the means which will be used must have antiterrorist specific particularities, as the ones used until now turned out to be inefficient. Apart from technical means, Western countries need to change the ideological approach of this phenomenon. The problem of the fight against terrorism calls for solutions which differ from those used until now, another concept, another strategy. This war against terrorism can take many years, with an uncertain ending.

Unless appropriate action is taken, many innocent people will become victims. Terrorism creates panic among the population, and it disrupts their social and economic life, leading to chaos.

Throughout history, the Western world has faced many unfavorable circumstances but has managed to defeat them. We hope the same thing will happen in the current context through appropriate measures. One solution can be to avoid conflict because it does not lead to anything good and the preference for peaceful cooperation between cultures.

References


DEVELOPING THE READINESS FOR THE ORGANIZATIONAL ACTIVITY OF THE CADETS
Venelin Terziev,1 Nikolay Nichev2

Abstract: The tasks being solved by the military units, which are part of the Bulgarian Army, require the possession of high-level knowledge and abilities for organizational activity from the newly promoted Logistic Officers. While performing his functional obligations, the Logistic Officer must promptly and thoroughly estimate the received task, duly organize the activity of the subordinated units and personnel and organize the collaboration with the State authorities, with the business, non-governmental and further organizations.

The research target is the professional military training of the future Logistic Officers, while the research subject is the developing of readiness for the organizational activity of the Logistic Officers in the course of their professional military training. The aim of the research is to outline the lines for improving the process of developing of readiness for the organizational activity of the Logistic Officers in the course of their professional military training. The research methods are: a theoretical analysis of the literature for military education and of the standard documents is made in the course of the research; analysis and synthesis of the scope and the contents of the basic definitions, being used in the elaboration; abstraction; conclusion and analogy.

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Keywords: military training, training of cadets.

Introduction
The tasks, which are solved by the military units, part of the Bulgarian Army, require from the newly promoted Logistic Officers to possess high-level knowledge and abilities for organizational activity. While performing his functional obligations, the Logistic Officer must promptly and thoroughly estimate the received task and the available forces and resources and must duly organize the activity of the subordinated units and personnel. The specific character of the organizational activity of the Logistic Officers has an effect on the organizing of collaboration with the State authorities, with the business, non-governmental and further organizations.

Despite this, in the Regulation for the state requirements for the regulated profession “Officer for a tactical grade of control” and in the qualification characteristic of the curriculum for Cadets training, it’s paid insufficient attention to the questions for the training of the Cadets from the Logistic specialties for organizational activity. The education is directed towards the realization of the conception for the optimal obtaining of a wide range of competencies in the field of military science, and also knowledge of the activity of the civil, political, socio-economic structures and systems. Its’ aim is to develop knowledge, abilities and moral-volitional qualities, serving as a ground for professional progress, but no strictly specialized training for obtaining of particular abilities for organizational activity is foreseen. (Ordinance on state requirements for acquiring higher education degree „bachelor” in professional fields „Military” in the specialties of the regulated profession „Officer for tactical levels of command”, 2012; Training plans for education on specialty of regulated profession „Organization and management of military units at the tactical level” and military occupational qualification „Officer for tactical levels of command”).

Acts of organizational activity
In the scientific literature, there is no unambiguous definition of the term „organizational activity.” Some of the researchers consider it as an obligatory part of the professional activity of every expert. However this activity is scrutinized in two aspects: on the one hand as a basic professional activity, and in this case, the other activities of the expert are subordinated to it; and on the other hand as equal to the other professional activities, being a connection element of the solving of different professional tasks. Another part of the scientific commonwealth considers the organizational activity to be a function of the management process. The management process wouldn’t be possible without the

1 Venelin Krastev Terziev Professor, Dipl.Eng. Ph.D., D.Sc. (National Security), D.Sc. (Ec.); Vasil Levski National Military University, Veliko Tarnovo, Bulgaria; University of Rousse, Rousse, Bulgaria; University of Telecommunications and Post, Sofia, Bulgaria, terziev@skmat.com
2 Nikolay Bonev Nichev, Colonel Assoc. Prof. Ph.D., National Military University, Veliko Tarnovo, Bulgaria, nicheff@abv.bg
organizational activity, which in the management system is scrutinized as the basis of each management activity or as an independent kind of management activity. The analysis of the functional obligations of a Logistic Officer defines the basic directions of revealed organizational activity in his professional military realization:

- Organization of the training and of the fulfillment of orders, given by the Commander of the unit for logistic support. The single Commander principle and the principle of the fulfillment of the ordered tasks in the Bulgarian Army is a specific sphere of the professional military activity, and in this sense, the Logistic Officer acts simultaneously as a direct executor and as an organizer of the order fulfillment. From the contents point of view, the organizational activity of the order fulfilment consists of: evaluation of the commanders’ decision and of the ground and resulting tasks; evaluation of the required forces and resources for the execution of the task; taking a decision, tasks allocation; issuing of orders to the subordinate; organizing the work of the subordinate for the fulfillment of the given task; control of the execution of the tasks; evaluation of the carried out work and reporting to the Commander about the performance of the given task;

- Organizing the action of the subordinated units, of the military and civilian personnel during the performance of the missions and the tasks of the Bulgarian Army of all kinds of supplies: technical, food, materials, fuels and lubricants, ammunition, transport supplies, construction services, the supply of resources, etc.;

- Organizing the action of the subordinated military and civilian personnel and of the staff from other units during the fulfillment of the given by the Commander of the unit common tasks;

- Organization of the collaboration with the regional and the state authorities, with supply and manufacturing companies, with non-governmental and other organizations for conclusion of contracts for the delivery of defensive articles and for the providing of services aiming to enhance the military profession image and the patriotic education of the population and others;

- Organization of the cooperation between the personnel of the Logistic units and professionals forms the civilian sector for the performance of joint tasks;

- Organization of the professional military training of the subordinated personnel (Med, 2009a, Nichev, 2015).

A conclusion can be drawn from the carried out analysis, that the organization activity of the Logistic Officer in the military units, in comparison to the Commanders of combatant units, is more versatile and possesses a specific, which must be taken into consideration in the training process of the future Logistic Officers for the performance of their professional military activities. The specifics of the organization activities lies not only in its contents but also in its implementation.

Specific of the organization activity

First of all, the command and management of the activity of the Logistic units is awarded to the corresponding Commander of the unit, while the non-combatant officers organize the execution of his orders. Therefore, the organization activity must be aimed at the unconditional execution of the orders and instructions of the direct commanders and superiors and to be implemented strictly in conformity with the requirements of the operative laws, normative documents, methodologies, instructions and etc. In order to avoid the creation of a paradoxical situation, where the orders of the Commander could not be executed, because of the violations of the normative documents, laid down in them, the organization activity of the Logistic Officer ought to be directed towards assisting the Commander in taking a legitimate decision (Todorkov, 1998).

Secondly, the organization activity of the Logistic Officer is clearly regulated in the Decree of the military service, in the corresponding job description and in the orders and instructions, and for these reasons, it’s appropriate to treat each innovation as a way of improving the activity, not as a radical change.

Third, the activity of most of the Officers from the Bulgarian Army and from the structures, which are directly subordinated to the Minister of Defense, is limited in the frames of the military community, while the organization activity of the Logistic Officers comes out of these frames. In order to allow him to perform a big part of the allocated tasks to him, the organizing activity of the non-combatant
of the activity of the Logistic Officer, his organizing action is versatile and has to cover wide ranges, starting from food supplies, the supply of ammunition, technical maintenance, transport, infrastructural maintenance, etc.

Thus, the organization activity of the Logistic Officer comprises the joint organization of the work of many people from different spheres of the military life, the applying of special efforts for the providing of concordance and coordination of the activity of the people and the subordination of its results for the achievement of the basic aim - the logistic support of the military education activity. That’s what makes the organization activity the main service activity, whereas the developing of its readiness in the future Logistic Officers becomes an important goal of the military profession training in the Vasil Levski National Military University.

Developing of readiness for organizational activity

Yury Med defines the готовность of the Logistic Officers to perform an organizational activity as a professional and personal knowledge, comprising motivational, theoretical and practical components. Thereby the readiness appears to be a sub-system of the system of a higher level - preparedness for professional military activity and possesses all properties of the professional qualifications in part, which refers to the application of organization activities (Med, 2009b).

The motivational component of the readiness for organizational activity includes active positive relation to the organization activity and significant personal grounds for the implementation of the organization activity (grounds for self-assertion, for the scare of failure, for the achievement of positive results (Angelov, 1994).

The theoretical component of the readiness for organizational activity comprises the availability of required knowledge for the execution of the basic functions and developing of professional ethical standards for the implementation of organization activity. In conformity with the basic documents, which define the military professional activity of the Logistic Officer, the following belong to the knowledge, required for the performance of organization activities: organization and management of business units and teams, management psychology, pedagogy, deontology, ethics, conflictology, sociology, rhetoric, labor law, healthy and safe conditions of work, etc. The developing of ethical professional norms involves the possession of professional ethics, high moral consciousness, sense of responsibility, realized necessity of enhancement of the professional qualification regarding the questions of organization and management, ability to avoid, and, when necessary, to successfully solve various conflicts, the conscientious attitude to the functional obligations, respectful attitude to the inferiors etc. (Todorkov, 1998).

The practical component of the readiness for organizational activity shows out in the combination of abilities, which are necessary for the future Logistic Officer for the accomplishment of the organization activity of his first officer’s position. The analysis of the possible appointment to first officer’s position shows, that the list of the organization competences, he must possess, is versatile and each possible organization activity reflects in him. This fact gives a reason to unite these abilities into three groups, which are required to the greatest extent for the implementation of the organization activity.

These one are the communication abilities - skills, which allow the Logistic Officer to create his business, professional and personal relations, based on the mutual respect between him and his inferiors, his supreme commanders and chiefs, between him and the representatives of the state and local authorities and of the business, and other people, who are responsible for the logistic support of the military unit; analytical skills - the ability of a person to evaluate adequately his own personal competences and the skills of his inferiors to perform the given tasks, to evaluate the received tasks, to take the best possible decisions, to plan the performance of the tasks, to foresee the end results and the consequences of the taken decisions, to implement the obtained in the Vasil Levski National Military University knowledge for the enhancement of the effectiveness of the activity of the subordinate staff etc.; organization skills - the skills to allocate the obligations, to set out tasks for the subordinate staff,
to secure the performance of the given tasks with the required resources, to organize the actions for the performance of the tasks, to render control and assistance during the execution, to stimulate the inferiors etc.

The developing of such components is carried out during the process of the professional military training of the future Logistic Officers.

The motivational component is being actively developed with the help of the setup system for education work. In the Vasil Levski National Military University all the army rituals and the whole education activity starting from the moment of entering the High School until the ritual for the awarding of the first officer rank are intended to develop in the Cadets the consciousness of the importance and of the particular significance of the chosen profession and to form a sense of national awareness and responsibility.

The theoretical component is formed actively during the learning of the management subjects of the civilian specialty and of the special military subjects. The management subjects of the civilian specialty give the fundamental organization theoretical knowledge, while the special military subjects give the chance of obtaining the knowledge of the structure, algorithm and the special features of the organization work of the Logistic Officers during the peacetime insurance and during the wartime support of the troops.

The practical component is formed during the performance of the tasks of the military training period, of the obligations of the army service and his appointment as a Commander of a Cadets Detachment or as Second-in-command of a Cadets detachment.

The analysis gives a ground to consider the „preparedness for organization activity” to be a goal and a result of the military professional training and a professional personal knowledge, where the organizational functions (motivational component), the level of its learning (theoretical component) and the ability to implement this experience in the future professional activity (practical component) find their reflection.

The developing of readiness for organizational activity in the Cadets during their professional military training is predetermined by many factors, among which a special place is occupied by the specially created for that purpose educational conditions (Med, 2009b). Here belong:

- **developing of a positive attitude to the performance of the organizational activity.** This is achieved with the help of developing sense of initiative, self-confidence in their own competences, responsibility, independence, inclination to reasonable taking a risk, etc. in the Cadets and of realized idea that the organization activity is an important part of the military professional management activity of the future non-combatant officers;

- **Stimulate the obtaining of knowledge and professional ethical standards in the sphere of the organizational activity during the professional military training.** The knowledge of organizational activity mustn’t have just a general theoretical characteristic but must be connected to the appointing to the first officer position and to the performance of particular official obligations.

In order to achieve it, it’s necessary to turn the attention of the Cadets during the process of learning the special military subjects to the interdependence between all components of the organizational activity in the Logistic units and to the enhancement of the confidence in their own organizational abilities.

- **The focused development of the organizational activity aiming to meet the requirements of the first officer position.** In this case, we must have in mind the fact, that it’s impossible to obtain the full range of competencies, which would be needed by the future Logistic Officer in his organizer role. The number of these abilities is huge, and it’s really exceptionally difficult for the Cadets from the Logistic profiles to obtain all of them. That’s why it’s most advisable to develop the relatively independent groups of abilities, which characterize the personality requirements for the future officers and to take into consideration the contents and the peculiarity of the future organization activities. The described communication, analytical and organization skills belong to such groups of competences.

**Conclusion**

As a result of the carried out analysis the following conclusions can be drawn:
1. The organizational activity takes a specific place in the structure of the professional military activity of the non-combatant officers. This place is predetermined by the versatile characteristics of the contents, of the kind and peculiarity of the solved tasks during the performance of their official obligations and represents a necessary condition for a successful official activity.

2. The readiness for organizational activity comprises motivational, theoretical and practical components. The contents of these components ensure the developing of a positive attitude to the organization activity of the future non-combatant officers, obtaining the knowledge of the organization activity and development of the needed organization competencies for the execution of their functional obligations.

3. The developing of readiness for organizational activity during the professional military training of the Cadets is predetermined by many factors, among them an important place is occupied by the positive attitude to the performance of the organization activity; the stimulation of obtaining knowledge and professional-ethical norms in the sphere of the organization activity during the process of the military professional training; purposeful development of the organizational activity in order to meet the requirements of the first officer position.

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HISTORIC MOLDOVA. HISTORICAL DISPARITIES, REGIONALISATION AND CROSS-BORDER INTEGRATION

Cristian Ploscaru,1 Ionuț Nistor2

Abstract: This study proposes a theoretical approach to the idea of a platform for research and education on the historical substance of regionalization in Romania, with reference to the case of the historical province of Moldova. Furthermore, to identify the consequences, reactions, weaknesses, opportunities afforded by administrative restructuring from a post-regionalization demographic and socioeconomic viewpoint. An inter-disciplinary analysis – historical, demographic, economic – the traits of a Romanian society stemming from Moldova, the historical dynamics that underpin the modern Romanian state, will provide a picture of the current situation, focused mainly on its causes while trying to find explanations rooted in economic and social behaviours and attitudes which came to define and inform the subsequent development strategy of regionalization, allowing Moldova to play a central economic role in relation to other territories, similar to the role it played in the past two centuries, in the context of European integration strategies, in neighbouring parts of the continent (Republic of Moldova, Ukraine). The theoretical approach involves three components, expanding concentrically: 1) component of knowledge / research; 2) digital platform; 3) e-learning component. The research component seeks dynamic historical development of Moldova, from the time after the Union of the Romanian Principalities until today, focusing on specific regional elements. We will try to identify and analyze the specific features of Moldova, links with other areas of historical Moldavia, as the interaction between them and the Romanian public policy. Within the demographic component, we look at the historical population dynamics of Moldova, including various ethnic and religious communities, rural-urban ratios, social and professional structures. Another issue concerns the economic and comparative analysis in space and time, with respect to Moldova historical economic dynamics parameters - resources, infrastructure, industry, agriculture, trade, transport, etc. Both aspects will be analyzed in correlation with the impact of a permanent political factor, pursuing public policies promoted by the political regimes in their chronological sequence.

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Keywords: historical disparities, regionalization, development, diversity, integration

Introduction

Our paper, Historic Moldova. Historical Disparities, Regionalisation, and Cross-Border Integration, addresses a topical theme. Our intention is to suggest some directions for research and application of the results in the educational process of our University, integrating other research results into a common platform, accessible to those are interested. Throughout its construction, it will incorporate strong practical objectives. We provide the development of integrated, interdisciplinary research, providing specialist support for the impact of regionalization of Moldova. Furthermore, to identify the consequences, reactions, weaknesses, and opportunities afforded by administrative restructuring from a post-regionalization demographic and socioeconomic viewpoint. An inter-disciplinary analysis – historical, demographic, economic – the traits of a Romanian society stemming from Moldova, the historical dynamics that underpin the modern Romanian state, will provide a picture of the current situation, focused mainly on its causes while trying to find explanations rooted in economic and social behaviours and attitudes which came to define and inform the subsequent development strategy of regionalization, allowing Moldova to play a central economic role in relation to other territories, similar to the role it played in the past two centuries, in the context of European integration strategies, in neighbouring parts of the continent (Republic of Moldova, Ukraine).

The theoretical approach involves three components, expanding concentrically: 1) component of knowledge / research; 2) digital platform; 3) e-learning component. The research component seeks dynamic historical development of Moldova, from the time after the Union of the Romanian Principalities until today, focusing on specific regional elements. We will try to identify and analyze the specific features of Moldova, links with other areas of historical Moldavia, as the interaction between them and the Romanian public policy. Within the demographic component, we look at the historical population dynamics of Moldova, including various ethnic and religious communities, rural-urban ratios, social and professional structures. Another issue concerns the economic and comparative analysis in space and time, with respect to Moldova historical economic dynamics parameters - resources, infrastructure, industry, agriculture, trade, transport, etc. Both aspects will be analyzed in

1 Associate Professor, „Alexandru Ioan Cuza” University, Iași, Romania, cploscaru@yahoo.com
2 Associate Professor, „Alexandru Ioan Cuza” University, Iași, Romania, inistor2001@yahoo.com
correlation with the impact of a permanent political factor, pursuing public policies promoted by the political regimes in their chronological sequence.

Results of the specialized research will be posted on an electronic platform. It will include extensive statistics, demographic and economic graphs and tables that can be accessed and permanently completed by other researchers. The platform will include a forum for discussion in real time, which can be used for organizing workshops, conferences or universities. It allows users to watch not only data (numbers, statistics), but also the performance, according to their own interests, graphs, tables and charts using available infrastructure information. One objective is to achieve interactive digital maps of historical Moldavia, loaded with all collected data and can be accessed for the purposes of space and time comparisons. The platform will host a photo library, a corpus documents, and a bibliography. All information will serve as a basis of support for students and will be used in seminars and supplementary courses, and for the general interest to the public at large.

Methodological observations and historiographical comments
Western research devoted to regional differences in demographic, socio-economic and habitat have a long tradition, their results are used by central governments of the states, and by managers of older or newer companies. We will report on the latest works and initiatives that provide context to our project. In 2008, a report was published by the Center for the Study of Demographic Change in Rostock (Tivig, Frosch, Kühnzopf, 2008, 32) trying to conceptualize and quantify regional changes of the population during 1990-2030 and the risks involved for companies operating in the European Union. There existed major interest, not only from researchers but also from national and European political structures for finding solutions to global challenges and this found expression in the creation of the ESPON 2013 Programme - European observation network on territorial development and cohesion. The program is funded by the European Regional Development Fund, and the purpose is to support development and cohesion policy designed by utilizing: available information, statistics, analyzes and scenarios on territorial dynamics, revealing territorial capital and development potential of regions and larger territories. Under the program, Corrado Bonifazi and Massimiliano Crisci drafted a paper (Bonifazi, Crisci, 2013, 230) whose objectives were to analyze the interaction between the factors of migration, demographic and economic in the last decade in Catalonia, by which to anticipate future interactions, depending on the results of regional projects implemented by EU countries. Study of The Relationship Between Demographic Change and Economic Growth in the EU conducted in 2007 by Prskawetz Alexia, Thomas Fent, Werner Barthel (from Vienna Institute of Demography, Austrian Academy of Sciences), Jesus Crespo-Cuarezma (Department of Economics, University of Innsbruck), Thomas Lindth, Bo Malmberg, Max Halvarsson (Institute for Futures Studies, Stockholm) provides a review of recent literature linking demographic structure growth. Based on data available for the EU in 1950 to 2005, the study is a prospective analysis of future implications of demographic change on economic growth in 2050. The document stresses that demographics may affect productivity through its impact on the economy, investments, human capital formation, technological change, etc., as the economic behavior of people and their needs vary at different stages of life, and changes in the age structure of a country may have significant effects on its economic performance.

Our research uses as point of reference the study The Role of Regional Competition for Demography and Regional Disparities in Germany, published by Florian W. Bartholomae and Alina M. Popescu of the University of the Federal Armed Forces Munich, in which they analyse the regional differences specifically between east and west and the northern and southern regions of West Germany, based on indicators such as natural population growth, fertility rates, migration, etc. Their findings show that demographic aging and population decline have serious consequences for the economic and social development of the country (Bartholomae, Popescu, 2007, 47).

In the United States, there are a number of institutes specially constituted to analyze socio-economic and demographic indicators. Institute for Research on Poverty, University of Wisconsin has developed a database to serve the general public, they store information about the local database, available online for the Midwest region. They include sites containing local statistics and a number of issues related to poverty: basic demographic information, employment, and income, health and mortality, social assistance programs. University of Texas and the Brookings Institution have collaborated to produce a website dedicated to urban poverty, which allows users to visualize poor areas of cities, determined by data provided by the censuses of 1970-2000 and know the economic development of these areas.
Office analysis of economic and social trends of the Iowa State University, collects, analyzes, interprets and disseminates information on social trends, economic and demographic. They created a well-organized site level data for states in the Midwest region.

In our approach, we start with the idea that Romanian regionalization should not widen economic disparities. Social frustrations exist in Moldova and are noticeably reviving in the form of historical justification, particularly in the intellectual and political arena, and more importantly, manifesting in the form of competition for access to scarce resources among sub-regions and counties (Sucava, Neamţ, Bacău, Iaşi, Galaţi). An inter-disciplinary analysis – historical, demographic, economic – the traits of a Romanian society stemming from Moldova, the historical dynamics that underpin the modern Romanian state, will provide a picture of the current situation, focused mainly on its causes while trying to find explanations rooted in economic and social behaviours and attitudes which came to define and inform the subsequent development strategy of regionalization, allowing Moldova to play a central economic role in relation to other territories, similar to the role it played in the past two centuries, in the context of European integration strategies, in neighbouring parts of the continent (Republic of Moldova, Ukraine).

Also, our research and documentary support complex developed from it, will continuously refer to the concept of territorial cohesion, European and national policies essential for regional development that aim at unlocking the potential of regional and territorial capital, in consonance with shared borders, to be seen as opportunities for development, all the while increasing cultural exchanges with neighbouring states. In this regard, the European program INTERREG supported by EPSON, attaches high priority to remote regions in close proximity to borders to other countries, thus affording the Moldovan Republic a unique privilege from both points of view (Scholich, 2007, 2). One of the most challenging and difficult issues related to the concept of territorial cohesion is the related concept of territorial capital, the description, and analysis of which is a central tenet of research. This concept was defined in Territorial Outlook by OECD (2001) on four levels: 1) capital infrastructure and housing; 2) knowledge capital; 3) cultural capital and identity 4) social capital all of which will be approached from a historical perspective, with particular attention being paid to demographic- and economic factors (OECD, 2001, 15). With the some importance are level of education, including literacy, access to various educational stages, the share of specialized elites and orientation, both at the sub-regional level and in terms of ethno-religious communities, historic landmarks and cultural dynamics of identity, their size measurable quantity - Romanian, Russian, Ruthenian and Ukrainian literature etc., media, associations and cultural organizations representing civil society, birth, death, infant mortality, population movements within and outside Moldova historic urban-rural ratio horizon and comparative urbanization policies and their impact etc. Thus, the current territorial capital can be better assessed by reference to its historical foundations, not just theoretical models, often contradicted by reality.

Research undertaken within the project includes both a theoretical component, about the new lines of research in the field, whose findings should be a specific theme and a practical component, the availability of research results, not only for academics but also more especially for the public and private entities involved in projects related to regionalization of Romania to benefit from the database and specialized expertise offered by the project. Regarding the theoretical component, an innovative way to promote the project aims would be by means of scientific benchmarking of aspects of regionalization processes under the influence of new regionalism concept, taken in recent years by the European strategy of integration (Lombaerde, Baert, 2012) and a still has relatively low impact among Romanian research specialists. This new regionalism related methodological model, successfully applied in studies of Western (American and European) should be adapted to the specific requirement of our case (Mansfield, Milner, 1997), (Maatli, 1999), (Herrschel, Newman, 2002), (Telò, 2007). Recent contributions suggest a correlation of economic and financial analysis for regionalization policies regarding the identity of the historical and political traditions of various national states, in order to identify explanations for collective behaviours that can make it difficult or, conversely, can stimulate the process of regionalization (Breslin, Hughes, Phillips, Rosamond, 2004, 10). Another innovative component of the research stems from the fact that regionalization should be understood as a complex response, on the one hand, the internationalization of markets and social division of labour, on the other hand, the political, economic and financial strategies of multinationals – EU policies of multinational companies, banking consortia, etc (Flemes, 2010, 15-29).
In Romania, there does not exist sufficiently rich experience in interdependent and interdisciplinary research on topics such as those undertaken by this project and especially research products often remain confined to academia, without producing tangible benefits to business, the state, and the citizen. This perspective endured many political and ideological constraints, as well as the strict demarcation and teaching of fundamental areas of knowledge (history, economics, geography, sociology), which in part caused parallel discourses, and in other cases (demography) lack of tradition and interference from the communist regime, did not leave enough room for major development. However, experience in the Romanian research is a useful start, especially recent contributions.

The need of justifying the national centralist-state, in democratic or totalitarian form, formed the foundation for the socio-economic, demographic and habitat policy perspective, which was mainly based in the tradition of historical writing. Romanian „provinces,” from a centrist point of view, were often viewed in the same way, from a teleological standpoint. There were, however, especially in the context of the search for a Romanian communal identity, further considerations beyond the Prut and the restructuring of post-December speech, saturated stereotypes, questions of „national project,” a common destiny. Beyond the need to unify in 1859, there were works that have attempted to quantify the costs incurred for Moldova (Ivănescu, Turluc, 2001) and presenting classical works with inexorable process of union of Bessarabia and Bukovina and unification benefits on different levels administrative, fiscal, cultural, studies were soon published noting constraints, differences and sacrifices. Recent studies (Cuşco, 2011, 203-216) on the Romanian state modernization policy of the three southern districts of Bessarabia in the Russian Empire between 1857-1878 and the reaction after 1878, capture a „symbolic issue” between the two countries on several more levels: administrative, economic, demographic. Two state models are at odds with one another, one democratic and the other autocratic, and how to impose their respective vision of a region with economic and trade potential: control of the Lower Danube.

Recent economic and demographic studies have attempted current challenges, realizing interchangeable research products and assuming that productivity, economic efficiency or consumption are expressed by reference to the number of different categories of population size. Concerns in this regard cover both contexts and global perspectives and case studies. A volume published by Bogdan Murgescu is a very useful comparative analysis of socio-economic development on the Romanian and European level, based on the "obsession gaps.” The author tries to explain how these development gaps were built and when these gaps accumulated while providing comparative analysis with other cases on the continent (Murgescu, 2010). The same general ledger and job falls Cornelia Mureşan, a summary of the demographic evolution in Romania, following the structure of the habitat and the urbanization process, sex and age structure of the population, legislation, using log-linear methods in regional chapters devoted to aspects of the demographic regime (Mureşan, 1999).

During the negotiations and discussions that took place in the period before accession to the EU were initiated, several research projects cover all the state of development of Romania in comparison with other EU member states. Through these projects, we remember the one coordinated by Valeriu Ioan-Franc, entitled Dezvoltarea durabilă a României în context European și mondial (Sustainable Development of Romania in the European and global context), conducted under the auspices of the National Institute of Economic Research (Vasile, 2007) Among the initiatives that have sought to integrate the concerns of many researchers interested in social issues and dynamics of change in Romania, can be remembered the coordinated work volume (Iluş, Nistor, Rotariu, 2005). Such researches are focused more on current reality issues and seek to provide a projection of what will be happening in the near future and therefore do not concentrate on the historical aspect, and nor do they analyze the situation in the long term. The research series points is essential to this project from a comparative perspective, the topics and similar case-study tangents are coordinated in the volume by Ioan Bolovan (Bolovan, Paula, 2007) comprising an amount of studies focused on the experience of Transylvania, trying to provide a detached perspective of classical key of the national historiography that treat in many cases, the problems related to the demographic regime of the area in a passionate and ethnocentric way. The work captures demographic change occurring amid world wars, the refugee problem in 1940, returns, and case studies. Marinela Istrate provided an applied study of human geography, examining the role of cities in economic development of Moldova, the role of physical distances and a constraints framework played in shaping the urban settlement network, and how the
centrality determines the characteristics of spatial mobility of population and the development of cities (Istrate, 2008). The two volumes (Jinga, Soare, Dobos, Roman, 2010) deals with a sensitive topic, but important in the economy of the project pronatalist's development under Ceausescu (1966-1989), following its effects and impact on the population and it relates to similar phenomena in other countries in the communist camp, concluding that Romania has applied the most restrictive legislation on voluntary interruption of pregnancy.

Ethno-religious dimension is as challenging and it not be excluded from the sphere of interest of this research. By 1878, between the two world wars and during the communist state report, ethnic minorities have always been formally negotiated with around the policies adopted by the government and the Romanian parliament, and pragmatically at the community level, with local decision-makers. But although the dominant thinking of the Romanian state laws relating to minorities was, until World War II, the acceptance of international provisions, policies unification, centralization and politico-institutional homogenization and economic territories, in 1918 tense situations with minority ethnic dialogue was soon feigned. After 1945, inspired by the practice of the Soviet Union, the communist state under all ideological imperatives, revised its policy towards minorities, creating a new body composed of social classes that transcend ethnic and linguistic borders. Abolishing racial laws adopted after 1938 and building official atheism, in an attempt to reduce the importance of the religious factor in identifying the group, the new „elite” aims to incorporate minority communities in the social and political system of the Communist bill. There was, therefore, a formal integration, symbolic, beyond the means of setting administrative policy towards minorities, but these measures were often perceived as being imposed, and not agreed to, and led to resistance and institutional reluctance, factors promoted by the central and local power in relation to "the others" (Hebrew, Roma, Russians, Poles, Ukrainians, Bulgarians) tacit exclusion policies led to the closure of the key institutions of the Romanian state for the minority. There is an amount of more recent work published volumes of documents and state policies towards Virgil Pană (Pană, 1996), Levente Salat (Salat, 2008), Monica Vlad (Vlad, 2008), Irina Livezeanu (Livezeanu, 1998), Stefano Bottoni (Bottoni, 2010) and serial collective volumes (five in number) coordinated by Sorin Radu, Vasile Ciobanu (Ciobanu, Radu, 2006-2011) and research institutes focused specifically on minority issues as the Institute for Research on National Minorities in Cluj Napoca. Their philosophy is based on organizing and analyzing state policy Romanization of cities and industrialization, made by liberals in the interwar period. Elements of the debate focuses on the economic, administrative and cultural Romanian authorities, objectives seen as necessary Romanian affirmation element in the new provinces, but also some concepts that circumscribe state policy: educational and administrative unification of Romania as a territorial form of integration and homogenization, but not the integration of minorities, racial resorts of state action, the trend of assimilation by the majority of other Romanians.

Conclusions

In conclusion, the objectives of our research are focused on two fundamental aspects - knowledge and communication. The research component is of course primarily dedicated to the subject of knowledge, perspective and interdisciplinary analytical priority, which is subordinated to the collection and processing of a demographic, economic, cultural reference period. The objective is to identify specific features of Moldova, in terms of historical, demographic, and economic and responses / reactions to public policy in different historical stages. Setting these goals assumes the existence of differences in development between Moldova and other historical regions of the country, but also between different sub-regions of Moldova. The public policies of the Romanian regimes between 1859 and 2012 have managed successfully to mitigate these differences. On the contrary, the gap increased and labor migration from Moldova, a national domestic phenomenon before 1989, turned to the West in the context of de-industrialization of the country and EU integration. Component of research / knowledge has a fundamental aim to identify rational, substantiated and reliable answers, resulting in a complex analysis with a solid interdisciplinary and comparative component. To achieve this objective, scientific challenges mainly focuses on the processing of data gathered from their investigation of historical research, and demographic and economic data to be classified and correlated based on a number of specialized criteria that require interdisciplinary efforts. Research in the project, in all its complexity, will lead to some solid conclusions on the human and material potential of Moldova, according to demographic and economic benchmarks correlated quantitatively, following their dynamics in time.
and space, opportunities for regional development and the specific cross-based characteristics of the region and collective behaviours, and vulnerability of the region, as they result from historical experience.

Acknowledgement

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STUDYING MINDSETS OF STUDENTS TO SOLVE PROBLEMS

Tsvetana Kostadinova Antipesheva

Abstract: This theme of solving problems is very actual. Their conclusion begins in school and continues whole life. This presentation consists of an investigation with students about solving problems. During the work the following conceptual basis for research intentions was raised: As a basic conceptual basis in this study the increased interest in psychological approaches such as changes in Bulgarian educational paradigm determine the need for the transformation in education is considered. Conceptually, the reason is the fact that the current situation needs ways which to be found to improve the practical training of young people.

Last but not least, it can be said that modern socio-scientific context puts imprints on attitudes and ways of acquiring the students, the emphasis is placed on the learner as an individual - with specific needs, attitudes and motivation. In connection with the teaching of problem-solving, the following general questions arise: How the students in the program acquire the necessary training? Is it of adequate in their future practical activity? How modern is the current methodology for solving problems and how to update it? What are the new guidelines to improve training in order to solve problems in a meaningful? How to determine the ratio of students to solve problems? There are the conclusions from the results of the investigation.

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Keywords: solving problems, investigation, figures, results

Introduction

Only the accumulation of knowledge in a discipline is not enough. It is important that the knowledge can be applied in solving various practical tasks. "In applying the knowledge in practice, a rise is carried from the abstract to the concrete. Understanding and remembering are absolutely necessary but not the only precondition for the successful application of knowledge" (Andreev, 1987). Solving problems recreates theory into practice and demonstrates the meaning of the study. In this scientific-practical study, the problem of the attitudes of students learning to solve tasks is examined. Psychological approaches to selection, training, and implementation of rules for solving problems are established. The reflection of the author from his long teaching is used.

A real part

It could be said that the "quality of each product as well as of knowledge, is a function of the quality of the processes that create the product. Only through the optimum management of knowledge and its quality can we be given the correct answer to the questions: "What knowledge is to be produced," "For whom is it to be produced," and "How is it to be produced" (Ivanova, 1994).

This scientific-practical study does not claim to solve all questions but, has the ambition to interpret the survey given to students, which was conducted during the academic work and gives both interesting results and has formed a certain type of thinking.

The purpose of the survey is to establish: what are the attitudes of students to the process of solving problems flowing in classes; what are their attitudes to their own participation in this process as future leaders and representatives of various institutions.

The working hypothesis of this survey can briefly be formulated as follows: We assume that the attitudes of respondents will be changed in a positive way, after passing through a series of trainings for solving problems in different disciplines.

The study was conducted with students majoring in "Technology, technology and entrepreneurship" / TTP / "Business Management" / SU / and "International Economic Relations" / Relationships / first course in the academic year 2015/2016. Their total number is 116. The distribution of subjects was as follows: TTP - 10 T - 82 and Relationships - 24. Consciously freshmen were selected to track their attitudes and presented at the beginning of their training. It would be interesting for them to be tracked down and at the end of their studies. The actual survey focuses on the attitudes of students for the specific type of learning activity.

The attitude towards an object, exploring attitudes to it are binary - "strongly disapprove" - "not approve." Three components have been explored:

1 Faculty of Economics, South-West University "Neofit Rilski", 2700 Blagoevgrad, Republic of Bulgaria, cvetana_anta@abv.bg
Associated with our knowledge of the site;
Related to the emotional evaluation of the site.
Related to the behavior of the object.

Writing on attitudes, we are actually looking at the attitude of the individual and in this sense they are regarded as having a "sustainable latent predisposition of the individual to positive or negative assessment of the object or situation that arises on the basis of life experience, it turns regulatory dynamically organized influence on perceptual, emotional and mental processes and results in consistency of behavior - verbal and non-verbal" (Mitkova, 2010)

Attitudes can be defined as a mental state of the human predisposition to certain activities in certain situations. They can be based on positive or negative views about people, events or processes forming the subject of attitude. The influence of attitudes on the effectiveness of each activity is directed and deep because they are a constructive element of motivation and personal attitude to the action. Attitudes are based on the value system of the individual, his perceptions about themselves and the world. Like most mental phenomena they are dynamic and subjected to change and development that would motivate another similar study.

In the survey, we chose to study six functions of attitudes to solve problems. There is also included the rock of denial for a fuller examination of these attitudes. The questions are covered in full enumeration of possible answers (Piryov & Desev 1981).

1. Cognitive attitude - reflects the attitude of the individual to knowledge that can be acquired. Here it reflects the trend towards deepening knowledge in a professional way. The individual seeks knowledge to make sense of the world around him;
2. Value adjustment - reflects the attitude of individuals towards the realization of values in the working process. Here, it is good for the student to attach importance to the good performance of the team, the standards in the system, and gives a higher sense of their future profession;
3. Material attitude - reflects the material interest of students for participation in his future work purely. The attitude towards material gain applies to comparing their pay with the salaries of others;
4. Ego protecting attitude - reflects the desired future position in the hierarchy of the society. It is part of the reference group, and one has the feeling that was adopted as part of it;
5. Energy saving attitude - reflects the attitude of the individual to retreat and the failure to act. The attitude is passive about investing efforts into action. Lack of enforcement activities on its own initiative;
6. Socially progressive attitude - refers both to career development, i.e., the desire to rise in the hierarchy (even without regard to real possibilities) and projection over other (even without regard to the real achievements) and to the benefits and privileges that a person receives unlike other people;
7. The scale of denial - this scale reflects the existence of resistances, negative attitude of the individual to the job and negative attitude towards the implementation of the tasks in teamwork.
Higher scores on this scale could mean as the entirely negative attitude of the student, and a moment of dis-adaptation. Regardless of the interpretation, obtaining inflated results on this scale, one should address the causes and take appropriate measures.

The proposed functions are the prism through which will be examined the attitudes of students to the process of solving problems. The main allegations are formulated in the form: .................................... , because: In the final version 5 are the formulated statements. Of the surveyed students 78 are women, and 38 are men. Graphically it looks like this: (fig. 1)

<table>
<thead>
<tr>
<th>Figure 1: Ratio women / men</th>
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<td>Source: Author</td>
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The first question is worded as follows: "I like my chosen specialty because:
1. ... gives me the opportunity to learn many new things.
2. ... the specifics and objectives are important to me
3. ... gives me good opportunities for future payment.
4. ... at future work I could run a team.
5. ... I led without much effort.
6. ... have the opportunity for career development.
7. ... I chose it by accident."

Stratification in these attitudes is as follows: 1 - 39 students, 2 - 34 students, 3 - 7 student, 4 - 10 students, 5 - 5 student, 6 - 18 students, 7 - 3 student. The schedule specified values are distributed as follows: (fig. 2)

![Figure 2: Election of specialty](image)

Source: Author

It is noteworthy that the logical answers to every student are the majority. Visible is the pursuit of knowledge, to the opening of new goals and perspectives.

The second question was: "Solving the problems in the learning process is significant because:
1. ... thus I put into practice what they have learned in lectures.
2. ... learn to seek the most valuable in the taught material.
3. ... at solving practical problems may have an additional charge.
4. ... I could become head of the experimental team.
5. ... guiding his colleagues will leave them to do the job.
6. ... dealing with tasks prepares me for my professional development.
7. ... I do not like the process of solving problems."

These responses from students are the following: 1 - 41 students, 2 - 43 students, 3 - 5 students, 4 - 11 students, 5 - 3 students, 6 - 3 student, 7 - 10 students. Graphically these values look like this: (fig. 3)

![Figure 3: Importance of solving problems](image)

Source: Author
On that graph, it is shown that there are few results. Obviously, students do not associate the process of solving problems in their future career. The case may have its logical explanation. If the exercises are solved "invented" and non-life tasks, their effect would be purely academic. The tasks that are solved with training, an opportunity must be from actual practice. They need to be referred to real objects.

Third question: "The selection and formulation of tasks are important because:

1. I get the opportunity to select tasks in their future activities.
2. I can prioritize tasks to be performed.
3. I can select tasks in their future activities.
4. Every choice is important.
5. Not like to solve problems.

The responses of the students are:

1 - 33 students, 2 - 37 students, 3 - 7 students, 4 - 15 students, 5 - 5 student, 6 - 7 student, 7 - 12 students. The schedule specified values are distributed as follows: (fig. 4)

![Figure 4: Selection and formulation of tasks](image)

Source: Author

The condition of the task and its results correspond to a real practical situation. It should not lead to absurd or unusable results. In the practice of training, most often the given tasks to educational content are selected intuitively. The connections between the elements of the content must be transformed into an adequate system of these tasks. Choosing the type and complexity of tasks and sequence of their placement, the trend towards a gradual complication and promotion of cognitive activity should be optimized. The selection of tasks, the way of putting them, and their analysis helps to see beyond the individual task and to grasp the general way to solve them.

The fourth question is: "The proposed steps for solving tasks help because:

1. Thus the problem is decomposed and easy.
2. Learn to work in stages.
3. Every stage could be well paid.
4. Gives me an opportunity to acquire skills to work in groups performing different stages.
5. Cannot miss any stage if somebody else does the job.
6. Each step brings me closer to my future practical activity.
7. These steps do not help me.

Stratification in these attitudes is as follows: 1 - 45 students, 2 - 31 students, 3 - 4 students, 4 - 20 students, 5 - 3 students, 6 - 10 students, 7 - 3 student. The schedule specified values are distributed as follows: (fig. 5)

![Figure 5](image)
Answer 1 and 2 give 46% of the total. This means that students perceive stages offered as an aid to solve the problem. Breaking the separated parts into tasks whose solution is easier and faster. The end result summarizes the stepwise answers. So many tasks are algorithms, and their decision becomes certain rules.

The fifth question is worded as follows: "I participate fully in the process of solving problems because:
1.… thus I get deeper professional knowledge.
2.… thus appreciate their competence.
3.… the physical benefit of dealing with tasks is great.
4.… in its future shall I set tasks.
5.… prepare for a manager who only puts tasks.
6.… have the opportunity for advancement in the hierarchy after dealing with problems.
7.… I have no choice."

Stratification in these attitudes is as follows: 1. - 29 students, 2. - 38 students, 3. - 7 students 4. - 14 students, 5. - 9 students, 6. - 15 students, 7. - 4 students. The schedule specified values are distributed as follows: (fig. 6)
And here it seems overwhelmingly professional. Students assess their own competence to contribute fully to the work. The important fact is the significance they attribute to their work in the team and their commitment to the event.

**Conclusion**

The conclusions that can be finally drawn are the following:

- The accumulation of knowledge leads to more easily cope with any task;
- There is generally positive attitude towards the process of solving problems both in school and in life;
- Even people with mercantile attitude tend to participate in this process, knowing that they will benefit from it;
- Possible positive change on their own values and attitudes.

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MEDICINE AND PHARMACY
THE EFFECTS OF AN INNOVATIVE TECHNOLOGY APPLIED AS VIRTUAL REHABILITATION ON CLINICAL OUTCOMES IN ANTERIOR CRUCIATE LIGAMENT INJURY

Onur Aydoğdu,1 Zübeyir Sari,2 Ufuk Saadet Yurdalan,3 Gülden Mine Polat4

Abstract: In recent years, many different technologies on virtual rehabilitation have been produced and used in research. However, existing studies are limited because most of them focus on the balancing ability of the elderly or studied stroke patients with same systems. Thus, it is necessary to investigate the effects of a new virtual rehabilitation system in patients with Anterior Cruciate Ligament (ACL) Reconstruction. The purpose of this study was to investigate the effects of a virtual rehabilitation system using a MarVAJED® system which provides visual and auditory stimulus aimed at educating and controlling the joint proprioception, range of motion, pain intensity, and knee swelling in individuals with an ACL injury. A total of fifteen patients with ACL reconstruction participated in this study. In addition to conventional physiotherapy, a virtual rehabilitation treatment was applied with visual and auditory stimulus for a total of eight weeks, three sessions per week. There were statistically significant improvements in measures of proprioception, range of motion, pain intensity, and knee swelling between pre- and post – treatment (p<0.05). We concluded that this new VR system known as MarVAJED effectively treat ACL patients by improving proprioception, range of motion, and by decreasing pain intensity, and knee swelling.

UDC Classification: 617.3 ; DOI: http://dx.doi.org/10.12955/cbup.v5.1047

Keywords: Innovative Technology, Rehabilitation, Physiotherapy

Introduction

Knee joint injuries are common in activities of daily life as well as in sports activities. Anterior cruciate ligament (ACL) injuries are one of the most common knee injuries (Lange et al., 2015; Tichonova et al., 2016). ACL injuries do not recover spontaneously because of poor vascularization of the injured ligament. Therefore, when individuals injure their ACL, they should often take comprehensive rehabilitation (Takata et al., 2017).

Various treatment protocols after cruciate ligament injuries for rehabilitation have been studied, which focus on open versus closed chain exercises, early versus delayed weight bearing status, use of brace post operatively, accelerated versus non-accelerated rehabilitation, supervised versus home-based rehabilitation along with strength training, balance training, and criteria for return to play (Priyanka et al., 2017). Due to new trends, to accelerate recovery, innovative technology should be made an integral part of ACL rehabilitation.

Improvements in technology have made virtual rehabilitation popular and available in various rehabilitation systems. Virtual rehabilitation systems play an increasing role in rehabilitation. They provide an interactive environment and increased motivation for patients during the session (Ferreira et al., 2016). Virtual rehabilitation may be an appropriate device because it allows the clinician visual and auditory feedback to train their patients. In addition, it is possible with virtual rehabilitation to manipulate the environment that would be impractical or impossible to create in the real world (Gokeler et al., 2016).

In recent years, many different technologies on virtual rehabilitation have been produced and used in research however, existing studies are limited because most of them focus on the balancing ability of the elderly or studied in stroke patients with same systems (Park et al., 2015). Thus, it is necessary to investigate the effects of a new virtual rehabilitation system in patients with Anterior Cruciate Ligament (ACL) Reconstruction.

The purpose of this study was to investigate the effects of a virtual rehabilitation system using the MarVAJED® system which provides visual and auditory stimulus aimed for educating and controlling the joint on proprioception, range of motion, pain intensity, and knee swelling in individuals with ACL injury.

1 Marmara University, Faculty of Health Sciences, Istanbul, Turkey, fztomuraydogdu@hotmail.com
2 Marmara University, Faculty of Health Sciences, Istanbul, Turkey, fztzubeyir@yahoo.com
3 Marmara University, Faculty of Health Sciences, Istanbul, Turkey, ufukyurdalan@hotmail.com
4 Marmara University, Faculty of Health Sciences, Istanbul, Turkey, guldenpolat2002@yahoo.com
Methods

A total of fifteen patients with ACL reconstruction participated in this study. In addition to conventional physiotherapy, a virtual rehabilitation treatment was applied with visual and auditory stimulus for a total of eight weeks, three sessions per week.

Visual and auditory stimuli were applied via the MarVAJED® system which was developed by Marmara University, Department of Physiotherapy and Rehabilitation with the aim of educating and controlling the joint as a virtual rehabilitation system.

Before and after intervention, proprioception was measured with a Biodex System Pro 4 Isokinetic Dynamometer (Sadeghi et al., 2017), the range of motion was measured with a universal goniometer, pain intensity was measured with a Visual Analogue Score (Huskisson, 1983), and knee swelling was measured with a tape measure (Jakobsen et al., 2010).

The study was planned as a clinical study and ethical approval was obtained from the Marmara University Faculty of Medicine Clinic Researches Ethical Board.

MarVAJED

MarVAJED is an innovative device that allows continuous evaluation of the deviation angle of 0.10. The device allows evaluating different measurements such as: goniometric and proprioceptive assessment and changes of range of motion during physical activities. It also has a virtual rehabilitation application with visual and auditory stimulus. MarVAJED operates under both a direct and a smart phone system. The device includes the following components:

(1) Software and Smart Phone Panel – The android software had been specifically and exclusively designed for the purpose of the device and measurement control. The main role of the software is to control the values and direction of knee deviation, record and archive the patients’ data, together with the results of repeated measurements (Figure 1).

(2) Device – The device consists of two parts: an upper and a lower which connect to each other and a smart phone via Bluetooth (Figure 2). It is possible to assess all directions of movement in almost all joints: flexion – extension, abduction – adduction, and internal – external rotation in the joint of shoulder, elbow, wrist, hip, knee, and ankle. In addition, patient data are stored in a database in the smart phone. Following the measurement, it can be easily exported to the PC with a desired format such as excel, pdf, etc.

Statistical Analysis

All statistical analyses were performed using the software IBM SPSS Statistics version 11.5 (IBM Corporation, USA), with a P value <0.05 considered statistically significant. All numerical data were expressed as mean ± standard deviation. Data obtained from patients before and after treatment were assessed by using the Wilcoxon Signed Test.
Results
The study included 2 females (13%) and 13 males (87%). A total of 15 patients completed the study (Table 1), SD: Standard deviation. There were statistically significant improvements in measures of proprioception, range of motion, pain intensity, and knee swelling between pre– and post–treatment (p<0.05) (Table 2). We encountered no adverse effects of our device in our trial.

<table>
<thead>
<tr>
<th>Demographic Features</th>
<th>Mean±SD</th>
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<tr>
<td>Age (year)</td>
<td>23.36±6.76</td>
</tr>
<tr>
<td>Body weight (kg)</td>
<td>76.48±11.30</td>
</tr>
<tr>
<td>Height(cm)</td>
<td>174.37±8.25</td>
</tr>
<tr>
<td>Body Mass Index (kg/m²)</td>
<td>25.15±4.86</td>
</tr>
</tbody>
</table>

Source: Authors
Discussion

The study investigated whether our innovative device – MarVAJED, providing a virtual rehabilitation system with visual and auditory stimulus aimed for educating and controlling the joint has beneficial effects on proprioception, range of motion, pain intensity, and knee swelling in individuals with an ACL injury. To our knowledge, this is one of the first clinical trials to determine the effects of virtual rehabilitation on patient outcomes in patients with an ACL injury.

The results of our study showed that the MarVAJED innovative device system used as a virtual rehabilitation decreased the pain intensity, and knee swelling in patients with ACL reconstruction. This clinical trial confirmed the hypothesized advantage of virtual rehabilitation in patients with ACL reconstruction.

Conclusion

We concluded that this new VR system known as MarVAJED effectively treated ACL patients by improving proprioception, range of motion, and by decreasing pain intensity, and knee swelling. Integration of technology into rehabilitation programmes may enhance assessment and rehabilitation. New technology systems may be more effective in increasing quality of life of patients.

Acknowledgement

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References


DETERMINATION OF SOME ELEMENT CONCENTRATIONS OF FIRST INFANT MILK FORMULA AND HEALTH RISK ASSESSMENT

Funda Demir,1 Meral Yildirim,2 Nevin Karamahmut Mermer,3 Emre Moroydor Derun4

Abstract: Breast milk is suggested as the best method for baby nourishment by The World Health Organization (WHO, 2003). However, in some cases, breastfeeding is not possible due to different metabolic reasons. In such cases, an infant formula that is similar to the breast milk content is designed to meet infant nourishment requirements during the first 6 months after birth. It is important to know the content of infant milk formula for a baby’s health. The purpose of this presented study is to determine the elemental (Fe, Cu, Al, Cd, As, Ni, Ba) contents of the four different brands of first infant milk formula sold in the Turkish markets. Elemental contents of samples were identified by Inductively Coupled Plasma Atomic Emission Spectrometer (ICP-OES) after a microwave digestion process. Target hazard quotients (THQ) of analyzed elements were calculated and risk analyses were conducted. According to the results, the hazard indexes (HI) of infant milk formula samples were founded as less than 1 and all samples were included in the low risk group.

UDC Classification: 66.03; DOI: http://dx.doi.org/10.12955/cbup.v5.1048

Keywords: Infant milk formula, element content, ICP-OES, hazard index.

Introduction

Optimum nutrition and good feeding have a significant role in the determination of infants' health, growth and development. Healthy infant nutrition prevents some chronic diseases and reduces infection risks in adults (Michaelsen et al., 2003). Breast milk is suggested as the best method for baby nutrition by The World Health Organization (WHO), but it is not adequate or possible in some cases such as metabolic reasons or increasing nutritional requirements (Mehrnia & Bashti, 2014). In such cases, baby milk formulas which are designed and marketed for feeding to babies are used and they show similar characteristic to breast milk (U.S. Department of Health and Human Services). Infant milks are classified based on nutrient content and numbered according to month. 1st (first infant milk), 2nd (follow-on milk) and 3rd (growing up milk) numbers of milk are suitable for 0-6, 6-9, 9-12 months old babies respectively.

Toxic elements can be taken into the human body in various ways from the atmosphere or foods and they may pose health risks especially for infants. Many developmental problems are directly related to exposure to them. Because of this reason, it is important to know the content of infant milk formula. The elemental contents of milk formula and their influence on baby health is a curious issue (Mehrnia & Bashti, 2014).

Infant milk contains various elements (essential and non-essential) of Fe, Cu, Al, Cd, As, Ni, Ba. There are lots of effects of these elements found in the content of infant milk on the health of a baby. Al, Cd, As, Ni, and Ba are non-essential elements that may cause negative effects on the baby body. Aluminum (Al) damages nervous and skeletal system and causes Parkinson’s disease and Alzheimer’s disease at a later age (Sipahi et al., 2014; Yalcın et al., 2014). Cadmium (Cd) shows the toxic effect on kidneys and causes bone demineralization (Sipahi et al., 2014). Arsenic (As) is a human carcinogen and causes skin, lung, and bladder cancer (Hong et al., 2014). Ba causes gastrointestinal disturbances and muscular paralysis (Yalcın et al., 2014). Nickel is a known as immunotoxic, neurotoxic, carcinogenic agent so Ni intake shows the toxic effect on the health (Das et al., 2008). Iron (Fe) and Copper (Cu) are essential for human life however, they can show toxic effect at high concentrations. Iron poisoning is a common toxicological effect seen in young children (Boyle, 2016).

There are several literature studies about elemental contents of baby food. Mehrnia et al. (2014), determined four toxic elements (Cd, Ni, Mn, Pb) in the different type of baby food and estimated the daily intakes of toxic elements for children. Odhiambo et al. (2015), determined Cd, Al, Pb, and Ni content in milk infant formula which sold in the Kenyan market. Ljung et al. (2011), studied several elements in breast milk, infant formula, and rice-based baby food. Tripathi et al. (1999), investigated Zn, Cu, Pb, and Cd content of milk and milk products.

1 Yildiz Technical University, Istanbul, Turkey, demirfunda1@hotmail.com
2 Yildiz Technical University, Istanbul, Turkey, meraly@yildiz.edu.tr
3 Yildiz Technical University, Istanbul, Turkey, nevinkaramahmut@hotmail.com
4 Yildiz Technical University, Istanbul, Turkey, moroydor@yildiz.edu.tr
The aim of the present study is to investigate and compare the concentration of Fe, Cu, Al, Cd, As, Ni, and Ba amount of 1st number infant milk formulas sold in Turkey. The health effects of these elements in an infant body were also investigated and the health risk was determined.

**Materials and methods**

**Preparation of the Infant Milk Samples**

Infant milk samples were obtained from the local market in Istanbul, Turkey. Samples were prepared for ICP-OES use by a microwave method.

In this method, 0.1 g of infant milk powder was digested with 10 mL of HNO_3 (65% Nitric acid, Merck KGaA, Darmstadt, Germany) in a microwave digestion system (Berghof MWS 3+) (Figure 1), using the digestion program specified in Table I. The digested and cooled solutions were diluted to 50 mL with distilled water. ICP-OES was used for the analysis of the resultant solutions.

<table>
<thead>
<tr>
<th>Step</th>
<th>Temperature (°C)</th>
<th>Ramp Time (min)</th>
<th>Hold Time (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>150</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>160</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>190</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>4</td>
<td>100</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 1: Operating conditions for the microwave digestion system

**Preparation of the Calibration Sets and Elemental Analysis of the Samples**

Calibration sets were conducted by using Al, As, Ba, Cd, Cu, Fe, and Ni standard solutions which are obtained from Merck Chemicals (Merck KGaA, Darmstadt, Germany). Inductively coupled plasma-optical emission spectrometry (ICP-OES) is a widely used technique which can determine trace-level element composition and it has a high sensitivity for detecting elements (Sivakumar et al., 2014). In this technique the emission spectra of a sample are used to determine and quantify the element, therefore, excitation and/or ionization of the sample is ensured at the high temperatures (Hou & Bradley, 2000).
The Perkin-Elmer Optima 2100 DV model ICP-OES equipped with an AS-93 autosampler was used in the experiments (Figure. 2). Measurement conditions were adjusted to a power of 1.45 kW, plasma flow of 15.0 L min⁻¹, the auxiliary flow of 0.8 L min⁻¹ and nebulizer flow of 1 L min⁻¹.

Calculation of Estimated Daily Element Intakes
The estimated daily intake of elements (EDIs) was assessed using the daily food consumption of an infant, element concentration, and body weight. The following equation is used in the calculation (Islam et al. 2015).

\[ EDI = \frac{FIR \times C}{B_w} \]  

(1)

Where \( C \) is the average concentration of elements in infant milk samples (mg/kg), \( FIR \) is the daily food consumption (g/day) and \( B_w \) is the body weight (kg). The average weight \((B_w)\) and food consumption amount \((FIR)\) of 0-6-month-old babies are calculated as 5 kg and 120 g, respectively according to the literature study (Sipahi et al., 2014) which indicated the mean weights of 0-2, 2-4 weeks and 2, 4, 6 months old infants. The average concentration of elements \((C)\) are given in Table 2.

Health Risk Calculation
The health risk factor related with infant milk consumption is calculated by using the following Equations (Islam et al., 2015; Shaheen et al., 2016).

\[ THQ = \frac{EFr \times ED \times FIR \times C}{RfD \times B_w \times A_f} \]  

(2)

\[ HI = \sum_i^n THQ_i \]  

(3)

Where \( THQ \) is the target hazard quotient, \( FIR \) is the rate of food consumption (g/person/day), \( RfD \) is the oral reference dose, \( BW \) is the average body weight and \( AT \) is the average lifetime (70 years). Exposure frequency \((EFr)\) (180 days/year) and exposure duration \((ED)\) (6 months) were calculated according to 6 months value because of the using 1st number infant milk which consumed by 0-6 months infants in the experimental. The RfD values of Fe, Al, Cd, Cu, As, Ni and Ba are set to be 0.7 (Wu et al., 2016), 1 (Yu et al., 2015), 0.001, 0.04, 0.0003, 0.02, 0.2 mg/kg/d (Shaheen et al., 2016).

Results and discussion
Analysis Results
Elemental analysis results of samples are given in Table 2. The element with the highest concentration among the analyzed elements is Fe (max 41.35 ppm) and followed by Al (max 7.98 ppm). Cu (max 0.36 ppm) and Cd (max 0.25 ppm) contents of the analyzed samples are considerably lower than Fe and Al contents.
Table 2: Element concentrations of infant milk samples

<table>
<thead>
<tr>
<th>Infant milk samples</th>
<th>Element concentrations (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fe</td>
</tr>
<tr>
<td>S1</td>
<td>23.9</td>
</tr>
<tr>
<td>S2</td>
<td>26.5</td>
</tr>
<tr>
<td>S3</td>
<td>41.35</td>
</tr>
<tr>
<td>S4</td>
<td>23.41</td>
</tr>
</tbody>
</table>

b.m.l. below measurable levels

Source: Authors

The concentration of non-essential elements of As, Ba, and Ni are below the measurable levels in all infant milk samples. For S1, Cd and Cu content cannot be detected when Cd and Cu contents are measured between 0.05-0.25 ppm and 0.32-0.36 ppm, respectively. The Al contents are varied between 5.88 and 7.98 ppm when S1 contains the highest Al amount. The highest Fe and Cu contents are determined for S3. Figure 3 (a) and Figure 3 (b) show the comparison of Fe-Al elements and Cd-Cu elements contents for all samples, respectively.

Figure 3: The comparison of Fe-Al elements (a) and Cd-Cu elements (b) contents for all samples

Calculation of Estimated Daily Elemental Intakes and Health Risk Assessment

Estimated daily elemental intakes (EDI) of essential and non-essential elements were calculated by using Equation (1). Calculation results for each element were given in Table 3.

Table 3: Estimated daily elemental intakes (mg/kg)

<table>
<thead>
<tr>
<th>Samples</th>
<th>Fe</th>
<th>Al</th>
<th>Cu</th>
<th>Cd</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>0.6216</td>
<td>0.1915</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S2</td>
<td>0.6252</td>
<td>0.1824</td>
<td>0.0077</td>
<td>0.0060</td>
</tr>
<tr>
<td>S3</td>
<td>0.9924</td>
<td>0.1411</td>
<td>0.0086</td>
<td>0.0012</td>
</tr>
<tr>
<td>S4</td>
<td>0.56184</td>
<td>0.1546</td>
<td>0.0084</td>
<td>0.0034</td>
</tr>
</tbody>
</table>

Source: Authors

Equation (2) was used for calculation of THQ values. The trends of THQ values for Fe in the samples are in order to S3>S2>S1>S4 and for Al in the samples are in order to S1>S2>S1=S4. The lowest THQ values are obtained for Cu and the THQ values of Cd element change between 0.0042-0.0211.

Taking the four samples into consideration, Equation (3) was used to estimate the total health risk index (HI) value caused by Fe, Al, Cu, and Cd. The risk assessments of metals taken with infant milk formula consumption were calculated to be within safe limits (THQ<1) and the HI values (sum of individual metal THQ) were calculated in this study.

According to the results of the risk analysis of the elements for 4 samples, the hazard index is found to be less than 1 which is calculated for a 120 g consumption of infant milk and therefore these milk powders have been included in the low-risk group.
### Table 4: THQ and HI calculation

<table>
<thead>
<tr>
<th>Samples</th>
<th>Fe</th>
<th>Al</th>
<th>Cu</th>
<th>Cd</th>
<th>Health Index (HI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>0.0031</td>
<td>0.0007</td>
<td>-</td>
<td>-</td>
<td>0.0038</td>
</tr>
<tr>
<td>S2</td>
<td>0.0032</td>
<td>0.0006</td>
<td>0.0007</td>
<td>0.0211</td>
<td>0.0256</td>
</tr>
<tr>
<td>S3</td>
<td>0.0049</td>
<td>0.0005</td>
<td>0.0008</td>
<td>0.0042</td>
<td>0.0104</td>
</tr>
<tr>
<td>S4</td>
<td>0.0028</td>
<td>0.0005</td>
<td>0.0007</td>
<td>0.0118</td>
<td>0.0158</td>
</tr>
</tbody>
</table>

Source: Authors

In Figure 4, the health index of first infant milk formula is shown. The highest HI value was obtained for the S2 sample (Figure 4a) which was followed by S4, S3, and S1, respectively. As seen in Figure 4b, the main reason of the high HI values was the Cd content of samples.

### Conclusion

Contents of some essential (Fe, Cu) and non-essential elements (Al, Cd, As, Ni, Ba) in infant milk samples sold in the local market in Istanbul, Turkey were measured in the present study. The amounts of Fe were significantly higher than other elements in all samples and this is followed by Al, Cu, and Cd respectively. After that, EDI, THQ, and HI values are calculated for the selected infant milk samples. THQ values are estimated for each element and hazard index is determined by using total THQ values of each element that belong to per samples.

The risk groups of samples are classified according to HI values. HI values higher than 1 represents the high-risk group. In the same way, the samples that have a HI value less than 1 are in the low-risk group.

Based on HI values of these elements all analyzed infant milks are in the low-risk group. In conclusion, there is no health risk for the examined infant milks in terms of their elemental compositions.

### References


HEALTH-RELATED QUALITY OF LIFE AMONG DISPENSARY OBSERVATION PATIENTS WITH CHRONIC ILLNESS IN BULGARIA

Teodora Dimcheva,1 Boryana Levterova,2 Desislava Bakova,3 Nonka Mateva4

Abstract:
Introduction: The prevalence of chronic non-communicable diseases (NCDs) worldwide acquires epidemic dimensions. In Europe, five nosological groups (diabetes mellitus, cardiovascular disease, cancer, chronic respiratory diseases and mental disabilities) constitute 77% of NCDs and cause about 86% of deaths in the region.

Objectives: This study aimed to assess the quality of life in patients with chronic non-communicable diseases under dispensary observation.

Methods: The pilot cross-sectional study was performed among adult with chronic diseases in primary care practices in the Plovdiv district (the second largest in Bulgaria) from May to June 2013.

Results: A total of 200 adults with chronic diseases participated in the study. The mean age was 55.6 years (range 25–95, standard deviation (SD) 16.9). The most common chronic diseases in our study were cardiovascular 51% (ischemic heart disease, hypertension, etc.), followed by endocrinology diseases (23%). There was statistically significant differences in the assessments of "general health" in different groups of participants by gender ($\chi^2 = 16.65$, $P <0.002$), age ($\chi^2 = 12.57$, $P <0.05$) and social status ($\chi^2 = 28.54$, $P <0.0001$).

Conclusion: The subjective assessment of health is a factor that has a strong impact on the quality of life of patients and is an important component in evaluating the effectiveness of provided health care for patients with chronic non-communicable diseases.

JEL Classification Numbers: I120, I140; DOI: http://dx.doi.org/10.12955/cbup.v5.1049
UDC Classification: 614.4
Keywords: Health Related Quality Of Life; Chronic Non-Communicable Diseases (NCDs); Bulgaria

Introduction
The prevalence of chronic non-communicable diseases (NCDs) worldwide acquires epidemic dimensions. The most common NCDs are cardiovascular diseases, cancer, chronic respiratory diseases and diabetes mellitus. According to the World Health Organization (WHO) - ¼ of them occur in low- and middle-income countries, and over 16 million people are getting sick before the age of 70 (WHO, 2014; Lim et al., 2012).

Chronic diseases are defined as "diseases of long duration and slow progression" (WHO, 2008) or "conditions or symptoms that once acquired cannot be removed after 3 months or more" (Goodman et al., 2013).

In Europe, five nosological groups (diabetes mellitus, cardiovascular disease, cancer, chronic respiratory diseases and mental disabilities) constitute 77% of NCDs and cause about 86% of deaths in the region (Busse et al., 2010). Bulgaria is not an exception to this alarming trend. In our country, NCDs cause 80% of deaths with diseases of the circulatory system being the most prevalent (67.5%), followed by malignant neoplasms with (15.1%), diabetes mellitus (8.3%) and others (Mateva & Nonchev, 2015).

Health is the most comprehensive basic category in medicine and healthcare. The WHO defines health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (Official Records of the World Health Organization, no. 2, p. 100, 1948). In recent years WHO could add this definition the person's ability to maintain "productive socially and economically life" (Nutbeam, 1998).

The concept of Health-Related Quality Of Life (HRQOL) and its determinants have evolved since the 1980s to encompass those aspects of overall quality of life that can be expressly indicated to affect health. On the individual level, HRQOL incorporates physical and mental health perceptions and their correlations such as health risks, functional status, social support, and socioeconomic status (CDC,
2000). On the community level, HRQOL includes community-level resources, conditions, policies, and practices that impact a population’s health (CDC, 2000; Dimcheva et al., 2015). Health-related quality of life representing a person’s subjective assessment of their sense of well-being and ability to perform social roles has been well accepted as a health indicator in medical interventions or health surveys. The HRQoL of patients with a single chronic disease has been explored in primary care (Fortin, 2004).

The implementation of appropriate tools for assessing the quality of life can find those areas of health NCDs which require closer scrutiny from health professionals. Instruments to measure QoL have the potential to identify specific and common unmet health needs of the population level (Levetorova et al., 2014).

The aim of this study was to assess the quality of life in patients with chronic non-communicable diseases under dispensary observation in Plovdiv, Bulgaria, through an original questionnaire.

Material and Methods
A pilot cross-sectional survey, including the original questionnaire, was performed among adults with chronic diseases in primary care practices in Plovdiv district (the second largest in Bulgaria) from May to June 2013.

We selected patients from the primary care practices under contract to the Regional Health Insurance Fund Plovdiv. Inclusion criteria in the study were: age over 18 years old and subject to dispensary chronic non-communicable diseases according to Ordinance № 39 for prophylactic examinations and dispensary/ 16.11.2004 Ministry of Health of Bulgaria. An exclusion criteria included: patients with cognitive damage and inability to self-complete the questionnaire.

Additionally, 12 medical experts with extensive experience in the care of patients with chronic disease completed an open ended questionnaire in which they listed items that have a significant impact on the quality of life of patients with NCD; the importance of each item was ranked on a five point scale where 1 was the least important and 5 was the most important. Interviews with 16 patients with chronic disease were carried out (two focus groups of eight patients each) which supplemented the list of items for the initial questionnaire. We constructed appropriate questions for each item identified for the questionnaire, and specified response options using five point scales, ranging from the worst (1) to the best (5) possible function. The final questionnaire included 54 items divided into several groups. The study was approved by the Research and Ethics Committee of the Medical University–Plovdiv. The study was in compliance with the Declaration of Helsinki. After informed consent was obtained, all participants were given the questionnaire and questions on socio-demographic information (age, sex, and ethnicity, level of education, employment status and marital status) and type of chronic disease.

Statistical analyses was performed using the SPSS 17.0 software (SPSS, Inc., Chicago, IL). Statistical significance was set at p value < 0.05 for the data analysis.

Results and Discussion
Of the 200 patients recruited, 97 agreed to participate, representing a response rate of 48.5%. Fifteen questionnaires were deleted because some data was missing. Among the 82 eligible respondents, 75.6 % were women. The mean age was 55.6 years old (range 25–95, standard deviation (SD) 16.9). The characteristics of the sample are shown in Table 1.

All patients had a confirmed diagnosis, according to the International Classification of Diseases (icd-10) and were liable to dispensary surveillance.

The most common chronic diseases in our study were cardiovascular diseases (CVD-ischemic heart disease, hypertension, etc.), followed by endocrinology diseases. This is consistent with the data that Bulgaria has the highest incidence and mortality of CVD in Europe (60% of all deaths in our country are the result of stroke and coronary heart disease) (Mateva & Nonchev, 2015; Finegold, Asaria & Francis, 2013).

In Bulgaria dispensary observation is a method for actively monitoring the dynamic impact on the health of pregnant women and patient groups especially with chronic diseases. This is a method of
active search, dynamic monitoring, diagnosis and rehabilitation, medical and social adaptation (Dimcheva & Mateva, 2015). The implementation of these health activities provides guaranteed access to each insured person a volume of preventive actions aimed at early detection of risk factors for developing the disease, early diagnosis of the disease and timely referral for treatment in order to prevent permanent damage or an unfavorable outcome. These activities are consistent with the objectives and priorities of the Bulgarian health policy implemented by the Ministry of Health aimed at improving the health status of the population and reducing morbidity and mortality by strengthening health promotion, and the primary and secondary prevention of diseases (Ministry of Health, promulgated in State Gazette number 106 of December 3, 2004; Levterova et al., 2013).

Table 1: Characteristics of the sample (n = 82)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Gender</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male, n (%)</td>
<td>Female, n (%)</td>
</tr>
<tr>
<td></td>
<td>20 (24.4%)</td>
<td>62 (75.6%)</td>
</tr>
<tr>
<td>Age (years)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
</tr>
<tr>
<td>Cardiovascular diseases, n (%)</td>
<td>56.3 (17.66)</td>
<td>55.39 (16.75)</td>
</tr>
<tr>
<td>Cancer, n (%)</td>
<td>13 (16%)</td>
<td>29 (35%)</td>
</tr>
<tr>
<td>Endocrinology diseases, n (%)</td>
<td>4 (5%)</td>
<td>15 (18%)</td>
</tr>
<tr>
<td>Respiratory diseases, n (%)</td>
<td>1 (1%)</td>
<td>5 (6%)</td>
</tr>
<tr>
<td>Other, n (%)</td>
<td>0 (0.00%)</td>
<td>10 (12%)</td>
</tr>
<tr>
<td>Employment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed, n (%)</td>
<td>10 (12%)</td>
<td>29 (35%)</td>
</tr>
<tr>
<td>Unemployed, n (%)</td>
<td>2 (2%)</td>
<td>3 (4%)</td>
</tr>
<tr>
<td>Retired, n (%)</td>
<td>8 (10%)</td>
<td>30 (37%)</td>
</tr>
<tr>
<td>Income</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very low, n (%)</td>
<td>11 (15%)</td>
<td>39 (48%)</td>
</tr>
<tr>
<td>Low, n (%)</td>
<td>1 (1%)</td>
<td>10 (12%)</td>
</tr>
<tr>
<td>Middle, n (%)</td>
<td>8 (10%)</td>
<td>8 (10%)</td>
</tr>
<tr>
<td>High, n (%)</td>
<td>0 (0.00%)</td>
<td>4 (4%)</td>
</tr>
</tbody>
</table>

Source: Authors

The original questionnaire is using the traditional five-Likert scale from "excellent" to "very bad" for "general health". Analysis of the responses showed that the majority of respondents accepted his/her condition as "good" - 55% (41) and 22% (16) as "bad". The distribution of answers by nosological groups is given in Figure 1.

Figure 1: The assessment of "general health" depending on chronic disease

Source: Authors
There were statistically significant differences in the assessments of "general health" in different groups of participants by gender ($\chi^2 = 16.65$, $P < 0.002$), age ($\chi^2 = 12.57$, $P < 0.05$) and social status ($\chi^2 = 28.54$, $P < 0.0001$).

The analysis of the data by using a questionnaire showed that age, gender, and social status are important factors affecting self-esteem "general health." This fact allows for the creating of a specific profile of patients and their needs using appropriate approaches to health education (Arnold et al., 2004).

The difference in quality of life between the sexes is well expressed in this study - female individuals have worse QoL. This is consistent with the reported gender differences in QoL in the general population and in studies involving patients with chronic diseases (Fayers & Machin, 2013).

**Conclusion**

There are a few studies on the Health-Related Quality Of Life of patients with chronic diseases in Bulgaria, which seriously limits the possibility of an objective assessment of the effectiveness of medical and medico-social assistance for these patients. Health-related quality of life is a measurable element and for quantifying of its objectification different scales may be used (Garratt et al., 2002; Bradley, 2001).

Subjective assessment of health is a factor that has a strong impact on the quality of life of patients and is an important component in evaluating the effectiveness of provided health care for patients with NCDs. Data reported by the patients is important for health professionals as feedback on the care. Patient-reported health assessments results offer a great potential for improving the quality and outcomes of health services.

Analysis of the results from the measurement of quality of life in patients with NCDs can be used to determine the priorities of health and social policies in these groups of people which could lead to better medical care and improve the quality of life in patients with NCDs. Integrated measurements of quality indicators will provide a comprehensive assessment of the management of NCDs. Introducing these innovations in health policies will improve health care and reduce the clinical and financial burden of these diseases.

**Acknowledgments**

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**Reference**


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SID: EPIDEMIOLOGY, INFANT PHYSIOLOGY AND SALIVA ASPIRATION

Sigitas Chmieliauskas1,2, Sigitas Laima1,2, Karolina Ginčienė1,2, Gerda Andriuškevičiūtė2, Meda Sutkevičiūtė1, Monika Stančiukaitė1, Jurgita Stasiūnienė1, Algimantas Jusulaitis1

Abstract: A sudden infant death syndrome (SIDS) is diagnosed in the case of a sudden and unexpected death of an infant during sleep and where an autopsy shows no obvious pathological lesions or injuries. Although literature indicates a wide range of risk factors, there is no single opinion on the specific cause of SIDS. This paper describes a study of 191 infant deaths in which the State Forensic Medicine Service established 29 SIDS cases. Microscopical and histological results of samples taken from sections of the respiratory system reveal serous fluid in the alveoli and change specific to asphyxia in all autopsy cases of infants diagnosed with SIDS. The risk of SIDS is highest in infants aged 1–4 months. Salivary gland secretion increases with the development of infant physiology, and this increase coincides with infant teething. However, in this phase, an infant’s swallowing reflex is still to form completely. Findings suggest that the serous fluid found in the alveoli was from the salivary glands, and thus, saliva aspiration may be associated with infant deaths due to SIDS.

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Keywords: SIDS, salivation, asphyxia, sudden death

Introduction

Sudden infant death syndrome (SIDS) is a postmortem diagnosis for an infant, usually less than a year old, who dies suddenly and unexpectedly of natural causes during sleep with the reason indeterminable by an autopsy (Gilbert-Barness & Debich-Spicer, 2005). In the USA, the incidence of SIDS reaches 1.2 birth cases, but overall, it ranges from 0.046 to 6.7 cases per 1000 births (Sharma, 2007). About 90–95% of SIDS deaths occur in infants under six months of age, but according to different sources, the highest mortality peak is between 1–4 months (Janette & Marshall Haith, 2009; Moon, Darnall, Goodstein, & Hauck, 2011). In most cases, death occurs between midnight and 9 am. (Gilbert-Barness & Debich-Spicer, 2005). Epidemiological studies have shown that SIDS cases increase during the winter months and they occur in male infants more often. According to the statistics, SIDS befalls more frequently on infants of a lower socioeconomic status, with young and unmarried women of poorer education, and on infants whose mothers took drugs before and during pregnancy. The risk of SIDS increases with prone sleeping position, bed sharing, hyperthermia, and hypothermia (Sharma, 2007).

Data and Methodology

In the period of 1995–2015, the State Forensic Medicine Service (SFMS) studied cases of deaths among children under 2-years old. The sample number was 191 with 15% (n = 29) diagnosed with sudden infant death syndrome, acute respiratory and cardiac disorder, and unspecified acute cardiac disorder. The Shapiro-Wilk normality test was used based on the data distribution according to the normality law. A 95% confidence interval and a significance level (p-values) of 0.05 were chosen. Samples to determine levels of ethyl alcohol were collected from all infants and for drugs, psychotropic agents, and other highly active substances from 59% of infants.

Infant sleeping positions were examined to identify the various SIDS risk factors and prevention models.

Results and Discussion

In the studied cases, 14% (n = 27) of the reported deaths due to SIDS occurred in hospital (Figure 1) with the majority 83% (n = 158) occurring at home (Figure 1). Overall, 52% of the studied SIDS cases were male infants, and 48% were female (Figure 2).

The youngest infant diagnosed with sudden infant death syndrome was a 1-day old child and the oldest 2-years old. The median age was two months, with the mean 3.9 ± 5.7 months (p < 0.005; Figure 3).

1Faculty of Medicine, Vilnius University Lithuania.
2State Forensic Medicine Service, Vilnius, Lithuania.
E-mails: sigitas.chmieliauskas@mf.vu.lt, sigitaslima@gmail.com, karolina.ginciene@gmail.com, andrgerda@yahoo.com, meda.sut@gmail.com, monika.stanciukaite@gmail.com, jurgita.stasuniene@yahoo.com, algimantas.jusulaitis@mf.vu.lt
The tests to determine the level of ethyl alcohol and other substances in samples showed negative results in all cases. The autopsies revealed traces of a foamy, pink liquid at the bifurcation of the trachea. Histological examination showed a mucous secretion present at places in the larger bronchi with eosinophilic masses (in parts with a yellowish-brown color) and extra mucus and desquamated bronchial epithelial cells in bronchial lumens. The lungs were of average elasticity, full-blooded, swollen, with uneven tissue airiness and focal swelling of hyaline membranes in several alveoli. Other findings included a bronchial epithelial desquamation in the lumen at places, serous fluid with little erythrocyte addition in the alveoli, and minor focal intra-alveoli swelling. Such an image dominates among cases of SIDS. A similar representation was observed in the infants who had died from asphyxia due to blockage of the airways (nose and mouth) and compression around the neck.

**Figure 1:** The location of the reported deaths of infants who died from SIDS ($n = 191$)

![Figure 1](image1.png)

Source: Authors

**Figure 2:** Distribution by gender of infants, who died from SIDS ($n = 191$)

![Figure 2](image2.png)

Source: Authors

**Figure 3:** Distribution by months of infants, died from SIDS ($n = 191$)

![Figure 3](image3.png)

Source: Authors
The Postmortem Examination

Although this topic is widely analyzed in the literature, and great deals of potential risk factors are provided, the findings of this study were inconclusive in determining the cause of SIDS. However, based on the literature data and the findings of the micromorphological and macromorphological examinations carried out by the State Forensic Medicine Service on respiratory system samples taken from the study cases, the cause of SIDS may relate to saliva aspiration. Especially, the excretion of saliva starts at about six weeks and increases with teething, coinciding with the age observed for most of the infant deaths attributed to SIDS, i.e., one to four months (Figure 3).

Infant Teething and Salivation

Infant teething starts around the age of 3–4 months (Castiglia, 1992; American Academy of Pediatrics, 2013). The study of Memarpour, Soltanimehr, and Eskandaria (2015) analyzed the most common symptoms that occur at the beginning of teething. The study, which included 254 children, found that the most common symptoms include salivation (92%), sleeping disorders (82.3%), and irritability (75.6%; Memarpour, Soltanimehr, & Eskandarian, 2015). During the first months, infant salivary glands secrete a small amount of saliva. Salivary gland secretion begins to increase from about six weeks (Nicory, 1922). There are three major pairs of salivary glands (parotid, submaxillary, and sublingual salivary glands) and about 700–1000 small salivary glands, which are located in the oral cavity and pharynx. All salivary glands begin to develop between 6-10 weeks of embryogenesis. The amount of all glandular secretion is about 0.3–0.5 ml min⁻¹, and at maximum stimulation, this quantity can reach 1.5 ml min⁻¹ (Heinrich & Johannes, 2014). Parotid salivary gland secretion accounts for 20–25% of the total saliva amount; submaxillary salivary glands, 65–70%; and sublingual and small salivary gland secretion, 5% each (Ekberg, 2012; Leung & Pion Kao, 1999).

Examination of salivary gland excretion has revealed that higher excretion occurs in the afternoon than in the morning (Ekberg, 2012). In addition, Ekberg (2012) observed more saliva being released in winter than in the summer. Salivation can occur not only because of salivary hypersecretion, swallowing disorders, but also because of teething, central nervous system disorders, mental retardation, gastroesophageal reflux, drugs administered, and congenital genetic diseases. Small salivation is a relatively frequent phenomenon for infants and is considered normal until 18–24 months (Lakraj, Narges, & Bahman, 2013). As infants’ mouths are often open, their front teeth not yet fully grown, and a well-balanced swallowing reflex yet to form a little later, an elevated salivation in infants is common and is particularly striking in 5- to 6-month-old children (Leung & Pion Kao, 1999). Only 18- to 24-month-old children learn to swallow with lip closure (Arvedson, 2006).

Swallowing

Despite the swallowing reflex forming in the fetus during the fourth month of prenatal development, the central nervous system does not develop until after birth, with mutual relations of the cortex and lower centers developing until the child is about one-year old (Rodier, 1994). The cortex begins to dominate in the central nervous system at about the fourth month of life when the conditional reflexes begin to form. One such reflex is mature swallowing (Campbell, 1971), which consists of a conscious oral-preparatory phase, i.e., conscious oral, pharyngeal, and esophageal phases. Infant swallowing does not involve conscious oral or oral-preparatory phases, and thus, infant swallowing of liquids differs from adult swallowing (Stevenson & Allaire, 1991). This development of conditional reflexes protects an infant from choking and aspiration on saliva. During the period when an infant’s liquid swallowing reflex is not sufficiently formed and salivary excretion is elevated, the risk of SIDS is the greatest.

Infant Aspiration and Laryngospasm

While an infant is sleeping, the non-swallowed saliva accumulates in the mouth which it can potentially leak into the respiratory tract and cause choking, aspiration, and laryngospasm. Dysphagia is a common cause of infant aspiration. Aspiration can be caused by stomach content regurgitation, a foreign body, or saliva entering the respiratory tracts. The aspiration of a large amount of substance into the lungs (macroaspiration) can cause a mechanical obstruction or aspirational pneumonitis, which provokes a severe hypoxia. Microaspiration irritates the upper respiratory tract and can trigger a reflex action that induces laryngospasm or bronchospasm (Mohan, 2002). Infants are characterized by an autonomic imbalance and increased parasympathetic activity in the larynx. Therefore,
laryngospasm is more common among infants than adults (Campbell, 1971). Glottis closure is a protective respiratory tract reflex which occurs after contraction of internal laryngeal muscles to avoid aspiration (Ikari & Sasaki, 1980; Gavel & Walker, 2014). In the case of increased salivation, a sleeping infant with a partly formed swallowing reflex will have saliva entering the respiratory tract. The irritation of the vagus nerve receptors located around larynx could trigger a reflex action where the inner laryngeal muscles would contract and initiate laryngospasm causing asphyxia.

**Infant Sleeping Positions**

Various authors unanimously agree that the risk of SIDS is highest when an infant is placed in bed in a prone position (Moon & Fu, 2012; Scragg & Mitchell, 1998; Oyen, N., Markstad, T., Skaerven, R., Irgens, L. M., Helweg-Larsen, K., Alm, B. B., et al., 1997). Research suggests that sleeping in a prone position causes the autonomic cardiovascular system control to change, especially in infants of two-three months of age, and limit brain oxygenation (Moon & Fu, 2012). Lying in the prone position causes the respiratory tract to compress; making it difficult to breathe and apnea develops (Scragg & Mitchell, 1998). In 1999, the study examined laryngeal chemoreflex, which is a protective respiratory tract reflex. The study revealed that during sleep an infant lying in the prone position breathes and swallows less frequently than when lying on the back (Jeffery, Megevand, & Page, 1999). In addition, after salivation increases saliva enters the nostrils of an infant lying in the prone position, which triggers a diving reflex that induces apnea, bradycardia, and arrhythmias (Campbell, 1971). Given these reasons, infants should not be laid in the prone position, but whether sleeping on the back or the side is safer remains unknown. Many authors argue that a child placed in the side position can easily turn to the prone position (Scragg & Mitchell, 1998) and believe that the position of laying on the back has the lowest risk for developing SIDS. Despite the position of sleeping on the side not being as safe as sleeping on the back, the risk of SIDS is deemed significantly lower in this position than in the prone position. Also, where an infant is laid on the side, caregivers should ensure that the child’s hand is stretched out in a forward position to reduce the probability of an infant rolling into the prone position (American Academy of Pediatrics, 2005).

**Conclusion**

Information in the literature and results of microscopical and histological respiratory system investigations of infants who died of sudden infant death syndrome indicate traces of serous fluid found in the lungs of the study cases to be salivary gland secretion, i.e., saliva, which has entered the lungs during the infant’s sleep. Possibly, incomplete development of the swallowing reflex and increased salivation contributes to sudden death by asphyxia. However, accepting this theory requires additional research. For example, in the case of a sudden infant death of a sleeping baby, a histological examination of the respiratory system during autopsy is recommended. After detection of serous fluid, a saliva S-amylase qualitative analysis (S-AMYL) would confirm whether this fluid is a salivary gland secretion, which could lead to an infant’s asphyxia.

**References:**


MICROcirculatory Disorders in Women with Polycystic ovary syndrome

Daniela Koleva,1 Mariana Batzelova,2 Julia Nikolova,3 Maria Orbetzova4

Abstract: It is believed that microvascular dysfunction plays a major role in the development of insulin resistance (IR). Performing nailfold capillaroscopy with evaluation of microvascular parameters in women with polycystic ovary syndrome (PCOS) would undoubtedly be helpful for the investigation of novel pathophysiological mechanisms in IR occurrence. The aim of the present study was to compare the values of microvascular parameters between PCOS patients and clinically healthy women and to assess its relationship with clinical and metabolic parameters in the PCOS women. Our study included 21 PCOS patients and 22 clinically healthy women (controls). Nailfold capillaroscopy was conducted and the following parameters were assessed: arterial limb diameter (d art), venous limb diameter (d ven), top diameter of loops (top d), length of loops, d art/d ven ratio, d ven/d art ratio, number of capillary loops (n cap), number of abnormal loops (% abn cap) and a presence of perivascular diapedesis. Weight, height, fasting plasma glucose (FPG), immunoreactive insulin (IRI), lipid parameters, total testosterone, systolic (SBP) and diastolic blood pressure (DBP) were measured in the PCOS women. Body mass index (BMI) and homeostasis model of insulin resistance index (HOMA-IR) were calculated. We found significantly higher values of age, BMI and % abn cap in the women with PCOS as compared to the controls. Interestingly, % abn cap showed a negative correlation with age. Furthermore, an inverse association between top d and the values of SBP and DBP was established. We determined a positive correlation between the presence of perivascular diapedesis and the values of FPG, HOMA-IR and testosterone. As a conclusion, the higher % abn cap in the PCOS women might be an early pathophysiological sign of microvascular dysfunction. The positive correlation between perivascular diapedesis and the degree of IR, hyperglycemia, and hyperandrogenemia shows the existence of a chronic low-grade inflammatory process in PCOS.

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Keywords: capillaroscopy, microvascular dysfunction, insulin resistance

Introduction

Polycystic ovary syndrome (PCOS) is a condition that represents a specific prototype of metabolic syndrome (MS) among women at reproductive age. Patients with PCOS are characterized by typical clinical features of hyperandrogenemia and their metabolic status often includes android type of obesity, glucose tolerance disturbances, atherogenic dyslipidemia, and hypertension. Several studies have shown that PCOS women have a greater risk of developing type 2 diabetes mellitus (TDM2) as well as a low-grade chronic inflammatory process leading to endothelial dysfunction and coagulation and/or fibrinolysis abnormalities (Teede et al., 2010; Koleva et al., 2016). It is known that microcirculation consists of terminal arterioles, capillaries, and venules. The main functions of the microcirculation are: 1) to accomplish the exchange of nutrients, oxygen, and hormones between plasma and tissue fluid; 2) to minimize the fluctuations in the hydrostatic pressure at the level of capillaries; 3) to adjust the peripheral vascular resistance, respectively the blood pressure (Muris et al., 2013). Certainly, the maintenance of normal microvascular function is important for the regulation of tissue homeostasis and arterial blood pressure (Levy et al., 2001). It has been found that microvascular dysfunction might cause disrupted glucose tissue utilization (Clark et al., 2003; Serne et al., 2001; Wallis et al., 2002) and peripheral vascular resistance (Antonios et al., 1999), resulting in the development of IR and arterial hypertension (AH). It is believed that microvascular dysfunction might be a possible cause for the occurrence of metabolic disorders in individuals with obesity and insulin resistance syndromes. Undoubtedly, there is a deficiency of data concerning microcirculatory characteristics in women with PCOS. This was the reason for us to conduct a study which aimed to compare the values of microvascular parameters between women with PCOS (a representative model of IR syndrome) and clinically healthy women and to assess its relationship with clinical and metabolic parameters in the PCOS women.

1 St. George’s University Hospital, Clinic of Endocrinology and metabolic diseases, nelka_medicine@abv.bg
2 Medical University of Plovdiv, Bulgaria, marali@abv.bg
3 Medical University of Plovdiv, Bulgaria, junikol@yahoo.com
4 St. George’s University Hospital, Clinic of Endocrinology and metabolic diseases, morbetzova@abv.bg
Materials and methods
The present study was conducted in the Clinic of Endocrinology and Metabolic Diseases at “St. George” University Hospital, Plovdiv. It comprised of 21 young PCOS women (mean age 25.7±4.08 years and mean BMI 30.78±8.08 kg/m²) and 22 clinically healthy women (mean age of 21.9±4.10 years and mean BMI 23.9±6.10 kg/m²), serving as a control group.
Nailfold capillaroscopy using capillaroscope model JH1005, PRC was conducted in the Department of Physiology at Medical University of Plovdiv. Each woman was examined after 20 minutes rest in a room with normal temperature (20-22°C). Visualization of the capillaries was realized after placing a drop of cedar oil on the nailfold of the fourth finger of the patient’s both hands. The following microvascular parameters were investigated: arterial limb diameter (d art) µm, venous limb diameter (d ven) µm, top diameter of loops (top d) µm, length of loops µm, d art/d ven ratio, d ven/d art ratio, number of capillary loops (n cap), number of abnormal loops (% abn cap) and a presence of perivascular diapedesis.
In all the PCOS women the following measurements and laboratory tests were performed: weight, height, fasting plasma glucose (FPG), fasting immunoreactive insulin (IRI), total cholesterol (TC), HDL-cholesterol (HDL-C), triglycerides (TG), total testosterone, systolic (SBP) and diastolic blood pressure (DBP). Venous blood samples were taken after a 12-hour overnight fast and were sent to Central Clinic Laboratory at "St. George “University Hospital.
Insulin was tested using a commercial kit for quantitative determination of immunoreactive insulin on the basis of microparticulate immunoenzyme analysis (MEIA) on an AxSYM system (ABBOTT, USA) with the following characteristics: sensitivity ≤ 0.8 mIU/ml; inter-assay variation, CV% < 2.9; intra-assay variation CV%<5.3. Serum glucose levels were determined by a standard GOD-POD method. TC was determined by ChOD, PAP; TG by GPO, PAP, and HDL-C by MgSO4-dextran SO4 precipitation, Schneiders Analysers; Netherlands test; Delta Kone Autoanalyzer.
Systemic blood pressure (SBP and DBP) was measured using a sphygmomanometer. The diagnosis of PCOS was made according to the Rotterdam criteria (Rotterdam ESHRE/ASRM-Sponsored 2003), when the two of the following three features were present: oligo- and/or anovulation, clinical and/or biochemical signs of hyperandrogenism, and polycystic ovaries on ultrasound examination (the presence of ≥ 12 follicles measuring 2-9 mm in diameter and/or ovarian volume > 10 cm³).
The statistical analysis was performed by SPSS version 21.0 for Windows. A comparative analysis of clinical, anthropometric and microcirculatory parameters was performed among the studied groups of women. The results are presented as mean±SD. Pearson (r) and Spearman (rho) correlation coefficients for assessing correlations among the parameters were used.

Results
Table I presents clinical, anthropometric and microcirculatory characteristics in the studied groups of women.
Interestingly, % abn cap showed a negative correlation with age (r= -0.567, P=0.043). Furthermore, an inverse association between top d and the values of SBP (r= -0.610, P=0.017) and DBP (r= -0.581, P=0.037) was established.
We determined a positive correlation between the presence of perivascular diapedesis and the values of FPG, HOMA-IR and testosterone (Table 2).

Discussion
Our results showed a higher percentage of abnormal capillary loops (elongated capillaries, increased tortuosity) in PCOS women compared to that in the clinically healthy women. A presence of perivascular diapedesis was found in 22.2 % of the PCOS women. A positive correlation between perivascular diapedesis and the values of FPG, HOMA-IR, and testosterone was determined.
Leukocyte extravasation, also known as diapedesis, is the process of leukocytes movement out of the circulatory system towards the locus of tissue damage or inflammation. Leukocyte extravasation is most commonly observed in post-capillary venules, where haemodynamic shear forces are minimized. This process consists of several steps, namely: 1. chemotraction; 2. rolling adhesion; 3. tight adhesion and 4. endothelial transmigration. Apart from an acute inflammatory disease, leukocyte
extravasation might be perceived as a sign of chronic low-grade inflammation (Anderson and Anderson, 1976).

Table 1: Clinical and microcirculatory characteristics of the studied groups of women

<table>
<thead>
<tr>
<th>PARAMETERS</th>
<th>PCOS n=21</th>
<th>CONTROLS n=22</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>25.7±4.08</td>
<td>21.9±4.10 **</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>30.78±8.08</td>
<td>23.9±6.10 ***</td>
</tr>
<tr>
<td>d art (µm)</td>
<td>9.28±3.06</td>
<td>9.09±1.57 NS</td>
</tr>
<tr>
<td>d ven (µm)</td>
<td>13.61±4.06</td>
<td>12.14±2.08 NS</td>
</tr>
<tr>
<td>top d (µm)</td>
<td>18.50±7.70</td>
<td>17.82±5.16 NS</td>
</tr>
<tr>
<td>length (µm)</td>
<td>224.67±94.49</td>
<td>224.55±69.94 NS</td>
</tr>
<tr>
<td>d art/ d ven</td>
<td>0.69±0.14</td>
<td>0.77±0.18 NS</td>
</tr>
<tr>
<td>d ven/ d art</td>
<td>1.51±0.33</td>
<td>1.38±0.36 NS</td>
</tr>
<tr>
<td>n cap/mm</td>
<td>10.58±1.87</td>
<td>9.79±1.96 NS</td>
</tr>
<tr>
<td>abnorm cap %</td>
<td>31.82±22.96</td>
<td>10.23±10.85 *</td>
</tr>
<tr>
<td>SBP (mmHg)</td>
<td>124.33±14.39</td>
<td>130.23±10.32 NS</td>
</tr>
<tr>
<td>DBP (mmHg)</td>
<td>79.87±4.27</td>
<td>78.18±7.44 NS</td>
</tr>
</tbody>
</table>

NS – lack of significant difference, P>0.05
* - presence of significant difference, P<0.05
** - presence of significant difference, P<0.01
*** - presence of significant difference, P<0.001

Source: Authors

Table 2: Correlations (rho) between the presence of perivascular diapedesis and the values of FPG, HOMA-IR and total testosterone

<table>
<thead>
<tr>
<th>PARAMETERS</th>
<th>Perivascular diapedesis rho</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>FPG (mmol/l)</td>
<td>0.588</td>
<td>P=0.027</td>
</tr>
<tr>
<td>HOMA-IR</td>
<td>0.581</td>
<td>P=0.029</td>
</tr>
<tr>
<td>TESTOSTERONE (ng/ml)</td>
<td>0.578</td>
<td>P=0.039</td>
</tr>
</tbody>
</table>

Source: Authors

Our results showed the existence of an inverse relationship between the top d and the values of SBP and DBP. This correlation may explain the pathophysiological mechanism of the development of arterial hypertension.

In general, arterial hypertension is characterized by both functional and structural microvascular changes. First, the mechanisms regulating vasomotor tone are considered to be abnormal, leading to enhanced vasoconstriction or reduced vasodilatation. Second, decreases in arteriolar diameters and increases in the wall-to-lumen ratio of small arteries have been demonstrated (Levy et al., 2001; Houben et al., 1995). Furthermore, a reduction in the density (rarefaction) of arterioles, venules, and capillaries can be observed in different vascular beds (Houben et al., 2005).

Endothelial dysfunction in hypertensive patients might be explained by the presence of suppressed vasodilator response and altered capillary activation under the influence of endothelium-dependent typical vasodilators (acetylcholine) as well as shear stress itself (Serne et al., 2001). Recently, several researchers in this field have described the occurrence of a disrupted insulin-mediated NO-dependent vasodilation in various models of hypertensive animals (Debbabi et al., 2006; Eringa et al., 2004). In addition, hypertension is characterized by a parallel increase in the production of the biological constrictive agents such as endothelin-1 (ET-1) and angiotensin II (Ang II) (Li et al., 2010).

Microvascular dysfunction may be secondary – due to permanently increased levels of blood pressure (Serne et al., 2002), as well as primary - representing a cause, not a consequence of hypertension. Microvascular disturbances may occur at a very early stage in the development of hypertension. Changes in the capillaries (similar to those described in the already established hypertension) can also
be observed in patients with prehypertension or in normotensive individuals with a familial predisposition to the development of hypertension (de Jongh et al., 2004).

Pazos-Moura et al. (1990) conducted a study including 15 healthy individuals and 16 patients with TDM2 (a model of insulin resistance syndrome). Direct intravital microscopic examination of nailfold capillaries was performed in all the studied subjects. The results showed an increased number of enlarged capillaries in the TDM2 patients as compared to the controls. Besides, capillaries with nodular apical elongations were found only in the TDM2 group. In addition, capillary blood flow velocity (CBFV) was measured during rest and after the release of 60 s arterial occlusion. In order to assess the autoregulatory capacity the investigators determined peak CBFV after occlusion and time to reach it in single capillaries. The values of mean resting CBFV were not statistically different in the two groups but mean peak CBFV post occlusion was found to be significantly lower (controls: 1.49±0.14 mm/s; T2DM: 0.93±0.13 mm/s, P<0.05) and mean time to reach it significantly prolonged (controls: 8.9±0.6 s; T2DM: 18.0±1.9 s, P<0.05) in the diabetics compared to the controls.

In a study of Kraemer-Aguir et al (2008) 36 subjects with MS (National Cholesterol Education Program-Adult Treatment Panel III criteria) (10 men/26 women, 38.8±7.9 years, 35.8±4.9 kg/m²) with normal glucose tolerance (American Diabetes Association criteria) and 16 controls (11 men/5 women, 33.6±8.4 years, 23.9±3.6 kg/m²) were studied using nailfold videocapillaroscopy. Afferent, efferent, and apical capillary diameters; functional capillary density; red blood cell velocity (RBCV) at baseline; and RBCV (max) and time to reach it during postocclusive reactive hyperemia after 1-minute arterial occlusion were measured. Subjects with MS had smaller afferent, efferent, and apical diameters (4.2 [3.8-4.2] vs 5.6 [4.65-6.25] mum, P<0.001; 4.8 [4.2-4.8] vs 6.2 [5.6-7] mum, P<0.001; and 5.2 [4.8-5.55] vs 7.4 [6.2-8] mum, P<0.001); lower functional capillary density (7.28 [6.37-9.10] vs 10.4 [9.1-11.8] capillaries per square millimeter, P<0.001), RBCV (0.62 [0.57-0.65] vs 0.79 [0.76-0.89] mm/s, P<0.001), and RBCV(max) (1.14 [1.12-1.21] vs 1.57 [1.45-1.62] mm/s, P<0.001); and longer TRBCV(max) (10.0 [10-11] vs 4.5 [4-6] s, P<0.001) compared with controls. Tha data show that microcirculatory dysfunction was associated with BMI.

A study of Lakhani et al. (2005) aimed to assess microvascular function in 12 PCOS women and 12 age-matched controls. The investigators conducted observation of forearm skin microvascular erythrocyte flux responses to cumulative doses of 1% acetylcholine (Ach) and 1% sodium nitroprusside (SNP), using laser Doppler imaging. Basal microvascular perfusion was found to be comparable in the two groups of women. However, the increase of skin microvascular perfusion in response to Ach was blunted in the PCOS women (P=0.018). Furthermore, peak Ach-induced erythrocyte flux was less in the PCOS patients (125.1±21.7) than in the controls (200.8±28.5). Additional covariance analysis determined that the aforementioned effect was unrelated to differences in BMI or serum testosterone, but IRI might be a weak confounder. As far as the response to SNP was concerned, no differences were found between the PCOS and the control groups. The authors concluded that the study was the first demonstration of the presence of microvascular endothelial dysfunction (an inhibited vasodilatory response to Ach) in women with PCOS.

Hyperandrogenemia is a typical endocrine feature of PCOS. It had been proved that testosterone could influence vasocontractile responses impairing endothelium-dependent relaxation (Adams et al., 1995; Hutchinson et al., 1997) in hypercholesterolaemic rabbits and monkeys. However, more recent studies have suggested that the vascular effects of testosterone might be more complex. It was found that acute exposure even to low doses of testosterone might significantly potentiate endothelin-1-induced vasoconstriction in porcine coronary artery rings (Teoh et al., 2000). This effect was insensitive to flutamide (an androgen receptor antagonist) and was not blocked by de novo protein synthesis inhibitors, suggesting that it was not mediated via the classical androgen receptor influence on gene transcription. Nevertheless, this fact does not detract from the possibility that the diminished ACh-induced microvascular perfusion response seen in the aforementioned study of Lakhani et al. (2005) resulted, at least in part, from the elevated levels of androgens in women with PCOS. ANCOVA was used to test the effect of testosterone on the difference in ACh-induced erythrocyte flux between the control and PCOS groups. The testosterone-adjusted erythrocyte flux difference remained significant, suggesting that the effect of PCOS on ACh-induced microvascular blood flow was not related to differences in serum testosterone between the controls and the PCOS women.
We may suggest that microvascular dysfunction in women with PCOS can be explained primarily with the accompanying obesity, not with the presence of hyperandrogenemia in PCOS, which was confirmed by the study of Ketel et al. (2008).

**Conclusion**

The higher % abn cap in the PCOS women might be an early pathophysiological sign of microvascular dysfunction. The positive correlation between perivascular dialedasis and the degree of IR, hyperglycemia, and hyperandrogenemia shows the existence of a chronic low-grade inflammatory process in PCOS.

**References**


COMMUNICATION BETWEEN NURSES AND DEAF PEOPLE IN HEALTH INSTITUTIONS

Marija Ljubičić,1 Sanda Zubcic,2 Sonja Sare3

Abstract:
Introduction: Upon arrival into a health institution, a deaf person is exposed to a higher stress level. They are at risk of receiving inadequate health care and health-related information due to limitations in communication between the deaf person and the health care workers. Despite the awareness of the presence of communication difficulties, research about the ways of communication between nurses and deaf people hasn’t been sufficiently presented. This article focuses on the ways in which nurses and deaf people communicate, the difficulties in communication arising from that; emotional reactions and nurses’ interest in the manual alphabet and sign language, and the perception about the need for an interpreter of sign language in a health institution.

Objectives: The primary objective of this cross-sectional study is to examine the difficulties in communication upon a deaf person’s arrival into a health institution.

Methods: The original paper-and-pencil questionnaire for nurses includes questions about the communication problems upon the arrival of deaf people into health institutions. Differences between study variables were assessed for significance using the Mann-Whitney U test and Kruskal-Wallis test. The associations between variables were explored using Spearman rank correlation coefficients.

Results: The results show that 65% of the nurses think that the communication problem is strongly pronounced as the problem is the inability of deaf people to respond when called (65%) and difficulties in understanding (40%). The interest of nurses for problems of deaf people affects the manifestation of difficulties and the understanding of messages. The most frequent way of communication is showing (95.1%) and writing (62.5%). There is no significant difference in relation to age ($p=0.103$, sex ($p=0.473$), level of education ($p=0.901$) and the length of service ($p=0.062$).

Conclusion: The obtained results show how pronounced the communication difficulties between nurses and deaf people are. An interpreter in a health institution is necessary for effective communication. There is a high priority need for quality education of nurses about the ways of communicating with deaf people.

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Keywords: deaf people, nurses, communication, health institution

Introduction
Hearing impairment is the most common sensory disorder (Adib-Hajbaghery & Rezaei-Shahsavaro, 2015; Bennion & Forshaw, 2013). The term “hearing impairment” or “hearing loss” means loss of function of varying intensity to all parts of the ear and the auditory pathway (Ljubičić, 2014). This impairment is the result of an illness or an injury ear canal and drum, middle ear, inner ear or of any localization of hearing aids. Because of limitations or barriers, people can be disabled in performing daily activities that are considered normal. (Mattjus, 2012). Depending on age, the level of development and the acquisition of speech, we can divide people with hearing impairment into prelingually and post-lingually deaf people (Ljubičić, 2014).

Communication problems are the most evident problems of these people. Due to difficulties in communication and the inadequate support of the environment, deaf people can feel excluded from the environment they live in (Hersh, 2013). Disrupted social interaction and social isolation are very common due to the feeling of discomfort of people because they believe that they have heard something wrong or to have talked about a wrong topic. The person can have emotional difficulties, be suspicious, frustrated, and angry due to the inability to hear (Ljubičić, 2014).

Upon arrival into a health institution, a deaf person is exposed to a higher stress level. They are at risk of receiving inadequate health care and health-related information because of limitations of communication between the deaf person and the health care workers (Chowdhry, Padhi, Mohanty, & Biswal, 2016). Both, deaf persons and nurses face problems with information transfer, and the dissatisfaction of the deaf people and their family members. This results in different emotional reactions for deaf people and for nurses. The impossibility to hear a message, to respond, the lack of understanding of the staff, and numerous other problems can intensify communication problems and

1 University of Zadar, General Hospital Zadar, Croatia, marija.ljubicic.zadar@gmail.com
2 General Hospital Zadar, Intensive Coronary Care Unit, Zadar, Croatia, sanda.culina@gmail.com
3 University of Zadar, Medical School Ante Kuzmanica, Croatia, sonja.sare@gmail.com
increase the sense of social isolation (Ljubičić, 2014). Also, the nurses encounter difficulties since there are sometimes different distracting factors that interfere with the communication process. The limited ability of deaf people to communicate and the not-providing of appropriate feedback from the nurse can negatively affect the active cooperation of the deaf person and the successful implementation of health care (Hornakova & Hudakova, 2013).

There are four different ways of communication for deaf people: writing, lip reading, the manual alphabet, and sign language. (Ljubičić, 2014). A successful transfer of messages to deaf people depends on the methods of communication of the nurses. Most deaf people use lip-reading, speech or writing. Deaf people, who use writing, ask the nurse to write down the question, as well as to explain the orders they have received in writing (Ljubičić, 2014).

The effective communication between nurses and deaf persons is an essential element of nursing care, yet nursing education in how to communicate with deaf people is insufficient. The current nurse education in this field is mostly informative, which doesn't contribute to the development of competencies that are necessary for everyday practice. Nurses often communicate inappropriately, and lack the knowledge and skills to understand the communication needs of deaf person (Dickson & Magovan, 2014). It is possible to look for reasons in the non-everyday need, the insufficient connection between theory and practice, but also in the insufficient sensitivity rising not only in general, but also in the scientific community for the needs of deaf people.

In order to minimize communication problems on both sides, it is necessary to elaborate in detail educational programs for nurses, with the emphasis on communication with deaf people. This is primarily important because the nurses are in a continuous contact with deaf people upon their arrival to a health institution and they can help to assure that deaf people receive proper quality care. Using good communication, nurses can provide effective health care for deaf people. (Newton & Shah, 2013).

Despite the knowledge of the presence of communication difficulties, the research about the ways of communication between nurses and deaf people is not sufficiently presented. Also, even less presented are studies of the factors that complicate and/or don't allow for effective information transfer. Although practical experiences confirm the described issues, there is only a small amount of research to agree with this notion.

The aim of this study is to examine the frequency of encounters of nurses with deaf people; the ways of communication between nurses and deaf people, the difficulties in communication; emotional reaction and interest of nurses for the manual alphabet and sign language, as well as the perception of the need for an interpreter of sign language in a health institution.

Methods

Design and instrument

This is a cross-sectional study. The original paper-and-pencil questionnaire includes 30 items in total, divided into the before-mentioned groups related to communication and 4 particles of general data. The general data has been collected by entering the numeric value (age and the length of working experience of the respondents and by circling the offered answers (sex and the level of education). In specific data, the respondents indicated their level of agreement with statements using a Likert scale from 1 (completely disagree) to 5 (completely agree). We asked nurses about the ways and difficulties in the communication with deaf people (inability of deaf people to respond when called, understanding instructions and messages, and the lack of visible signs for deaf persons); emotional reactions of nurses when encountering the problem in communication such as concern, inconvenience, insecurity and anger. The statements include ways of communication with deaf people: showing, writing, speech, and the perception about the manual alphabet, sign language and an interpreter in the institution. This study was approved by the Human Research Ethics Committee General Hospital. Before filling out the survey, subjects were told about the purpose of the study; they were assured that the study was voluntary and that their responses would remain anonymous. Upon providing consent, subjects filled out the survey in individual cubicles to ensure privacy.
Participants
The participants were 40 licensed nurses from 4 medical departments in one hospital in Croatia. Most of the participants were female (95%), and 5% were male. The average age of the respondents was 36.9 (SD=8.59; 95%CI=34.13-39.62) years, the age range varied from 24 to 62 years. The average length of service is 16.3 (SD±8.56; 95%CI=13.38-18.86) years; the range was from 3 to 42 years. The level of education attained was high school for 80% for the nurses and university for 20%.

Data analysis
The collected information has been processed with the MedCalc Statistical Software version 14.8.1 (Ostend, Belgium; 2014). The descriptive statistics include the distribution of frequencies, measures of central tendency and dispersion of results. The differences between variables were assessed using the Mann-Whitney U test and Kruskal-Wallis test. The associations between variables were explored using Spearman rank correlation coefficients. In the mentioned processing, values p<0.05 have been considered as statistically significant.

Results
In the analysis of the frequency of encounters of nurses and deaf people, the nurses declare that they are not often able to communicate with a deaf person in 62.5% of all answers, 20% can't assess it and 17.5% of them often communicate with deaf people. The encounters of nurses with deaf people is does not occur often (M=2.28; SD=1.06; 95%CI=1.94-2.61).

In the analysis which age group has the most encounters with deaf people, it can be noticed that it is mostly nurses with 6 to 10 years working experience, but the obtained difference in ranking of higher values is random, a statistically significant difference (p=0.210) hasn't been established.

There is no significant difference in age (p=0.232), sex (p=0.400) and level of education (p=0.561). Even 27.5% nurses are unable to immediately estimate that a person has a hearing impairment, 25% cannot assess it and 47.5% can immediately assess that a person has a hearing impairment (M=2.70; SD=1.20; 95%CI=2.32-3.08). In order to improve message transfer, 87.5% of nurses ask the deaf person to write down what they need (M=4.00; SD=0.91; 95%CI=3.71-4.29).

Despite that, 47.5% of nurses emphasize that they need a lot of time to understand what a deaf person wants (M=3.10; SD=1.22; 95%CI=2.71-3.49). In 87.5% of the answers the nurses state that they don't have an interpreter when in contact with a deaf person (M=4.48; SD=1.11; 95%CI=4.12-4.83).

Results show that 65% of the nurses think that the communication problem is strongly pronounced immediately upon the arrival of a deaf person into the health institution. One of the problems stated in 65% of the answers of the nurses is the inability of deaf people to respond when called upon their arrival to a health institution. Regarding the understanding of messages, 40% of nurses think that deaf people have difficulties in understanding the messages. On the other hand, 57.5% of nurses emphasize that they understand the message from a deaf person. In 77.5% they think that they are trying to listen to the end in order to better understand the message of a deaf person. 55% of the nurses emphasize the lack of visible signs that could make the moving around of the deaf people in the health institution easier.

As the main problem in the communication of nurses with deaf people, the nurses cite the inability to understand a deaf person (37.5%). In solving these difficulties, the nurses show patience (77.5%) and interest in the problems of the deaf (67.5%). According to the results in 67.5%, there is eye contact between nurses and the deaf people.

A lack of interest for the issues of deaf people is present with 30% of the nurses and a lack of patience 17.5%. However, middle values on the Likert scale show a low level of anger (M=1.63; SD=1.10; 95%CI=1.27-1.98), impatience (M=1.93; SD=1.25; 95%CI=1.53-2.32) and the lack of interest is around (M=2.25; SD=1.41; 95%CI=1.80-2.70). When meeting the problem of difficult communication with deaf people, 60% of the nurses feel concerned, 55% uncomfortable, 30% insecure, 10% angry. The results show middle level concern (M=3.08; SD=1.37; 95%CI=2.64-3.51), insecurity (M=3.10; SD=1.55; 95%CI=2.60-3.60), and inconvenience (M=2.68; SD=1.31; 95%CI=2.26-3.09).

In examining the causes of possible communication problems, it can be seen that the interest/lack of interest of the nurses for the problems of the deaf people strongly affects their patience at work, and it
intensifies communication problems and the possibility for a deaf person to better understand the message (Table 1).

<table>
<thead>
<tr>
<th>Nurses’ lack of interest for the problems of deaf people</th>
<th>Strongly expressed problems in communication</th>
<th>Lack of patience of the nurses</th>
<th>Deaf people rarely understand the message</th>
</tr>
</thead>
<tbody>
<tr>
<td>r_s</td>
<td>0.395</td>
<td>0.761</td>
<td>0.404</td>
</tr>
<tr>
<td>r_s^2*100</td>
<td>15.6%</td>
<td>57.9%</td>
<td>16.3%</td>
</tr>
<tr>
<td>p</td>
<td>0.012</td>
<td>0.000</td>
<td>0.010</td>
</tr>
</tbody>
</table>

Source: Author

It can be noticed that when it comes to difficulties in communication, male nurses feel more uncomfortable, worried and angry, while female nurses are more insecure. There is no significant difference in emotional reactions depending on age, sex, and level of education.

The communication between nurses and deaf people happens through showing (95.1%), then through writing (62.5%) and then through speech (50%). The manual alphabet (20%) and sign language (12.5%) are less common ways of communication used by the nurses. Descriptive measures of ways of communication are shown in Table 2.

<table>
<thead>
<tr>
<th>ways of communication</th>
<th>M</th>
<th>±SD</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>showing</td>
<td>4.23</td>
<td>0.73</td>
<td>3.99-4.46</td>
</tr>
<tr>
<td>writing</td>
<td>3.45</td>
<td>1.18</td>
<td>3.07-3.83</td>
</tr>
<tr>
<td>speech</td>
<td>2.95</td>
<td>1.32</td>
<td>2.53-3.37</td>
</tr>
<tr>
<td>manual alphabet</td>
<td>1.90</td>
<td>1.22</td>
<td>1.51-2.21</td>
</tr>
<tr>
<td>sign language</td>
<td>1.73</td>
<td>1.09</td>
<td>1.38-2.07</td>
</tr>
<tr>
<td>same way as with other people</td>
<td>2.35</td>
<td>1.42</td>
<td>1.89-2.81</td>
</tr>
</tbody>
</table>

Source: Author

According to the opinion of 30% of nurses, the communication with deaf people happens in the same way as it does with other people, while 60% don’t agree with that statement. There is no significant difference in relation to age (p=0.103), sex (p=0.473), level of education (p=0.901), and the length of service (p=0.062).

The analysis of the perception of knowing the manual alphabet and sign language of deaf people shows a frequency of positive opinion, 62.5%. In addition, 67.5% of the nurses would like to attend a course of sign language (M=3.78; SD=1.23; 95%CI=3.38-4.17). In order to improve the communication with deaf people, an interpreter is needed in a health institution (M=3.93; SD=1.21; 95%CI=3.54-4.31). Descriptive measures of all difficulties in communication are shown in Table 3.
The connection between the perception of the nurses about the needs of these ways of communication and the willingness to attend a sign language course has been examined. The result of the Pearson coefficient ($r=0.323$) shows that the nurses who emphasize the necessity of this knowledge are also willing to attend a sign language course. The percentage of this common variations is in average 10.4% which is the coefficient of determination ($p=0.042$).

There is no difference in age, sex, level of education, or length of service on the ways of communication, emotional reactions, and the perception of the presence of an interpreter in an institution.

**Discussion**

When a nurse in a health institution meets a person with hearing impairment, efficient, mutually clear and understandable communication becomes a problem.

In this research, the perception of difficulties in the communication between the nurses and deaf people is significantly pronounced. The difficulties include the lack of response of deaf people when being called and the lack of understanding of messages. This research shows that the nurses mostly communicate with deaf people by showing and writing, but can't clearly assess if the deaf people have understood their message. It is interesting that some of the nurses claim to use sign language in communication, although the practical experience shows that the knowledge of sign language isn't spread among nurses. The nurses state that deaf people don't have an interpreter provided. The initiative usually comes from the deaf person. A feeling of discomfort and insecurity indicates a need for education about the ways of communication with deaf people in order to reduce the difficulties and to develop a better communication at mutual pleasure. The age, sex, level of education, and the length of nurses’ service has no significant effect on the way of communication, emotional reactions and the perception of the need for an interpreter in a health institution.

Studies show that the hiding of the disability by the person with hearing impairment, the exposure of the staff to stress at work and a poor communication among the staff, as well as inadequate education and the lack of skills are the main factors for communicational problems of people with hearing impairment upon arrival to a hospital (Adib-Hajbaghery & Rezaei-Shahsavarloo, 2015; Pribanić & Mlčković, 2012). For nurses, communication with deaf people is difficult, and they sometimes need more time for the application of nursing intervention (Mattjus, 2012). The time needed for communication with deaf people is often limited by other demands the nurses have to fulfil, and considerably affects the way of communication. Due to a lack of time, the nurses sometimes avoid direct communication and they communicate with a deaf person through an intermediary, mostly a family member (Hemsley, Balandin, & Worrall, 2012). Using family members can cause problems for patient confidentiality or in protecting the patient from dispiriting information. In a situation when they are insecure or when they haven't understood what the nurse had been saying, deaf people can

<table>
<thead>
<tr>
<th>difficulties in communication</th>
<th>M</th>
<th>±SD</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>communication problem strongly expressed</td>
<td>3.70</td>
<td>1.32</td>
<td>3.28-4.12</td>
</tr>
<tr>
<td>deaf people are not responding</td>
<td>3.78</td>
<td>1.19</td>
<td>3.40-4.15</td>
</tr>
<tr>
<td>deaf people hardly understand instructions</td>
<td>3.15</td>
<td>1.03</td>
<td>2.82-3.48</td>
</tr>
<tr>
<td>deaf people rarely understand the message</td>
<td>3.70</td>
<td>1.32</td>
<td>3.28-4.12</td>
</tr>
<tr>
<td>deaf people you never look into eyes</td>
<td>3.78</td>
<td>1.19</td>
<td>3.40-4.15</td>
</tr>
<tr>
<td>nurses do not understand what a deaf person needs</td>
<td>3.15</td>
<td>1.03</td>
<td>2.82-3.48</td>
</tr>
<tr>
<td>nurses do not listen to the end deaf persons</td>
<td>2.85</td>
<td>1.21</td>
<td>2.64-3.24</td>
</tr>
<tr>
<td>low interest nurses to the problems of the deaf persons</td>
<td>1.93</td>
<td>1.02</td>
<td>1.60-2.25</td>
</tr>
<tr>
<td>low of patience nurses</td>
<td>2.45</td>
<td>1.13</td>
<td>2.09-2.81</td>
</tr>
<tr>
<td>no visible mark to facilitate movement in institution</td>
<td>1.95</td>
<td>1.09</td>
<td>1.60-2.30</td>
</tr>
<tr>
<td>communication problem strongly expressed</td>
<td>2.25</td>
<td>1.41</td>
<td>1.80-2.70</td>
</tr>
<tr>
<td>deaf people are not responding</td>
<td>1.93</td>
<td>1.25</td>
<td>1.53-2.32</td>
</tr>
</tbody>
</table>

Source: Author
feel uncomfortable to ask more than once to repeat the comment or the question. Moreover, difficulties in communication can result in dissatisfaction with the quality of health care (Barnett, Kuol, & Coppola, 2014).

Limitations in communication can result in the lack of understanding of the patients’ needs and a wrong assessment about patients’ intelligence (Helder, 2012). Also, a significant percentage of nurses in this research are patient during the communication, but feel worried, uncomfortable and angry when they are not able to understand a deaf person.

In communicating with deaf people, nurses and other healthcare workers often apply paper writing and lip reading. They assume that this way of communication is most effective. However, this communication is insufficient, often inadequate and ineffective (Kauenburg, Fellinger, & Fellinger, 2016). The data of researches show that deaf people can effectively recognize only 20% to 30% when lip reading or reading from the face (Pribanić & Milković, 2012). „Lip reading” is actually a way of guessing of the content of the spoken message according to the picture it makes on the lips and the face of the interlocutor (Kauenburg et al., 2016; Pribanić & Milković, 2012). Lip reading and note writing are often ineffective ways of communication with the deaf and the difficult of hearing patients (McKee, Moreland, SR., & Zazove, 2015).

Deaf people often have difficulties in communication when seeking health services due to insufficient knowledge of communicational needs and ways of adjustment to the situation (Pribanić & Milković, 2012). A lack of visible signs of deaf people while moving around in a health institution contributes to that.

Deaf people are aware of the difficulties they have in verbal communication, due to an unclear articulation and a lack of language competence. They have difficulties in situations when the nurses don't know them and/or when they lack experience with deaf people. In addition to the difficulties in direct communication with the nurses, the biggest problem for deaf people arises in waiting rooms when being called (Pribanić & Milković, 2012). It often happens that a nurse fails to recognize that it is a deaf person, they call the person and only when the person sees that nobody is answering, they realize it has been their name that was called. The difficulty is even bigger, when they call the people over the counter or the PA system or when the nurse is wearing a mask over the face (Pribanić & Milković, 2012). In this research, the difficulties of the deaf are recognizable by the nurses. Nurses state that deaf people are not responding and hardly understand instructions.

Ineffective communication leads to a lack of understanding, wrong information and frustration with people with hearing impairment. This results in different reactions, for example some deaf people simply give up seeking for clear information, others express their rancor in an unpleasant way. A negativistic or angry behavior with a simultaneous projection of the mentioned onto the staff is also possible. Such reactions don't have to be observed in the context of neurotic, pathological reactions, but as a normal response to a stress situation (Ljubičić, 2014).

Deaf people prefer going to that health staff who is patient, understanding and who understands the person regardless of the distorted speech and who knows the basic rules of communication with a person with hearing impairment (Hersh, 2013; Preminger, Oxenböll, Barnett, Jensen, & Laplante, 2015). They are satisfied when a nurse patiently listens and when, by asking additional questions, she looks for clarification of what hasn't been understandable due to bad articulation, speech or pronunciation or for the purposes of complementing (Pribanić & Milković, 2012). Some research confirms that the communicational barriers caused the non-acceptance of health recommendations and the lack of understanding of the situation they were in (Sheppard, 2014).

Since the nurses in this study show patience and interest in the problems of deaf people, it can be assumed that they show a significant level of empathy and sensibility for the needs of these people. The sensibility of the nurses is also confirmed by the interest in the manual alphabet or sign language. If the nurses knew the manual alphabet or the sign language, they could more easily communicate with a deaf person. This is why such a way of communication is important in health institutions, especially in combination with lip reading and nonverbal forms like facial expressions and body movements (Pribanić & Milković, 2012).

The possibility of having an interpreter in a health institution is another useful way of overcoming communicational and social difficulties of deaf people, but also of the health staff during their contact
with them. In spite of disability rights laws and the UN Convention on the Rights of Persons with Disabilities, in many countries hospitals have no common practice to provide professional sign language interpreters. This would not only affect the improvement of the quality of communication, but also the improvement of the health care for deaf people. However, sign language in healthcare institutions is still difficult to apply. Such problems are noticed even in countries where deaf people have the legal right to effective communication when they come to health institutions (Kauenburg et al., 2016). When it comes to deaf people, the possibility to hire an interpreter of sign language in a health institution is rarely used (Pribanić & Milković, 2012). Only 20% of deaf people use the service of an interpreter upon arrival into a health institution (Pribanić & Milković, 2012). The reason could be the unavailability of the interpreter. Together with the deficit of interpreters, the unsolved problem of the payment of the service of a professional interpreter is one of the most significant problems (Pribanić & Milković, 2012). Since it is a situational need, it is possible to conclude that it would be necessary to develop translation services that would, depending on the circumstances, secure an interpreter during the care for a deaf person (Pribanić, 2012; Steinberg, Wiggins, Barnada, & Sullivan, 2012). On the other hand, an interpreter is not continual with deaf person and it can also cause difficulties in communication. For instance, a deaf person can suffer from pain because nurse cannot understand his message and the interpreter of a deaf person is not present (Gichane, Heap, Fontes, & London, 2017). There, where the translation services aren’t developed, the hospital can look for the services of an interpreter through an agency. These services are being used if it is known that a deaf patient is going to be observed, as well as when it is completely clear that an interpreter would not only make the communication easier, but also more effective and pleasant (Pribanić, 2012). Most of the nurses in this research support the presence of an interpreter of sign language in a health institution because it can positively affect the process of message transfer. Mauffrey et al. emphasize that deaf people want to receive information in their own language. Health providers who use sign language or sign language interpreters are important for understanding deaf people’s needs (Mauffrey, Berger, & Hartemann, 2016). Nurses need to have special communication skills when working with deaf patients and to become aware of the specific communication form to provide inclusive and safe health care (Stephan & Pinilla, 2014). However, studies show that nurses are lacking in knowledge and skills which are needed for quality communication with deaf people and patients with hearing impairments (Adib-Hajbaghery & Rezaei-Shahsavarloo, 2015; Mattjus, 2012). In addition, studies show that an appropriate education about communication skills with deaf people would improve the nurses’ knowledge and eliminate most of the communicational problems (Adib-Hajbaghery & Rezaei-Shahsavarloo, 2015; Pribanić & Milković, 2012; Velonaki et al., 2015).

Considering that different circumstances which can affect the process of communication, the role of the nurse upon the arrival of deaf people to a health institution, and in the integration and inclusion in society is extremely important. Only through clear and comprehensible communication, the contents and messages become understandable to a deaf person (Radibratović, Milutinović, & Sindik, 2013). Effective communication makes nurses feel better during communication with patients with hearing impairments (Mattjus, 2012). Also, deaf people feel better because they have a feel of comfort and safety during health care (Mattjus, 2012). If a deaf person has understood the messages and is able to be independent because of the clear and comprehensive information, then integration and inclusion will be possible.

The limitations of this research include predominantly female nurses at the hospital. The small number of male population was insufficient to be an example with statistical significance for emotional reactions and possibly other significant factors. The participants were not followed longitudinally during their education for nursing care for deaf persons to determine the consequent change in attitude. It is necessary to include more than one hospital and health institutions on the primary level, since the deaf population often visits family physicians.

**Conclusion**

The nurses confirm that while communicating with deaf people, they mostly use showing and writing. The need for knowledge of sign language is also connected with the initiative to attend additional education. An interpreter in a health institution is necessary for effective communication. Signs that would make the moving around of deaf people in a health institution easier should be visible and available for deaf people.
There is a priority need for better nurse education on the ways of communicating with deaf people. This would significantly contribute to the raise in the quality level of health care, but also the inclusion and the social integration of deaf people in society.

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**KNOWLEDGE OF HEALTH EFFECTS OF DIETARY FIBRE AMONG NURSES AND THE GENERAL POPULATION IN CROATIA: COMPARATIVE ANALYSIS**

Marija Ljubicic, Marijana Matek Saric, Katja Curin, Raquel P. F. Guine,

**Abstract:**

Introduction: Nurses play diverse roles in educating patients about a healthy diet and in promoting healthy eating habits, through their conversations with patients and families and through their work providing enteral and parenteral feeding to critically ill patients. Given the position of nurses as key providers of dietary guidance, and given the health benefits of dietary fibre, we wanted to assess the level of fibre-related knowledge among nurses in Croatia.

Objectives: The primary objective of this cross-sectional study was to compare knowledge between nurses and the general population from Croatia about the health importance of consuming dietary fibre.

Methods: Knowledge from 369 nurses and 727 residents from the general population about fibre was assessed using a validated survey developed by the CI&DETS Polytechnic Institute, Viseu, Portugal. Differences between nurses and the general population were assessed for significance using the Mann-Whitney U test and the Kruskal-Wallis test, while associations between study variables and knowledge were explored using Spearman rank correlation coefficients.

Results: The level of knowledge among nurses and the general population in Croatia about dietary fibre varies from «undecided» to «partial knowledge». No association was observed between nurse education level and either general knowledge about fibre or knowledge about the health benefits of fibre intake. No significant differences were observed between nurses and the general population in general knowledge ($p = 0.894$) or in health-related knowledge ($p = 0.578$).

Conclusion: The results suggest the need for updating and expanding nursing curricula. The similar level of knowledge between nurses and the general population about dietary fibre indicates the need to strengthen nurse education and training in the areas of diet and diet therapy in Croatia. Given the role of nurses as diet educators and advisors, this may help improve the quality of health care.

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**Keywords:** knowledge, dietary fiber, nurses, general population.

**Introduction**

Public health campaigns and interventions designed to promote healthy behaviors such as diet often assume that if people know what is good for them, they are more likely to act in their own best health interest (Worsley, 2002). However, although knowledge about diet is indeed a predictor of healthy food consumption, it is not the only predictor (Worsley, 2002). Consumption of healthy food in general, and intake of dietary fibre in particular, also depends on knowledge, habits, motivation, personal characteristics and hedonistic orientation. This has important implications for health professionals, whose mission is to promote positive health behaviours through effective education, counselling and awareness-building.

Numerous studies have demonstrated the health benefits of dietary fibre, including its ability to prevent and treat various diseases (Fuller et al., 2016; Galisteo et al., 2008; Hajishafiee et al., Esmaillzadeh, 2016; Ismaiel et al., 2016; Kunzmann et al., 2015). Dietary fibre can be defined as edible parts of plants that are not digestible in the small intestine and so are not absorbed there, but that are partially or totally degraded in the large intestine by intestinal microflora (Guine, Martinho, Barroca, & Viseu, 2014). Main sources of dietary fibre are vegetables, fruit, grains, legumes and seeds. Daily intake of 25 g of dietary fibre is important for optimal functioning of the intestines, and daily intake above this amount can reduce the risk of many chronic diseases (Slavin, 2013; Yang, et al., 2015).

Knowledge about the health effects of fibre, daily intake requirements and methods to monitor fibre intake is crucial for nurses to provide effective care to patients with high comorbidity burdens. Indeed, nurses play diverse roles in educating patients about healthy diets and in promoting healthy eating habits, through their conversations with patients and families and through their work providing enteral and parenteral feeding to critically ill patients (Green & Jackson, 2002; Lazarou & Kouta, 2010). Nurses are able to identify health gaps in patient knowledge and behaviour or lifestyle, and they can...
react accordingly. In fact, they are well-placed to design research to examine these health gaps and develop solutions for them (Brotheton et al., 2013). Florence Nightingale emphasized the role of diet in patient recovery, and the important role of nurses in supporting proper diet (Yalcin et al., 2013). Nurses are frequently called upon to act as dietary consultants, offering patients information about diet and about healthy food selection (Henning, 2009), as well as monitoring patients’ food intake and eating habits. These duties come in addition to the routine duties of care such as administering treatments, monitoring vital signs and conducting other interventions (Yalcin et al., 2013). Education provides the foundation for a nurse to plan, provide and evaluate dietary care (Green & Jackson, 2002).

We are unaware of published studies assessing knowledge about dietary fibre among nurses, and it appears that in Croatia, no study has been published on nurses’ knowledge of diet in general or of fibre in particular. Research into such knowledge levels may generate key insights for improving systematic training and education of nurses. Given the position of nurses as key providers of dietary guidance, and given the health benefits of dietary fibre, we wanted to assess the level of fibre-related knowledge among nurses in Croatia and compare it with the level of knowledge in the general population. We examined both general knowledge about fibre and specific knowledge about the demonstrated effects of fibre on human health. In light of the research literature from other countries, we hypothesized that nurses in Croatia would show higher levels of knowledge than the general population. The results of our study may help guide the strengthening of dietary training at all levels of nursing education and training, which in turn may improve the ability of nurses to prevent and treat disease through diet therapy.

**Methods**

**Design and Samples**

In this cross sectional study, the level of knowledge about dietary fibre was assessed using a validated survey developed by the CI&DETS Research Centre at the Polytechnic Institute Viseu in Portugal (7). The survey contains questions about demographic characteristics as well as about knowledge of sources of dietary fibre, recommended daily intake and effects of fibre intake on particular diseases. They were asked about health knowledge i.e. the influence of fibre on the risk of cardiovascular disease, hypercholesterolemia, diabetes, obesity, constipation, carcinoma of the colon or breast, vision problems and vitamin and mineral deficiency.

This study was approved by the Human Research Ethics Committee of the General Hospital, Home Health and Nursing school. Aims of the study were explained to all participants and they were assured that participation was voluntary and anonymous. Upon providing consent, respondents filled out the questionnaires on their own and handed them in by placing them in a marked box.

**Participants**

A total of 1,096 respondents, comprising 369 nurses and 727 residents from the general population, were surveyed on the coast of Croatia. Nurses were from three health centres and one nursing school, all located in Zadar County, Dalmatia. Respondents were 69.7% female (764) and 30.9% male (332). Among the respondents in the general population, 57.3% (417) were female and 42.6% (310) were male; the corresponding proportions among nurse respondents were 94.0% (347) and 5.9% (22). The preponderance of female nurses contributed to the high proportion of females in the overall sample.

An urban environment was the living situation for most respondents from the general population (551, 77%) as well as for most nurses (268, 74.4%), while 165 (23%) respondents from the general population and 92 (25.6%) nurses lived in a rural environment.

Average age of respondents was 38.9 years (SD 12.3; 95% CI 38.2-39.6), ranging from 18 to 77 years. Most respondents from the general population and most nurses had a secondary school education.

**Measures**

Respondents indicated their level of agreement with statements about fibre using a Likert scale from 1 to 5: 1–completely disagree; 2–disagree; 3–neither agree or disagree; 4–agree; 5–completely agree. These levels of agreement were then transformed into levels of knowledge, such that responses of 5 indicated complete knowledge; 4, partial knowledge; 3, indecision; 2, partial lack of knowledge; and 1, complete lack of knowledge. Levels of agreement with questions formulated in the negative, such that 5 indicated complete agreement with an incorrect statement, were recoded before calculating level
of knowledge. As a result, levels of knowledge always indicated correct knowledge. Levels of knowledge were converted to percentages by multiplying central values by 20 (1 = 20%). Test reliability was good (Cronbach’s α = 0.775).

Data analysis

SPSS 22.0 (IBM, Armonk, NY, USA) was used to generate descriptive statistics about the results (frequency distributions, central tendency measures, dispersion measures) and to perform inferential statistical analysis to assess influences of sex, age, living environment and education level on knowledge about dietary fibre. Test reliability was assessed using Cronbach’s alpha, and results were tested for normal distribution using the Kolmogorov-Smirnov test. This test indicated a skewed distribution, so inter-group differences were assessed using the non-parametric Mann-Whitney U and Kruskal-Wallis tests. Associations between study variables and knowledge about dietary fibre were explored using a Spearman rank correlation analysis. For all statistical analyses, the threshold of significance was defined as p < 0.05.

Results

The survey asked respondents about their knowledge of recommended daily intake of dietary fibre and the presence and abundance of fibre in various foods and ability of dietary fibre intake to help prevent certain diseases. The median central value for level of knowledge of the various items ranged from 3 to 4 (interquartile range (IQR) 1 to 2) for the general population and for nurses. Relatively strong variability (Vq 0.33) was observed among both group on items asking about the presence of dietary fibre in foods of plant or animal origins. Both groups showed low variability in knowledge on all items related to the health effects of dietary fibre, with Vq ranging from 0.00 to 0.20. Average levels of general knowledge about fiber in percentages ranged from 58.9% to 83% for the general population, and from 61.4% to 82.1% for nurses, and 57.6% to 82.0% for nurses and from 58.9% to 79.3% for the general population for the health importance of dietary fibre.

Possible associations were explored between general knowledge about dietary fibre and several sociodemographic factors: age, sex, education level and living environment. Among nurses, those aged 36 to 45 showed significantly higher general knowledge than other age groups (p = 0.013). No other significant associations were observed. None of the sociodemographic factors appeared to significantly influence levels of knowledge about the dietary effects of fibre intake.

Among respondents from the general population, general knowledge was significantly higher among those living in urban environments compared to those in rural environments (p = 0.002), among those with higher education levels compared to those with less education (p = 0.042) and among women compared to men (p = 0.022). No other significant associations were observed. The only significant association identified between level of knowledge about health effects of fibre and sociodemographic factors was sex, with women showing significantly higher health-related knowledge than men (p = 0.004).

Respondents from the general population with higher education levels showed significantly higher levels of knowledge about the presence of dietary fibre in whole grain foods (1.6%, r = 0.13, p = 0.001) and unpeeled fruit (0.5%, r = 0.08, p = 0.045), and about the influence of fibre intake on the risk of bowel cancer (0.6%, r = 0.08, p = 0.032). No significant association was observed between education level and knowledge level on the other items.

Among nurses, those with higher education levels showed significantly higher knowledge levels about the presence of dietary fibre in whole grain foods (1.2%, r = 0.11, p = 0.035) and about the influence of fibre intake on the risk of certain diseases (1.9%, r = 0.14, p = 0.007), constipation (1.6%, r = 0.13, p = 0.016) and specifically the risk of bowel cancer (2.1%, r = 0.15, p = 0.005) and breast cancer (1.2%, r = 0.11, p = 0.039).

In both groups, significant associations were identified between general knowledge about dietary fibre and knowledge about its health benefits (Table 1). Education level was associated with level of general knowledge among respondents from the general population, but it was not associated with general or health-related knowledge among nurses.
The general population showed higher knowledge about the absence of dietary fibre from foods of animal origin, and about the ability of dietary fibre intake to prevent and treat certain diseases in general. Nurses showed higher knowledge about the ability of dietary fibre intake to prevent and treat obesity, constipation and breast cancer in particular (Tables 2). No other differences in knowledge between the two groups were observed on other items.

Aggregating responses on all items about general knowledge of dietary fibre or on all items about health-related effects of fibre intake indicated higher levels of both types of knowledge among nurses than among respondents from the general population though the differences were not significant (Table 3).

Table 1: Association between education level and level of general or health-specific knowledge about dietary fibre (N = 1,096)

<table>
<thead>
<tr>
<th>Survey item</th>
<th>General population</th>
<th>Nurses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Health knowledge</td>
<td>Education level</td>
</tr>
<tr>
<td>General knowledge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General knowledge</td>
<td>r_s</td>
<td>0.192**</td>
</tr>
<tr>
<td></td>
<td>p</td>
<td>0.000</td>
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<tr>
<td>Health knowledge</td>
<td></td>
<td>0.078*</td>
</tr>
<tr>
<td></td>
<td>p</td>
<td>0.622</td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level; Spearman's rho test (r_s)
* Correlation is significant at the 0.05 level; Spearman's rho test (r_s)

Source: Author

<table>
<thead>
<tr>
<th>Survey item</th>
<th>Sample</th>
<th>Mean Rank</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dietary fibre can prevent and treat diseases</td>
<td>general population</td>
<td>563.26</td>
<td>0.003</td>
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<tr>
<td></td>
<td>nurses</td>
<td>510.37</td>
<td></td>
</tr>
<tr>
<td>Dietary fibre can prevent and treat obesity</td>
<td>general population</td>
<td>527.86</td>
<td>0.018</td>
</tr>
<tr>
<td></td>
<td>nurses</td>
<td>571.57</td>
<td></td>
</tr>
<tr>
<td>Dietary fibre can prevent and treat breast cancer</td>
<td>general population</td>
<td>519.30</td>
<td>0.004</td>
</tr>
<tr>
<td></td>
<td>nurses</td>
<td>573.10</td>
<td></td>
</tr>
</tbody>
</table>

* Mann-Whitney U test
b p<0.05

Source: Author

Table 2: Differences in knowledge about dietary fibre between nurses and the general population (N = 1,096)

<table>
<thead>
<tr>
<th>Survey item</th>
<th>Sample</th>
<th>Mean Rank</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>General knowledge</td>
<td>general population</td>
<td>517.63</td>
<td>0.894</td>
</tr>
<tr>
<td></td>
<td>nurses</td>
<td>520.27</td>
<td></td>
</tr>
<tr>
<td>Health knowledge</td>
<td>general population</td>
<td>510.96</td>
<td>0.578</td>
</tr>
<tr>
<td></td>
<td>nurses</td>
<td>521.98</td>
<td></td>
</tr>
</tbody>
</table>

* Mann-Whitney U test
b p<0.05

Source: Author
Discussion
Motivated by the large number of studies demonstrating the positive health effects of dietary fibre in the diet therapy of many diseases, we set out to assess the levels of knowledge about fibre in general and its health benefits in particular among nurses and the general population in Croatia. Our results indicate that although nurses often recommend consuming fibre to treat conditions such as constipation, they have substantial gaps in knowledge about the effects of dietary fibre intake on health. Indeed, we found that nurses had nearly the same level of knowledge about dietary fibre as the general population. At the same time, nurses showed higher levels of specific knowledge about the influence of fibre intake on constipation, obesity and carcinoma of the colon or breast. Levels of knowledge in both groups varied substantially.

In our research and other studies, a high proportion of nurses have limited knowledge about diet therapy and about sources of soluble fibre and other foods that can prevent or treat certain diseases (Park et al., 2011). However, our finding that nurses showed higher levels of specific knowledge about the influence of fibre intake on constipation, obesity and carcinoma of the colon or breast likely reflects their formal education and previous experience. Our finding of similar knowledge points to inadequacies in nurse knowledge, which can negatively affect patient care. Studies in different countries point to deficits in dietary knowledge among not only nurses but other health professionals as well in South Korea and Australia (Kowanko et al., 1999; Park et al., 2011; Schaller & James, 2005); Denmark, Sweden and Norway (Mowe et al., 2008). In addition, the inadequate number of dieticians and nutritionists in the health system means that nurses often shoulder the responsibility of dietary advisor (Brotheton et al., 2013). However, nurses lack the necessary dietary education to offer optimal guidance and advice to patients (Henning, 2009; Kowanko et al., 1999; Yalcin et al., 2013). Nursing curricula include diet as only a small part of the wider spectrum of nursing areas, which is inadequate for satisfying patient needs in practice (Green & Jackson, 2002; Kowanko et al., 1999). This lack of dietary knowledge makes it difficult for nurses and other medical staff to identify malnourished patients and correctly calculate a patient's energy requirements. These deficiencies may contribute to the risk of complications and prolong patient stay in hospital (Mowe et al., 2008).

Studies demonstrate that nurses are best positioned to provide patients with all necessary information about diet (O'Mahony et al., 2011; Yalcin et al., 2013). Analysis of nursing experiences indicates that patients frequently ask them to provide dietary information. Studies show that nurses are in constant contact with patients and continuously communicate with them (O'Mahony et al., 2011) and often receiving dietary questions from patients, but nurses are often busy with other tasks, such as documentation and medication (Eide et al., 2015). Nurses accompany patients throughout their health care to prevent and treat disease, so their knowledge about diet and dietary fibre is key to successful diet therapy, which is an essential part of a patient's non-pharmacological treatment (Rodrigues-Fisher, Bourguignon, & Good, 1993). Nurses require a certain level of dietary knowledge to advise patients about choice of foods, meal sizes and meal schedules, all of which play an important role in diet therapy. Numerous studies underscore how important it is for a nurse to understand diet and the influence of specific ingredients in food on health (Brotheton et al., 2013; Kowanko et al., 1999; Park et al., 2011; Yalcin et al., 2013), as well as to be able to assess nutritional patterns according to Marjory Gordon (Gordon, 2011). However, studies show that nurses often lack this necessary knowledge and rarely document assessments of diet status, energy intake and body mass indexes (Kim & Choue, 2009; Persenius et al., 2008). Instead, nurses tend to note only the appearance of difficulties such as nausea, vomiting, reduced mobility or eating ability; assessment of diet status is usually limited to addressing patient concerns about specific types of foods (Persenius et al., 2008). This incomplete dietary assessment can lead to incorrect estimation of dietary needs, which can negatively affect patient recovery.

Our findings are consistent with literature showing that, even though nurses and physicians emphasise the importance of diet in medical care, and even though patients expect to receive relevant dietary information from their healthcare providers, the reality is that healthcare workers often feel poorly equipped to offer dietary guidance (Adams, Kohlmeier, Powell, & Zeisel, 2010). One study even found that physicians knew less than their patients about some dietary topics (Lazarus, 1997).

Several studies have shown that nurses as well as other health professionals often have insufficient dietary knowledge (Adams et al., 2010; Lane et al., 2014; Lazarus, 1997; Mowe et al., 2008; Warber,
et al., 1997; Yalcin et al., 2013). Park et al found that although most nurses are aware of the need for diet therapy, they have limited knowledge about low-cholesterol diets, sources of soluble fibre and specific foods that can help prevent disease (Park et al., 2011). Those authors concluded that nurses, had weak knowledge about clinical aspects of diet. This suggests that medical staff pay insufficient attention to diet, despite the fact that diet therapy is an important part of patient care.

Education appears to be more important than experience in providing good dietary care to patients: studies have shown that experience is not a predictor of dietary knowledge, and that less experienced nurses can showed greater knowledge than their more senior colleagues (Crogan & Evans, 2001). However, in our study, we observe a significant association between education level and knowledge about dietary fibre. Numerous studies concluding that higher education level among nurses is associated with greater dietary knowledge (Yalcin et al., 2013), and that they need education in the areas of diet therapy and many other diseases (Bjerrum et al., 2012; Crogan et al., 2001; Endevelt et al., 2009; Warber et al., 1997). We suspect that this discrepancy reflects the relatively high proportion of nurses in our sample with secondary education, as well as the relatively low levels of knowledge among university-educated nurses in our sample. On balance, the literature suggests a positive effect of education on knowledge about dietary fibre. Therefore, our results and those of others highlight an urgent need to update and expand content related to diet and diet therapy in the nursing curriculum (Boaz et al., 2013; Mowe et al., 2008; Park et al., 2011; Yalcin et al., 2013).

Studies examining questions of nurse knowledge and experience should be careful to distinguish between the two, which the literature often associates or even treats as equivalent. The two concepts are not necessarily inter-related: studies show that experience in the absence of specific education may not increase the level of knowledge about diet (Crogan et al., 2001; Yalcin et al., 2013) or dietary fibre.

Despite the strengths of the present study, including its relatively large sample, good test reliability, and analysis of different types of knowledge about dietary fibre, the work has some limitations. The survey did not collect data that would allow us to determine the percentage of respondents from the general population who might be more likely to know more about dietary fibre than others, such as scientists, physicians, and nutritionists.

Furthermore, the strong influence that nurses exert on patients' attitudes toward diet and healthy behaviours means that adequate dietary knowledge is crucial. The results of the present study, together with numerous studies from other countries, suggest the need for curriculum reform at all levels of nursing to strengthen knowledge of diet, diet therapy and health benefits of dietary fibre.

Conclusion

While the nurses in our sample showed a certain level of knowledge about the influence of dietary fibre intake on prevention and treatment of certain diseases, on the whole the nurses showed levels of knowledge about dietary fibre similar to those in the general population. This is troubling because nurses, given their role as diet educators and advisors, should know more about the subject than their patients. These results suggest the need for updating and expanding nursing curricula in the areas of diet and diet therapy.

References


ACCESSIBILITY AND AVAILABILITY OF PHARMACEUTICAL CARE IN COMMUNITY PHARMACIES IN THE SLOVAK REPUBLIC. AN EVIDENCE-BASED STUDY FROM 1998 TO 2014

Ivona Malovecká, Daniela Mináriková, Zuzana Haramiová, Viliam Foltán

Abstract: Community pharmacies are one of the parts of health care system and contribute to the public health and health promotion. Currently ongoing changes affect the functionality of the whole health care system. Current health care system is very sensitive to any change that might influence the wide range of parameters in the provision of pharmaceutical care. The number of pharmaceutical care providers particularly is a crucial parameter that should constantly be monitored and analyzed, especially in relation to demographic and geographic characteristics. The total number of community pharmacies, population to pharmacy ratio, and area to pharmacy ratio represent some of the parameters used for the evaluation of pharmaceutical care efficiency and are vulnerable to changes with powerful regulatory potential. In 1998, there were 952 community pharmacies in the Slovak Republic, the population to pharmacy ratio amounted to 5 552 and the area to pharmacy ratio amounted to 52.5. Gradually, the number of community pharmacies has increased and in some regions redoubled. This has resulted in a decline of population to pharmacy ratio and area to pharmacy ratio in all regions of the Slovak Republic (p<0.05). The most meaningful change in the development trend of the selected ratios occurred in 2005 (p <0.05). The number of community pharmacies culminated in 2012 (1612 community pharmacies: 3352 population to pharmacy ratio and 30.5 area to pharmacy ratio). In 2014, the Slovak Republic had 1598 community pharmacies, 3394 population to pharmacy ratio and 30.8 area to pharmacy ratio. The accessibility and availability expressed by the number, ratio and location of pharmacies in the Slovak Republic is perceived positively. The concerns regarding the economic stability of pharmacies and also long-term maintenance of the current accessibility and availability of pharmacies are presented.

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UDC Classification: 614.2

Keywords: community pharmacy, pharmaceutical care, population to pharmacy ratio, area to pharmacy ratio

Introduction
Pharmaceutical care in the Slovak Republic is considered to be one of the main pillars of healthcare. It ensures availability of medicines, medical devices, dietetic food and supplementary products for a minimum of five days a week. Furthermore it provides expert consultation on the appropriate application of medicines (Clifford et al., 2006) and dietetic food, appropriate application of medical devices (Cain et al., 2001), efficient disease prevention (OLoughlin et al., 1999), nourishment and a healthy way of life.

In all countries of Europe, the pharmaceutical care is provided either through regulated or deregulated systems. The character of the pharmaceutical care provider regulation influences community pharmacies in terms of accessibility, availability, quality and economic stability. Pharmaceutical care in a regulated system is characterized by governmental jurisdiction of the community pharmacy foundation that results in adequate accessibility and availability of pharmaceutical care. Moreover, the pharmaceutical care is evenly distributed between municipalities, particularly between urban and rural regions. Nordic countries, for example Norway, Sweden et cetera, have a deregulated system of pharmaceutical care. It has led to an escalation in the total number of community pharmacies and principally to their disproportionate allocation in the state territory (with a higher number of pharmacies located in the cities and a lower number of pharmacies in the countryside). The accessibility and availability of pharmaceutical care (especially the availability of medicines) have gotten worse especially in rural areas (Westerlud and Bjork, 2006).

The deregulated system of pharmaceutical care interferes with property rights via lack of ownership standards and creates structures of pharmaceutical care providers such as pharmacy networks and vertical integration; where large international companies own wholesale pharmacy chains that often control the pharmaceutical market (Vogler et al., 2012). This may affect the availability of medicines in pharmacies, and likewise the patients’ overall satisfaction with provided pharmaceutical care. Accordingly, the existence of policies describing the availability of medicines in stock (FIP/WHO,

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1 Faculty of Pharmacy, Comenius University in Bratislava, Slovak republic, ivonamalovecka@gmail.com
2 Faculty of Pharmacy, Comenius University in Bratislava, Slovak republic, minarikova@fpharm.uniba.sk
3 Faculty of Pharmacy, Comenius University in Bratislava, Slovak republic, haramiova@fpharm.uniba.sk
4 Faculty of Pharmacy, Comenius University in Bratislava, Slovak republic, foltan@fpharm.uniba.sk
2012) and the time necessary to acquire medicines (existing in Austria, Denmark, Finland, Norway, Spain and other countries) help prevent medicine shortages and shorten patient waiting times (Vogler et al., 2012).

Current legislation in the Slovak Republic, unlike in the past, does not restrict the acquisition of a license for provision of pharmaceutical care services to any demographic and geographic requirements and therefore the Slovak Republic belongs to countries with deregulated systems of pharmaceutical care providers.

The accessibility and availability of pharmaceutical care can be characterized not only by the number of community pharmacies but also by other derived parameters, such as the population to pharmacy ratio, area to pharmacy ratio, the number of pharmacists per 100 000 inhabitants (OECD, 2015) and others. However, the long-term evaluation of these data is rare in many countries. Similarly, the assessments of external factors on the development trend, and the most significant change in the development trend, are often not paid enough attention from the scientific community.

Data and methodology

Research Goal

The present study completes the limited data by the assessment of selected characteristics of community pharmacies in the time span of 17 years (1998-2014), focusing on the development trend type and the most significant change in the development trend.

Set of evaluated data

The set of evaluated data contained information about all community pharmacies providing pharmaceutical care services to the general public.

Date Set Source

The data on the number of community pharmacies, population and area surface during the years 1998-2014, were drawn from the “Datacube” database managed by the Statistical Office of the Slovak Republic.

Methods

For assessing the significance of the development trend non-parametric Mann-Kendall test and Fisher test for classical linear regression were used. For testing the most significant change in the development trend nonparametric Pettitt test was used. Subsequently, descriptive statistics was used to describe the results, which are presented in tables.

Processing software

The collected data were entered and edited in Microsoft Excel. Mann-Kendall’s, Fisher’s, and Pettitt’s tests were performed using the R statistical software (R Core Team, 2015).

Outcomes of assessment

Outcomes of the assessment are presented as two ratios: the population to pharmacy ratio and the area to pharmacy ratio. The population to pharmacy ratio expresses the number of inhabitants per community pharmacy and the area to pharmacy ratio represents the area per community pharmacy in square kilometers.

For the purposes of the present study, provision of pharmaceutical care was narrowed to only public pharmacies and branches of community pharmacies. The common term "community pharmacy" is used to refer to both of the above-mentioned health care facilities.

Results

Descriptive characteristics of community pharmacies

The smallest number of community pharmacies (952) and the lowest population to pharmacy ratio (6154 inhabitants) were in the year 1998, the lowest area to pharmacy ratio in 2002 (78.5). The number of community pharmacies had increased gradually over the evaluated time period and reached the maximum of 1618 community pharmacies in 2012. Concurrently the population to pharmacy ratio decreased to its minimum of 3406 inhabitants and the area to pharmacy ratio to its minimum of 29.5 square kilometers in 2010.
The population to pharmacy ratio: 1998-2014

Development trend of the population to pharmacy ratio

Regional level

The population to pharmacy ratio on the regional level assessed by the Mann-Kendall’s test and Fisher's test showed a statistically significant decreasing development trend in all eight regions of the Slovak Republic (p <0.05) (Table 2).

State level

The population to pharmacy ratio assessed by the Mann-Kendall’s test and Fisher's test showed a statistically significant downward development on the state level (p˂0.05).

Table 1: Number of community pharmacies, population to pharmacy ratio, area to pharmacy ratio in Slovak Republic in the time span 1998-2014

<table>
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<tr>
<td>Number of community pharmacies</td>
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<td>975</td>
<td>1010</td>
<td>1011</td>
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<td>1565</td>
<td>1586</td>
<td>1618</td>
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<td>Population to pharmacy ratio</td>
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<td>6103</td>
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<td>3603</td>
<td>3563</td>
<td>3698</td>
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<td>Area to pharmacy ratio</td>
<td>77.6</td>
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<td>74.1</td>
<td>73.2</td>
<td>78.5</td>
<td>52.4</td>
<td>40.4</td>
<td>33.9</td>
<td>32.8</td>
<td>30.6</td>
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</tbody>
</table>

The highest and lowest values of the evaluated characteristics are shown in bold

Source: Author

Table 2: Development trend of the population to pharmacy ratio and the area to pharmacy ratio on the regional and state levels in the time span 1998-2014

<table>
<thead>
<tr>
<th>Regions of Slovak Republic / characteristics</th>
<th>Population to pharmacy ratio Mann-Kendall test</th>
<th>Fisher test</th>
<th>Area to pharmacy ratio Mann-Kendall test</th>
<th>Fisher test</th>
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<tr>
<td></td>
<td>Decreasing trend p-value *</td>
<td>Decreasing trend p-value *</td>
<td>Decreasing trend p-value *</td>
<td>Decreasing trend p-value *</td>
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<td>Bratislava region</td>
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<td>0.000000</td>
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<td>Žilinská region</td>
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<td>Banskobystrická region</td>
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<td><strong>0.000001</strong></td>
<td><strong>0.000000</strong></td>
</tr>
</tbody>
</table>

* Significance on the level 5%

Source: Author

Table 3: Most significant development trend changes in the population to pharmacy ratio and the area to pharmacy ratio on regional and state levels

<table>
<thead>
<tr>
<th>Regions of Slovak Republic / characteristics</th>
<th>Population to pharmacy ratio Pettitt test</th>
<th>Area to pharmacy ratio Pettitt test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Year of the most significant change in development trend</td>
<td>p-value</td>
</tr>
<tr>
<td>Bratislava region</td>
<td>2005</td>
<td>0.007023</td>
</tr>
<tr>
<td>Trnava region</td>
<td>2003</td>
<td>0.023741</td>
</tr>
<tr>
<td>Trenčín region</td>
<td>2005</td>
<td>0.007023</td>
</tr>
<tr>
<td>Nitrianska region</td>
<td>2006</td>
<td>0.005062</td>
</tr>
<tr>
<td>Žilinská region</td>
<td>2005</td>
<td>0.005062</td>
</tr>
<tr>
<td>Banskobystrická region</td>
<td>2005</td>
<td>0.005062</td>
</tr>
<tr>
<td>Prešov region</td>
<td>2005</td>
<td>0.005062</td>
</tr>
<tr>
<td>Košický region</td>
<td>2005</td>
<td>0.005062</td>
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<tr>
<td>Slovak Republic</td>
<td><strong>2005</strong></td>
<td><strong>0.005062</strong></td>
</tr>
</tbody>
</table>

Source: Author
Change in the population to pharmacy ratio development trend

Regional level

The most significant changes in the development trend of population to pharmacy ratio assessed by the Pettitt’s test at the regional level occurred predominantly in 2005; and in two regions in different years (2003 in Trnava region 2006 in Nitra region). In all regions, the change in development was statistically significant (p <0.05) (Table 3).

State level

The most significant change in development trend of population to pharmacy ratio assessed by Pettitt’s test state level occurred in 2005 (p <0.05).

The area to pharmacy ratio in the time span 1998-2014

Development trend of the area to pharmacy ratio

Regional level

The area to pharmacy ratio at the regional level assessed by the Mann-Kendall’s test and Fisher’s test showed a statistically significant decreasing development trend in all eight regions of the Slovak Republic (p <0.05).

State level

The area to pharmacy ratio assessed by the Mann-Kendall’s test and Fisher’s test showed a statistically significant downward development at the state level (p<0.05).

Change in the area to pharmacy ratio development trend

Regional level

The most significant change in development trend of area to pharmacy ratio, assessed by the Pettitt’s test, at the regional level occurred in 2005; in two regions in different years (2004 in Trnava region and 2006 in Nitra region). In all regions, the change in development was statistically significant (p <0.05).

State level

The most significant change in the area to pharmacy ratio development trend at the state level, assessed by Pettit’s test, occurred in 2005 as well (p <0.05).

Discussion

Since the regime change in 1989, the health care has passed several significant changes in numerous key areas. Among the most important are the regulations of ownership, demographic and geographic criteria of community pharmacies establishment, and price regulation, which significantly influenced the number of community pharmacies, as well as the availability and quality of pharmaceutical care services. The initial period characterized by a small number of pharmacies (952 in 1998), with a high number of inhabitants per community pharmacy (approximately 5454 inhabitants) and a large area per community pharmacy (approximately 52.1 square kilometres) has been replaced by the growth phase, during which the number of pharmacies almost doubled in some regions. At the same time, the number of inhabitants per community pharmacy and the area per community pharmacy has decreased in all regions of the Slovak Republic (p <0.05). This development culminated in 2012 when the number of pharmacies peaked. According to the Statistical Office of the Slovak Republic, that year pharmaceutical care was being provided by 1618 community pharmacies (with a 3352 population to pharmacy ratio, and a 30.5 area to pharmacy ratio). In 2014, at the end of the assessed period, Slovak Republic had 1598 pharmacies, an average of 3394 inhabitants per community pharmacy and an average of 30.8 square kilometers area per community pharmacy.

In the Slovak Republic, similarly to other European countries without regulatory criteria, new community pharmacies have been established predominantly in larger cities (Wagner et al., 2009). According to the study of Martins et al. (2015), focusing on selected European countries, certain criteria for the establishment of a community pharmacy exist in 17 of the 19 European countries assessed. Nevertheless, despite the absence of these criteria in the Slovak Republic, the formation of new community pharmacies has been observed even in smaller towns and villages. Hence, the inhabitants have an accessible pharmacy available within a maximum of 25 minutes (Skybová and
In England, 89% of the population has access to a pharmacy within 20 minutes (Todd et al., 2014).

The number of pharmacies differs from country to country. According to OECD, there is a significant difference in the number of pharmacies per 100,000 population between countries. Countries such as Spain and Japan have a high number of pharmacies per 100,000 population (47.2 resp. 45.0 pharmacies per 100,000 population), while in countries such as Israel and Denmark the number is very low (6.0 and 3.9 pharmacies per 100,000 inhabitants respectively) (OECD, 2015). The Slovak Republic reaches 36.8 pharmacies per 100,000 inhabitants, which places it between Ireland and Poland, and far above the average of 25 OECD countries (25.1 pharmacies per 100,000 population). Differences between countries in the number of pharmacies can be explained among other reasons by different regulatory criteria as well as more or less actively scheduled tasks of the government, compensation models used in the country, ways of medicines distribution and other factors. For instance, drugs can be issued to patients not only in community pharmacies but also through hospital pharmacies (permitted in the Slovak Republic), or directly by doctors (prohibited in the Slovak Republic). Currently, approximately a third of the European countries have access to medicines limited exclusively to community pharmacies (Todd et al., 2014).

Conclusions

Nowadays, the accessibility and availability (expressed by the number and location) of pharmacies in the Slovak Republic is rated positively. This is due to more even population distribution in comparison to some other countries. There are, however, present some concerns regarding the economic stability of pharmacies, and also long-term maintenance of the current accessibility and availability of pharmacies. In this context, the intention of the analyses of the current status and development of pharmacies is beneficial since it provides a wider and original view of the development of pharmacies from 1998 to 2014. Evaluation of similar character has not yet been published in the Slovak Republic. The assessed areas should be further monitored and evaluated, and the baseline analysis should be expanded and evaluated in greater depth. All analyses, their outcomes, subsequent follow-up and additional activities, however, should be aimed at maintaining and improving the accessibility and availability of pharmaceutical care services for patients.

References

Cain W.T., Cable G., Oppenheimer J.J. (2001). The ability of the community pharmacist to learn the proper actuation techniques of inhaler devices. Journal of Allergy and Clinical Immunology, 108(6), 918-920.


Abstract:
Introduction: Various biomarkers are used to evaluate the severity and prognosis of community acquired pneumonia (CAP).

Objectives: To study and compare the prognostic value of MR-proADM, PCT and CRP in predicting the severity and outcome of CAP.

Methods: A prospective cohort study of 92 patients hospitalized with CAP in the Clinic of Pneumology and Phthisiatrics of MHAT “Saint Marina”–Varna in 2015 was conducted. The biomarkers were measured on admission. Midregional pro-adrenomedullin (MR-proADM) and procalcitonin (PCT) were measured by standard ELISA, and C-reactive protein (CRP) was determined by latex-enhanced immunoturbidimetric assay. CAP severity was assessed by CURB-65.

Results: Patients were on average 59.2±16.8 years of age; 68.5% of them were male. The in-hospital mortality rate was 7.6%. The three biomarkers MR-proADM, PCT and CRP were significantly higher in non-survivors compared to survivors (0.91±0.045 ng/ml vs. 0.39±0.269 ng/ml, p<0.01; 2.14±0.60 ng/ml vs. 1.12±0.68 ng/ml, p<0.01 and 215.12±96.39 mg/L vs.175.74±221.5 mg/L, p<0.05 respectively). In patients who needed intensive care, the biomarkers were also significantly higher than those in patients treated in the general hospital unit (0.50±0.336 ng/ml vs. 0.41±0.284 ng/ml, p<0.05; 1.92±0.76 ng/ml vs. 1.15±0.70 ng/ml, p<0.05 and 221.98±100.34 mg/L vs. 165.31±122.84 mg/L, p<0.05 respectively). MR-proADM and PCT showed a moderate correlation with the CURB-65 (r=0.33, p<0.01 and r=0.30, p<0.05 respectively). CRP did not correlate with the CURB-65 (r=0.10, p>0.05).

Conclusion: MR-proADM, PCT and CRP were significantly higher in non-survivors and in patients treated in the intensive care unit. MR-proADM and PCT showed a moderate correlation with the CURB-65, while the correlation coefficient for MR-proADM was higher. CRP did not correlate with the CURB-65.

UDC Classification: 616-01; DOI: http://dx.doi.org/10.12955/cbup.v5.1055

Keywords: MR-proADM, PCT, CRP, CAP, prognosis

Introduction

Various biomarkers are in use for evaluation of the severity and prognosis of community acquired pneumonia (CAP). Some of them, such as C-reactive protein (CRP) and, in some hospitals procalcitonin (PCT), are used routinely in clinical practice, but others, such as pro-adrenomedullin have been recently studied in an attempt to find better prognostic tools in CAP. CRP was discovered in 1930 by Tillet and Francis. It is an acute-phase protein, which is an early and sensitive, but nonspecific marker of systemic inflammation. It is synthesized mainly by hepatocytes under the influence of IL-6, IL-1 and TNFα (Clyne et al., 1999). Apart from its increase during infection, its level is also increased in autoimmune diseases, trauma, tissue necrosis and malignancy. PCT is the precursor of the active hormone calcitonin. It belongs to CALC-1 – gene family. It was discovered in 1975 by Moya. Its levels begin to rise within 2 hours after bacterial infection which makes it an earlier marker than CRP. It reaches a peak-concentration at 12 hours and has a half-life of 24 hours (Meisner 2000). Interferon gamma, which is produced in response to viral infection, blocks PCT synthesis. Therefore, its levels do not rise in viral infections. These reasons make it a reliable marker for the etiologival distinction between viral and bacterial infections and for the need of antibiotic treatment. Therefore, it would be capable of preventing antibiotic overconsumption (Christ-Crain et al., 2006). Its levels are particularly elevated in bacterial sepsis. Besides sepsis, its levels also rise in pneumonia, acute inhalation poisoning and other severe infections such as pancreatitis, appendicitis, burns, heat stroke, multiple trauma, surgeries (Becker et al., 2010).

Compared to CRP, it is a more specific marker for a bacterial infection. Adrenomedullin was first discovered in 1993 by Kitamura, and was initially isolated from pheochromocytoma (Kitamura et al., 1993). Similar to procalcitonin, it belongs to CALC-1-gene family. It is a peptide consisting of 52

1 Department of Pulmonology and Allergology, Medical University in Varna, Bulgaria, dari.miteva@abv.bg
2 Department of Pulmonology and Allergology, Medical University in Varna, Bulgaria, doc_radkov@mail.bg
3 Department of Microbiology and Virology, Medical University in Varna, Bulgaria, liivanova@abv.bg
4 Department of Medical Genetics, Medical University in Varna, Bulgaria, tuckata@gmail.com
5 Department of Pulmonology and Allergology, Medical University in Varna, Bulgaria, v_vanqkostadinova@abv.bg
aminoacids, mainly produced by cardiovascular tissue, but also by the adrenal medulla, lungs, kidneys, neurons. It is one of the most potent endogenous vasodilators. Its levels rise in the syndrome of systemic inflammatory response due not only to infections, but also to burns, trauma, traumatic shock, pancreatitis (Ueda et al., 1999). Its direct measurement is difficult because of its short half-life (22 minutes), due to binding to plasma proteins and technical difficulties. For practical purposes a part of the molecule of its precursor known as midregional pro-adrenomedulin (MR-proADM) is used. It has no biologically active properties, but according to its levels, the levels of adrenomedullin can be judged. In healthy individuals, the typical values of MR-proADM are 0.10-0.64nmol/L without difference between the sexes (Morgenthaler et al., 2005).

Objectives
To study and compare the prognostic value of MR-proADM, PCT and CRP in predicting the severity and outcome of CAP.

Methods
A prospective cohort study of 92 patients hospitalized in the Clinic of Pneumology and Phthisiatics of MHAT “Saint Marina”– Varna in 2015 was conducted. The biomarkers were measured on admission. MR-proADM and PCT were measured by standard ELISA, and CRP was determined by latex-enhanced immunoturbidimetric assay. CAP severity was assessed by CURB-65. Data were analyzed with SPSSv20.0. We used comparative and correlation analyses. Quantitative variables were reported as mean values and standard deviation (mean ± SD), and the qualitative variables were presented in number and relative proportion (%).

Results
The patients were on average 59.2±16.8 years of age; 63 (68.5%) of them were male and 29 (31.5%) were female. 22 patients (23.9%) were treated in the intensive care unit (ICU). 7 patients (7.6%) died during hospital stay. Characteristics of the group and the mean values of the three biomarkers are shown in Table 1.

Table 1: Characteristics of the studied group

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Value</th>
</tr>
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<tbody>
<tr>
<td>Average age</td>
<td>59.2±16.8 years</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>63 patients / 68.5%</td>
</tr>
<tr>
<td>Female</td>
<td>29 patients / 31.5%</td>
</tr>
<tr>
<td>Patients in ICU</td>
<td>22 patients / 23.9%</td>
</tr>
<tr>
<td>In-hospital mortality rate</td>
<td>7 patients / 7.6 %</td>
</tr>
<tr>
<td>Length of hospital stay</td>
<td>8.3±4.1 days</td>
</tr>
<tr>
<td>Mean value of MR-proADM</td>
<td>0.437±0.293 ng/ml</td>
</tr>
<tr>
<td>Mean value of PCT</td>
<td>1.19±0.72 ng/ml</td>
</tr>
<tr>
<td>Mean value of CRP</td>
<td>178.48±119.87 mg/L</td>
</tr>
</tbody>
</table>

Source: Authors

We compared the levels of the three biomarkers in non-survivors and survivors and found out that they were significantly higher in deceased patients. MR-proADM in non-survivors was 0.918±0.045 ng/ml versus 0.397±0.269ng/ml in survivors, p<0.001. PCT in non-survivors was 2.14±0.60ng/ml versus 1.12±0.68 ng/ml in survivors, p<0.001, and CRP was 215.12±96.39 mg/L in non-survivors versus 175.74±221.5mg/L in survivors, p<0.05). Figure 1 a, b and c

In the patients who needed intensive care, the three biomarkers were also significantly higher compared to those of the patients treated in the general hospital unit. MR-proADM in the patients treated in ICU was 0.509±0.336 ng/ml versus 0.414±0.28 ng/ml in the patients of the general hospital unit, p<0.05. PCT in the patients treated in ICU was 1.92±0.76 ng/ml vs. 1.15±0.70ng/ml in the patients of the general hospital unit, p<0.05. CRP in ICU patients was 221.98±100.34 mg/L vs. 165.31±122.84 mg/L in the patients of the general hospital unit, p<0.05.
We examined the mean values of the three biomarkers in the severity groups according to CURB-65 and established that MR-proADM and PCT increased significantly with the increase of the severity of CAP. No elevation of CRP was found with the increase of the severity of CAP, assessed by the CURB-65 (see Figure 2 a, b and c). We also established that MR-proADM and PCT showed a moderate correlation with the CURB-65 score (r=0.33, p<0.01 and r=0.30, p<0.05 respectively). CRP did not correlate with the CURB-65 score (r=0.10, p>0.05).

Discussion

Our study found that the levels of the three biomarkers were higher in deceased patients compared to survivors. Other authors also reported higher levels of MR-proADM in non-survivors (Christ-Crain et al., 2006; Huang et al., 2009; Suberviola et al., 2012). Higher levels of CRP and PCT in non-survivors were reported in many publications as well (Chalmers et al., 2008; Krüger et al., 2010; Menéndez et al., 2009). We think that these higher levels of the biomarkers may be linked with the more severe systemic inflammatory response of the deceased patients. We also found significantly higher values of the three biomarkers in the ICU patients. Other authors have also established the ability of MR-proADM to predict the need of intensive care. Renaud et al., for example, found significantly higher values of MR-proADM in patients with severe early pneumonia (Renaud et al., 2012). PCT is also able to predict the need for intensive care (Ramírez et al., 2011). Therefore, we consider that biomarkers can be used not only as mortality predictors, but also as predictors for the need of intensive care. Our study showed an increase in MR-proADM and PCT in high-risk groups according to CURB-65. Our data are consistent with the results of other authors, who have also observed such an increase in high-risk groups (Christ-Crain et al., 2006; Lacoma et al., 2014). Huang et al. established that elevated MR-proADM levels correlate with increased severity of CAP assessed by PSI (Huang et al. 2009), and Krüger, established that PCT levels increased with the severity of CAP assessed by the...
modified CRB-65 score, while there was no such increase in CRP (Krüger et al., 2008). We also did not find the elevation of CRP associated with the increase of the severity of pneumonia, as CRP did not correlate with the CURB-65 score. Therefore, we regard the other two biomarkers as better predictors of pneumonia severity compared with CRP. We found a moderate correlation of MR-proADM and PCT with CURB-65. Some authors have found better coefficients of the severity scores, for example, Bello established the correlation coefficient of MR-proADM with CURB-65 to be r=0.561 (Bello et al., 2012). We believe that the lower correlation coefficients established by us are most likely due to the relatively small number of studied patients, most of which fell into the low-risk groups according to CURB-65. This may be considered a limitation of the study. A number of authors have established a superior prognostic accuracy of MR-proADM compared with PCT (Christ-Crain et al., 2006). In our study, we have also found a slightly better correlation coefficient of MR-proADM with CURB-65 compared to that of PCT, as both markers showed moderate correlation with the severity.

**Conclusion**

MR-proADM, PCT and CRP were significantly higher in non-survivors and ICU patients. MR-proADM and PCT showed a moderate correlation with the CURB-65, as the correlation coefficient for MR-proADM was higher. CRP did not correlate with the CURB-65. Biomarkers provide fast and reliable information to physicians about the severity and prognosis of pneumonia and can help them to take correct treatment decisions. They should therefore be included in the risk stratification of patients with CAP as predictors of severity and poor outcome.

**Acknowledgement**

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**References**


THE ROLE OF CIRCADIAN RHYTHMS AMONG MEDICAL STUDENTS IN TIME MANAGEMENT ORGANIZATION AND ACADEMIC ACHIEVEMENT

Yuliya Modna,1 Bernadette Scott2

Abstract: Time management is one of the biggest problems of medical students. In this study, we examined the circadian rhythms of medical students and factors which may affect academic performance: perceived stress, sleep quality, time management. Students answered a Morningness-Eveningness questionnaire, the Time Management Personal Assessment questionnaire, the Pittsburgh Sleep Quality Index (PSQI), and the Perceived Stress Scale questionnaire. The correlation (R=0.87) between chronotype and GPA (P<0.001) showed a higher GPA in students with morning chronotypes. The PSQI analysis demonstrated 47% of the students had poor sleep quality; a correlation (R= - 0.56) between the PSQI and GPA (p< 0.04), supporting a link between higher GPA and good sleep. Results also showed a correlation (R=0.59) between time management and GPA (p< 0.01), implying that the students with excellent time management skills (17%) had excellent GPAs. Chronotypes, quality of sleep and time management, influence GPA and can be used as a guidance tool for academic advisors.

UDC Classification: 612/159.91; DOI: http://dx.doi.org/10.12955/cbup.v5.1056

Keywords: Circadian rhythms, time management organization, medical students

Introduction

Time management is one of the biggest problems of medical students. Good time management skills such as setting goals and monitoring the use of time can facilitate productivity and minimize stress, contributing to work effectiveness, maintaining balance and academic success (Al Khatib, 2014). Balduf (2009) recognized that poor time management skills can affect academic achievement negatively. Britton and Tesser (1991) found that the undergraduate students identified time management as their most pressing problem, which lead to anxiety, stress and poor sleep habits, and have a damaging effect on health and performance (Schneiderman et al., 2005). Not all time management methods work for everyone; (it depends on individual circadian rhythms (chronotypes). Understanding which circadian type is predominant in the body can help to assess what schedule is best. Laboratory studies which were conducted among medical students by Medeiros et al. (2001) showed that the irregularity of the sleep-wake cycle, the sleep deprivation, and internal desynchronization could be causing increased stress, and the stress could be influencing students’ academic performances. Our body has daily rhythms of hormone concentrations, core temperature, and the sleep-wake cycle, all of which have wide spread effects on the function of the entire body (Saper et al., 2005). This rhythm is known as the circadian rhythm and is controlled by an internal body clock. Widely acknowledged individual differences in circadian rhythms, commonly called morningness and eveningness, indicate preferences associated with morning or evening activities. A morning chronotype is often awake between 6 AM and 10 PM and is most energetic in the morning. The evening chronotype is often awake between 9 AM and 1 AM and is most energetic in the afternoon and in the evening (Allebrandt et al., 2014). Studies conducted at the University of Zurich led by Steven Brown (Roenneberg, 2012) showed that the natural biological rhythms of 50% of participants in the study were more or less out of step, and these participants often reported suffering from problems of insomnia or insufficient ability to concentrate on a task. Liaghatdar et al. (2016) also described the sleep-wake rhythm and internal rhythm of the body as having an effect on the cognitive activities of people and different people show different performances at different hours of the day. So everyone's body clock is not the same, therefore some difficulties synchronizing natural rhythms with daily plans can exist. Unfortunately, society is still organized to fit the early chronotypes for the people who prefer to work beginning early in the morning. Due to this mismatch between internal (circadian) and external (social) times, the people suffer from chronic sleep deficiency, which, in turn lead to stress, anxiety, and poor sleep habits (Van Dongen and Dinges, 2000). To solve this problem, following individual circadian rhythms and creating individual schedules is needed.

The present study was carried out to estimate the circadian rhythms of medical students and assess the correlation between their academic performance and chronotypes, sleep quality, and individual

1 Trinity School of Medicine/ Saint Vincent & the Grenadines, ymodna@trinityschoolofmedicine.org
2 Trinity School of Medicine/ Saint Vincent & the Grenadines, bscott@trinityschoolofmedicine.org
subjective perception of stress. The purpose of the study was to use the results as a tool to help in the organization of student time management.

Material and Methods
The subjects were seventy-seven medical students of Trinity School of Medicine (TSOM) with mean age of 24.7 years (SD=2.3), 33 male and 44 female. All students involved in this study had a similar academic load. Participation in the study was voluntary, and informed consent was obtained from all participants. Students who did not give consent and those who filled the questionnaire incompletely were excluded from this study. As variables, the chronotype, time management personal assessment, quality of sleep, and individual subjective perception of stress were analyzed. Student responses were linked to grade point average (GPA). Students were asked to answer the Morningness-Eveningness Questionnaire (MEQ) to determine their individual chronotypes. This MEQ (Horne and Ostberg (1976) consists of 19 items allow for the classification of objects into five types reflecting the student preference for morning or evening orientation. Scores for them are interpreted as follows: 16-30 - extreme evening type; 31-41 – moderate evening type; 42-58 – indifferent type; 59-69 – moderate morning type; and 70-86 extreme morning type. Student time management was assessed via the scores of on Time Management Personal Assessment questionnaire (Britton and Tesser, 1991). This questionnaire includes 25 items which are scored by the following scale: 2 for “Always,” 1 for “Sometimes,” 0 for “Never.” These data are interpreted as follows: 45-50 points - excellent time management skills; 30-44 points - time management is fairly well but should use the guide to increase the skills; 0-30 points - time management skills should be improved. The quality of sleep was assessed via their score on the Pittsburgh Sleep Quality Index (PSQI) questionnaire (Buysse et al., 1989), which consisted of 10 questions related to their normal sleep habits. Sleep quality was considered bad for individuals who obtained a score higher than 5. The Perceived Stress Scale (Cohen et al., 1983) was used for an evaluation of the level of stress. This scale includes 10 items and uses a 5 point rating scale ranging from 0 to 4: 0 – never; 1- almost never; 2- sometimes; 3- fairly often; 4 - very often; items 4, 5, 7, and eight are reversed scored). Data obtained were interpreted regarding the following scale: 0-13 - low-stress level; 14-26 - moderate stress level; 27- 40 - high-stress level.

Results and Discussion
Chronotype distribution showed that the majority (55%) of students had an indifferent type, 22.5% had a moderate morning type, 12.5% had a moderate evening type and 10% had a definite morning chronotype (Figure 1). This distribution is most likely due to an attempt to synchronize natural rhythm with an academic schedule.

![Figure 1: Distribution of chronotypes among TSOM students](image)

We also found the correlation (R=0.87) between chronotype and GPA which was significant (P<0.001), showed a higher GPA among students with morning chronotypes (Figure 2).
This indicated that the students with evening chronotype were maladapted for academic achievement whereas students with morning chronotype were adapted. One of explanation this finding may be “a synchrony effect in individuals” (May et al., 1998) suggesting morning-type individuals perform better at cognitive tasks in the morning and vice versa for evening-type individuals. This effect is based on cortisol levels which increased earlier and have higher amplitude in morning chronotypes than in evening chronotypes; therefore, morningness-oriented students reach their peak performances in the morning hours and eveningness-oriented students have a peak performances in the afternoon (Hasher et al., 2005). Liaghatdar et al. (2016) conducted research among medical students and concluded that evening students experienced academic failure in difficult courses, which required a more cognitive performance so there was a proposal to change the class hours of difficult specialized courses to the middle of the day. Enhancing the understanding and remembering abilities of morning and evening people were studied, and results of this study showed that immediate memory of morning people had a better performance in the early hours of the day and that of the evening people had a better performance in the evening hours (Song et al. (2000). In our research, we also studied the sleep quality of the TSOM students. The PSQI analysis showed 42% of the students had poor sleep quality. In addition, a correlation (R= - 0.56) was found between the PSQI and GPA (p< 0.04), supporting an association between higher GPA and good sleep (Figure 3).
Hence, sleep deprivation affects eveningness-oriented students accompanied by academic difficulties. This might be explained by increased sleepiness and tiredness of evening students due to an early beginning their academic day, which creates some problems in adjusting to the schedule in medical school (Gau et al., 2004). There was no significant relationship between GPA and perceived stress level (p>0.7). This suggests a stress factor is a part of students’ life. Stress in academic situations can have both positive and negative consequences. Misra and McKeen (2000) suggested classifying stress as “unfavorable stress,” which is associated with an inhibition of students’ academic performance due to suppression of the learning process, and as “favorable stress,” which creates a sense of competence and enhanced learning capability. We also found a positive correlation (Figure 4) (R=0.59) between the GPA and time management (p< 0.01), implying that the students with excellent time management skills (17%) had excellent GPAs. Those with poor skills (14%) had worse GPAs. However for 69% of the volunteers, guidance is needed to increase skills, and as a result, it can increase the GPA. This explains why a majority of the university students complaining about running out of time when asked to do a certain task, they get frustrated because they are not able to complete the task before the deadline because they cannot manage their time. In turn this increases the level of ‘unfavorable stress’ which adversely impacts the GPA.

Conclusion

- Evening chronotype, poor quality of sleep, bad time management skills were significant negative predictors of the grade point average (GPA) among medical students.

- Therefore, for the improvement of GPA in medical school students should:
  1. Consider personal circadian rhythms during the planning of study day and strive to improve their time management skills.
  2. Understand the important role of sleep and naps during their academic life which provide short/long term recovery and increase the level of energy for a productive learning process. Sufficient hours for the day /and night sleep must be scheduled daily.

- In addition, medical universities should try to adopt the schedule of exams and learning activities to accommodate circadian rhythms of the students. The most difficult subjects and exams should be conducted between 10-12 am when the alertness is high for all circadian rhythms.

References

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PREVENTION OF RISK FACTORS OF CARDIOVASCULAR DISEASE IN NURSING

Mária Novysedláková,1 Róbert Šeliga2

Abstract:
Introduction: Cardiovascular disease, in terms of its frequency, the severity of organ damage, and the consequences for the health of the population constitutes one of the most pressing problems of our population. The prevention of subsequent coronary events and the maintenance of physical functioning in such patients are a major challenge in preventive care. However, many patients opt for a change in their lifestyle, some with the support of a health professional.

Objective: This empirical survey focuses on the knowledge of respondents about preventing cardiovascular disease. Statistical methods determine the differences between males and females in attending preventive check-ups, understanding and observing risk factors in their lifestyle, and having an interest in changing their lifestyle.

Methods: The survey uses a non-standardized questionnaire. Apart from demographic data, the questionnaire had 10 items assessing the respondent’s knowledge of risk factors for cardiovascular disease, 10 on lifestyle and attitudes to the change in lifestyle, and five regarding their interest in education about the subject. Exploratory data includes answers from 70 respondents, who were outpatients in a general practitioner’s department. Of these, 32 are males (46.0%) and 38 are females (54.0%). Results of the survey are analyzed using the Chi-Squared test.

Results: Fifty-four of the 70 respondents (55.7%; 20 males and 34 females) undertake preventive check-ups at the general practitioner’s department at least once in two years. No significant differences present between males and females in attending preventive check-ups ($\chi^2 = 3.455; df = 1; P = 0.05$) and in showing a willingness for a lifestyle change ($\chi^2 = 1.789; P = 0.05$). However, based on the given data, a significant difference presents between males and females regarding proper regime observance ($\chi^2 = 18.651; df = 1; P = 0.05$). For example, females know the observance of a healthy diet is necessary for preventing ischemic heart disease ($\chi^2 = 20.124; df = 1; P = 0.05$).

Conclusion: The study shows that the difference between males and females is significant regarding their understanding of risk factors related to lifestyle and proper regime observance. Thus, education could lead to reducing or eliminating such risk factors. Prevention of risk factors is complex and lifelong. Under conditions of the Slovak health service, registered nurses are responsible for the education of patients.

UDC classification 615.8: 314.11; DOI: http://dx.doi.org/10.12955/cbup.v5.1057

Keywords: Cardiovascular disease, risk factors, lifestyle, nursing.

Introduction
The frequency of cardiovascular disease and subsequent severity of organ damage and other population health consequences constitute some of the most pressing problems for our population (Studenčan, 2006). Cardiovascular disease contributes to 53% of total mortality and is a major cause of the shorter life expectancy evident in Slovakia. On average, the share of the total number of deaths in 2011–2014 attributed to cardiovascular disease was approximately 52–55%. From the number of people who died from circulatory diseases, 15.8% were younger than 65 years, with every three premature deaths of men accounting for one death of a woman (Report on the State, 2015).

Literature review
Diseases of the circulatory system occur 3–4 times higher in males than females. Though, with age, the incidence of coronary heart disease increases for both males and females with post-menopausal females displaying the same incidence as males. Given the prevalence of the disease, it is necessary to devote considerable effort towards its prevention, with early recognition through commencing pathological processes. Today, risk factors for coronary heart disease can be divided into two main groups:

- Uncontrollable, depending on age, gender, and genetic factors; and
- Influenced, by high LDL cholesterol to low HDL cholesterol, smoking, diabetes, obesity, physical inactivity, mental stress, increased blood pressure, and alcohol.

Their treatment, according to Riečanský (2009) is carried out on several levels:

1 Catholic University in Ruzomberok, Faculty of Health Care, Slovak Republic, maria.novysedlakova@ku.sk
2 Catholic University in Ruzomberok, Faculty of Health Care, Slovak Republic, robertselaiga@centrum.sk
Halting or slowing the process of atherogenesis through an appropriate intervention using diet, physical activity, no smoking, and administration of appropriate medicines. Diet should include plenty of vegetables and fruits, fish and poultry, and exclude foods that are rich in cholesterol and saturated fatty acids. For obese individuals, it is indicated for the reduction of body weight. Also important is reducing the consumption of alcoholic beverages and improving blood flow to the ischemic heart muscle by administration of appropriate medicines.

Preventing the possible closure of the vessel by a blood clot through administration of drugs that inhibit blood clotting.

Mechanical treatment of coronary arteries through angioplasty or Cardiac revascularization with health-promoting behaviors, for research purposes, integrated into an individual’s lifestyle.

The role of nursing is to influence the health of the population from early childhood to advanced age. An individual’s behavior, according to (Štejfa et al., 2007, p. 242), depends on various factors:

Individual knowledge, skills, and personal motivation; Factors of the microcosm in which the person lives, e.g., family, friends, financial conditions and social background; and Macrocosm factors that advise the economic and political system, government organizations, national and cultural traditions, communication media, and finally, world globalization.

The ability to understand, predict, control, and change the behavior of an individual regarding their health remains problematic. Health-supporting behavior, for research purposes, is integrated into the lifestyle of an individual (Mendes, 2011).

The prevention of subsequent coronary events and the maintenance of physical functioning in affected patients are a major challenge in preventive care (Ades, 2001). Particular attention should be paid to the elements of a can use numerals for these numbers as this makes them consistent with the others in this paragraph.

Some major risks are modifiable in that they can be prevented, treated, and controlled. There are considerable health benefits at all ages, for both men and women, in stopping smoking, reducing cholesterol and blood pressure, eating a healthy diet and increasing physical activity (Alina, 2013).

The nurse is important in educating the population about health matters. A nurse helps individuals to change behavior by providing ongoing support for information, advice, and lessons, as well as assessing the motivations of their actions and behavior (Novysedláková, Hudáková, & Kozáková, 2015). Strengthening health is characterized as ‘behaviors’ that pursue a certain goal and progresses to health promotion as a process of increasing the ability of people to influence and improve their health. The aim of this survey is to establish whether respondents understand the risk factors of their lifestyle and about cardiovascular diseases and preventive measures that lead to their reduction or total elimination. Statistical methods are used to determine the differences in attendance of preventive checkups, the knowledge and observance of risk factors of lifestyle, and the interest to change lifestyle based on gender.

Data and Methodology

Exploratory data were obtained from 70 outpatients in a general practitioner’s department. Respondents were classified by gender, age, and the presence of a minimum of one risk factor for cardiovascular disease. From a total number of 70 respondents, there were 14 of the age 18–30 years (27.9%), 20 of the age 31–45 years (28.9%), and 36 respondents of 46 and more years (50.9%). Altogether, 32 male (45.8%) and 38 female (53.9%) participated in the survey. Adjusting for education showed there were 10 respondents with primary education (13.8%), 42 respondents with secondary education (60.1%), and 18 respondents accomplished university education (25.7%). The survey was carried out using a non-standardized questionnaire. Apart from demographic information and data about blood pressure, body weight, and height, it contained ten items for assessing knowledge of risk factors for cardiovascular disease, ten for lifestyle and the attitude towards changing lifestyle, and five regarding respondents’ interest in education about the subject.

The survey was carried out from December 2012 to January 2013 in a general practitioner’s outpatients’ department of a non-state health institution.
Results of the survey were statistically evaluated using the chi-squared test using Microsoft Excel version 2013 with the add-on function, CHINV, which calculates the inverse of the right-tailed probability of the chi-square distribution. At 5% level of probability, the critical $\chi^2$ for one degree of freedom (df) was 3.841, as determined using the CHINV.

Our hypothesis: In these files, there is a significant difference (chi.q>chi.q.crit) between male and female in the measures taken to reduce cardiovascular disease. Critical differences between men and women were regarding attendance for preventive check-ups and proper regime observance to reduce cardiovascular disease.

**Results and Discussion**

Regular fifty-four respondents of the total 70 (55.7%) at least once in two years. The chi-squared result was 3.455 (df: 1; critical value: 3.841) (Table 1), there was no significant difference between men and women based on the collected data in participating in preventive checkups.

<table>
<thead>
<tr>
<th>Table 1: Regular attendance for preventive check-ups</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Regular attendance</strong></td>
</tr>
<tr>
<td><strong>Counts</strong></td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
<tr>
<td>$(O – E)^2/E$</td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td>Chi-squared = 3.455</td>
</tr>
<tr>
<td>Df = 1</td>
</tr>
</tbody>
</table>

We present other survey of results. Eleven respondents (15.7%) indicated that they would be at risk of cardiovascular disease; 17 (24.3%) chose more likely than not; 30 (42.9%) could not assess either way; 5 (7.1%) were convinced they were less likely to be at risk; 3 (4.3%) answered that they were not at risk of cardiovascular diseases occurring; and 4 (5.7%) were being treated for cardiovascular disease at that time. Twenty respondents (28.6%) answered they knew of the medical examination for which they were entitled under the terms of a preventive checkup; while 25 respondents (35.7%) were unaware, and 25 respondents (35.7%) relied on the decision of the general practitioner.

Cardiovascular disease occurred in the family of 37 respondents (52.9%). It did not occur in 20 respondents (28.6%), and 13 respondents (18.6%) did not know about the occurrence of cardiovascular disease in their families. For changes in lifestyle for cardiovascular risk were motivated 43.9% respondents.

Preventive checkups are itemized in Act N°577 of 2004 of the Statute Book on Health Care Extent. Although health insurance companies completely finance them, the majority of people do not complete their check-ups. The Act on Health Care Extent lists 15 different preventive check-ups.

According to the statistical data of health insurance companies, female, in general, are more disciplined than men in completing the checkups. Women in the productive age range of 35–45 years appear to approach preventive checkups most responsibly. People with higher education also complete them more often. The majority of the population, however, does not feel obliged to complete such.

According to Framingham (2002, pp. 3068–3072), the risk of ischemic heart disease occurring at age 40 years is 21% for a male and 20% for a female. Prognostication is serious for a population with risk factors. The incidence of diseases of the circulatory system are 3–4 times higher in males, than in females. With age, the incidence of coronary heart disease increases for both male and female. After menopause, female suffer the same incidence as male. For the working-age population, coronary heart
disease is a recognized disability, but significantly more so for male than female (Report on the State, 2015). Individuals with relatives displaying pre-existing ischemic disease (male < 55 years, female < 65 years) have an increased risk of developing coronary artery disease and should have their risk factors evaluated (Riečanský, 2009). Family and personal history fall into the category of ‘uncontrollable’ risk factors. It is also likely that intra-uterine effects on the fetus such as smoking or inadequate maternal nutrition during pregnancy may be significant. The family history of male under 55 years of age and female under 65 with premature ischemic cardiovascular disease is an independent risk factor (Štejfa et al., 2015).

Regarding knowledge about risk factors for coronary heart disease, the chi-squared result was 18.651 (Table 2) and higher than the critical value at the 0.05 probability. Thus, there was a significant difference between male and female in this respect.

### Table 2: Knowledge about risk factors for coronary heart disease

<table>
<thead>
<tr>
<th></th>
<th>They have knowledge (n)</th>
<th>They do not have knowledge (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Observed (O)</td>
<td>Expected (E)</td>
</tr>
<tr>
<td>Counts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>7</td>
<td>16</td>
</tr>
<tr>
<td>Female</td>
<td>28</td>
<td>19</td>
</tr>
<tr>
<td>Total</td>
<td>35</td>
<td>35</td>
</tr>
<tr>
<td>(O – E)²/E Male</td>
<td>5.063</td>
<td>5.063</td>
</tr>
<tr>
<td>Female</td>
<td>4.263</td>
<td>4.263</td>
</tr>
<tr>
<td>Chi-squared =</td>
<td>18.651</td>
<td></td>
</tr>
<tr>
<td>Df = 1</td>
<td>Critical value = 3.841</td>
<td></td>
</tr>
</tbody>
</table>

Source: Authors

The survey results, that describe lifestyle of respondents. Of the total number, 22 respondents (31.4%) smoked cigarettes. Three respondents (4.3%) smoked 0–5, nine (12.9%) 6–10, three (4.3%) 11–15, and five (7.1%) more than 15 cigarettes daily. Thirty-three respondents (47.1%) participated in sports activities in their free time. Twenty-eight respondents (40.0%) were aware of the dietary intake suitable for reducing the risk of cardiovascular disease, and 21 respondents (30.0%) mostly knew. A body mass index higher than 29 was determined in (41.4%) of respondents.

There remains a risk for heart disease in Slovak population. It was found that, regarding the four most serious risk factors, 25% of the population show no risk, more than 33% display one, 25% two, 8% three and 1% all four factors. According to the Social Insurance Agency in Slovakia, the leading cause of disability in 2016 regarding civilization diseases result from unhealthy lifestyles and diets, lack of exercise, and stress. This is reflected particularly in male, in whom up to 15% of disability cases is caused by diseases of the circulatory system. In general, the risk of ischemic heart disease is higher in male than in female, mainly in male at a younger age; male in middle age already have a high occurrence of the main risk factors. More often they suffer from an abdominal type of obesity and metabolic syndrome. Health consultations first visited 1590 smokers, of which 598 were male and 992 female. Of these 1590 smokers, 22% of the highest smoking prevalence was in the age group 20–24 years in the male or 25–34 years in female. In the ages, 25–64 years, optimum weight occurred in 35.1% of male and 43.2% female. Overweight and obesity was observed in 64.6% of male and 54.9% female (Report on the State, 2015). The difference in the incidence of coronary artery disease decreases with change in lifestyle away from high consumption of cigarettes, alcohol, and oral contraceptives, and the changing role and position of women in modern society (Riečanský, 2009, p. 71).

For lifestyle measurements, the chi-squared result was 20.124 (Table 3), which is greater than the critical value of 3.841 for the 0.05 probability. Hence, the result is statistically significant. The given
data was significantly higher among female, who know observance of a healthy diet is necessary for the prevention of ischemic heart disease.

**Table 3: Measures in lifestyle that reduce the risk of cardiovascular disease**

<table>
<thead>
<tr>
<th></th>
<th>Reduce the risk</th>
<th>Do not reduce the risk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Observed (O)</td>
<td>Expected (E)</td>
</tr>
<tr>
<td>Male</td>
<td>12</td>
<td>28.343</td>
</tr>
<tr>
<td>Female</td>
<td>50</td>
<td>33.657</td>
</tr>
<tr>
<td>Total</td>
<td>62</td>
<td>8</td>
</tr>
<tr>
<td>(O – E)^2/E</td>
<td>Male</td>
<td>9,424</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>7,936</td>
</tr>
<tr>
<td>Chi-squared</td>
<td>= 20,124</td>
<td></td>
</tr>
<tr>
<td>Df = 1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Authors

Regarding interest in changing lifestyle, the chi-squared results of 1.789 (Table 4) was less than the critical value for a 0.05 probability. Thus, there was no significant difference between male and female. Interested in changing their current lifestyle were thirty-six respondents (51.4%), 29 responded (41.4%) they were more likely to than not, five responded (8.0%) they could not assess it.

The number of deaths from injuries increases with age, up to the age of 64 years. This occurs mainly at age 15 years, where death among boys and male is 3–6 times higher than girls and women for higher-risk models in their behavior.

**Table 4: Interest in changing lifestyle**

<table>
<thead>
<tr>
<th></th>
<th>Interest</th>
<th>Do not interest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Observed (O)</td>
<td>Expected (E)</td>
</tr>
<tr>
<td>Male</td>
<td>25</td>
<td>29.714</td>
</tr>
<tr>
<td>Female</td>
<td>40</td>
<td>35.286</td>
</tr>
<tr>
<td>Total</td>
<td>65</td>
<td></td>
</tr>
<tr>
<td>(O – E)^2/E</td>
<td>Male</td>
<td>0.748</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>0.629</td>
</tr>
<tr>
<td>Chi-squared</td>
<td>= 1.789</td>
<td></td>
</tr>
<tr>
<td>Df = 1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Authors

Slovakia may obtain representative data on the prevalence of both risk factors in repeated screenings of population health, under the World Health Organization, Program of Countrywide Integrated Noncommunicable Disease Intervention. This data is a national study of health surveillance for the years 1993, 1998, 2003, and 2008 that uses international criteria. The European Health Examination Survey (EHES) Act 2011–2012 is a product of the activities of counseling centers for the protection and promotion of health (referred to as ‘health counseling’) within the framework of individual interventions of clients interested in their health (Report on the State, 2015). Primary efforts focus on the control of reversible coronary risk factors atherosclerosis. Clients are to avoid smoking and
commence effective control of hypertension, diabetes, and hyperlipoproteinemia. Modifying lifestyle involves a change in eating habits, increasing physical activity, and easing mental stress by practicing relaxation techniques. An ideal approach is a comprehensive one that deals with all risk factors (Ades, 2001). Changing dietary intake, introducing regular physical activity, and converting to non-smoking will reduce cardiovascular risk in the adult population by as much as 30%, and significantly improve an individual’s control over developing heart and blood vessel diseases (Riečanský, 2009, p.71).

This research examining the differences between males and females found that it was difficult to separate innate types of behavior from learned or to understand the extent to which stereotypes affect the perception of individuals and the behavioral or cognitive differences between the sexes. The research shows that compared with existing similarities between males and females the extent of these differences is minimal (Gender Differences, 2010, pp. 42–51). Changes in the lifestyle of a patient with ischemic coronary or other atherosclerotic disease depend on his or her willingness to modify his or her behavior. Many patients choose to make a change in their lifestyle and often with the support of a professional health worker or family.

Conclusion

Research results revealed significant differences between male and female knowledge of lifestyle risk factors and proper regime observance. Results of scientific research indicate that with a change towards nutrition, regular physical activity, and non-smoking, the risk of cardiovascular disease in the adult population could reduce by 30% and thus, help control the advancement of cardiovascular diseases. Human health and behavior cannot be separated. Since many of the current generation of citizens are prone to illnesses from an improper lifestyle, a change towards healthy lifestyle habits and shifts in behavior can have an immense role in health protection. A greater emphasis on studying human behavior towards health would help improve overall public health. The nurse who achieved a professional qualification for a medical occupation, apart from tending care, assists in protecting, supporting, and maintaining health along with specialized functions in the sphere of health education and instruction and research connected with providing health care.

References


PAIN MANAGEMENT IN GERIATRIC PATIENTS AND THE ROLE OF THE NURSE
Diana Paskaleva,1 Maria Semerdjieva,2 Stoilka Tufkova3

Abstract:
Introduction: The role of the nurse for pain management in geriatric patients is not only for the administration of painkillers prescribed by a doctor. It also includes timely information about it, accurate assessment of its extent, which facilitates the physician’s diagnostic actions, rapid intervention and control of the syndrome, in order to achieve the ultimate goal of improving the quality of life of geriatric patients.
Purpose: We set a goal to investigate the opinion of geriatric patients, and if the pain syndrome is positively affected by the nurses in inpatient care.
Materials and methods: The study includes an anonymous survey of 392 patients aged over 65 years who received treatment in the inpatient department.
Results: It was determined that sex factorial signs P<0,01 ($\chi^2 = 10,63$) and age P <0,001 ($\chi^2 = 18,29$) are expressed according to the management of pain during hospitalization.

UDC Classification: 613.9. DOI: http://dx.doi.org/10.12955/cbup.v5.1058
Keywords: geriatric patient, pain syndrome, nurse

Introduction
Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described as such. Pain is always subjective and every individual gives his own interpretation of it. It can be classified according to the duration, the etiology, and according to the prognosis. The most common complaint among geriatric patients is pain. The diseases that are most prevalent in geriatric patients are cancer, diseases which affect the musculoskeletal system, and chronic diseases occurring with severe pain (AGS Panel on Persistent Pain in Older persons, 2002). Geriatric patients are often misunderstood because of the pain (Gloth, 2001). The consequences can have a negative impact on the health and quality of life of older people which leads to depression, anxiety, social isolation, cognitive impairment and sleeping problems. (Cavalieri, 2002) (Ferrell, 2001). Medical professionals contribute towards good practices of pain management.
The nurse is the main purveyor in the system of care for anesthesia, not only giving proper information and direction, but for also applying painkillers on time. Effective pain assessment is a prerequisite for proper planning of activities and proper behavior that the nurse should have. During the assessment she must obtain information from the patient and their relatives, which will help her to understand their feelings. The obtained information is necessary for planning and evaluating the strategies to help to cope with the pain syndrome in a timely manner. (Toncheva, 2005)
The author's team of M. Popov, B. Davidov and M. Marinov after a review of literature on the opinions of the patient from hospital services concluded that “the patient is subject to their needs, rights, feelings, satisfaction and dissatisfaction” (Popov M., 2000)

Purpose: We set a goal to investigate the opinion of geriatric patients, and if the pain syndrome is aided by the nurses in inpatient care

Materials and methods: The study includes an anonymous survey of 392 patients aged over 65 years who received treatment in the inpatient department.
The survey was made using the method of an interview, and given the peculiarities of the research contingent. The study covered all University and General Hospitals in Plovdiv.

Results: After statistical processing of data we concluded the following:
The study found that in the majority of patients (62.6%) the pain syndrome during the time period of hospitalization was completely controlled. Half of the remaining respondents (24%) received partial responses, and only 9% of patients clearly had no relief to the pain syndrome. It is noteworthy that 4% of the surveyed geriatric patients could not judge and give a definite answer to the question of- is there

1 Faculty of Public Health, MU-Plovdiv, Bulgaria, paskaleva_1975@abv.bg
2 Faculty of Public Health, MU-Plovdiv, Bulgaria, msemerdjieva@abv.bg
3 MU-Plovdiv, Bulgaria, tufi_med@abv.bg
a positive effect of the applied treatment or even a temporary response in view of the complexity of the used anti-viral therapy (Figure 1).

![Figure 1: Mastery of the pain process according to the patients](image1)

Source: Authors

The conducted statistical analysis confirms the alternative hypothesis, that gender is in strong correlation with the management of the pain during hospitalization $P < 0.01$ ($\chi^2 = 10.63$) (Figure 2).

![Figure 2: Correlation between gender and management of the pain syndrome](image2)

Source: Authors

It is noteworthy that in both sexes there is a high percentage of positive responses to pain relief - 54.50% for men and 68.80% for women. Moreover, the women’s sample had less than 4% show an inability to decide.

Most likely, we associate this with the greater female emotional state and the constant active search for comprehensive medical care and adequate treatment.

There is a correlation between age and management of the pain syndrome $P < 0.001$ ($\chi^2 = 18.29$) (Figure 3).

Advancement of the age of patients over 65 years and the presence of concurrent somatic diseases, often several such as: atherosclerosis, transient cerebral circulation disorders and a number of others, suggest that geriatric patients cannot accurately assess and give a clear assessment of the effectiveness
of controlling the pain syndrome - 28.70%. The percentage of respondents from both age groups with definite negative response is also not that small – 18.80%.

Figure 3: Correlation between age and management of the pain syndrome

Source: Authors

Discussion

The obtained results are revealing. According to the ethical code of healthcare professionals the nursing profession is based not only on humanity and compassion, but also on professional competence. Data show that nurses have a deficit in knowledge about management of pain syndromes. Barriers to medical staff for effective pain management are an inadequate assessment and judgment of the same, not reporting by patients, atypical manifestations of pain in the elderly.

Very important is the skillset a nurse should have when working with people experiencing pain, and that makes it necessary to be well aware of the phenomena (symptoms and behaviors) that can help them in the process of identifying, planning, and assessing the condition and actions that need to be taken. Some authors define a cyclic nature of the pain-related phenomena that can be schematically presented (Figure 4).

Figure 4: A cycle of pain related phenomena

Source: Authors

Effective pain assessment is a must for proper planning of activities and adequate actions that needs to be taken by the nurse. In the evaluation process, the nurse has to get information from the patient and potentially their relatives, which helps the nurse understand the patient’s feelings. The information received is necessary for planning and evaluating assistance strategies (Figure 5).
Conclusion

Pain management for each patient, incl. the geriatric ones is a result of complex factors, in which the physician and the nurse actively participate. Timely information from the nurse about the presence of pain and a proper assessment of its extent especially in the elderly, contribute to rapid pain management, and this is a prerequisite for improving the quality of life of geriatric patients.

References


LASER STOKES-POLARIMETRY OF THE ERYTHROCYTES SUSPENSION AT COMORBID COURSE OF CORONARY ARTERY DISEASE, DIABETES MELLITUS TYPE 2 AND ANEMIA

Nataliia Pavlyukovich,1 Oleksandr Pavlyukovich,2 Marta Garazdiuk,3 Oleg Wanchuliak,4 Oleksandr Garazdiuk5

Abstract:
Introduction: Investigation of the rheological properties of the erythrocytes is one of the crucial issues in the pathogenesis of most diseases of internal organs. Changes in the morphological structure of the red blood cell membrane serve as an early diagnostic criterion of coronary artery disease, diabetes mellitus type 2 and anaemia, thus a search for modern methods of investigation which can be used for early detection of erythrocytes membrane disorders is of great importance. Methods of laser polarimetry of the erythrocytes suspension smear are crucial in this area.

Objectives: Investigation of the possible structural changes of the erythrocytes membranes in patients with coronary artery disease, diabetes mellitus type 2 and anaemia of different degrees of severity.

Methods: For the objective assessment of the structural state of erythrocytes membrane laser polarimetry of the red cell suspension smear was applied. Set of the statistical points of the 1st-4th grades was calculated and their effectiveness in the early pre-clinical detection of the erythrocytes membrane disorder was established.

Results: Images of the erythrocytes suspension samples, registered in the co-axial and crossed planes of the polarizer and analyser transmissions, regardless of the investigated group, are coordinating heterogeneous. However, obvious signs of the changes of the images structure depending on the presence and type of pathology are not visually detected. As the basis of an objective approach, a statistical analysis with histograms of the coordinate distributions of the random variables and a statistical calculation of the statistical points of the 1st-4th grades should be used. All statistical points, which describe the coordinate distributions of the various parameters of the Stokes vector, have individual sets of values and may be used for the differential diagnosis of the coronary artery disease, diabetes mellitus type 2 and anaemia.

Conclusions: Interconnections between the values of the sets of the statistical points of the 1st-4th grades, which characterized coordinate distributions of the intensity, azimuth and ellipticity of the polarization of the erythrocytes suspension laser images of the elderly and senile patients with comorbidity were established by means of laser polarimetry. The most sensitive were asymmetry and kurtosis, which can be used for early detection of the erythrocytes membrane disorder when routine methods of its visualization and estimation still are not able to be applied.

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Keywords: coronary artery disease, diabetes mellitus, anemia, laser, polarimetry

Introduction
Laser radiation during interaction with biological tissue (BT) can be absorbed and dissipated. Ushenko et al. (2007) found that each of these processes has some information on the micro- and macrostructure of the biological environment. According to Ushenko and Bachynskiy (2007), modelling the structure of the BT is based upon the idea that it is a two-component structure that consists of:

- optical-anisotropic component – the matrix predominantly formed by the fibrous tissue components (collagen fibers, proteins, fibrin fibers, etc.). This component is able to change the main parameters of the laser radiation during its passage through the layer of BT;
- amorphous component – the components of BT, which has no fibrous structure. The latter is optically neutral, i.e. one that does not change the basic characteristics of the beam of laser radiation while passing through BT.

The possibility of usage of the laser polarimetry methods for objective assessment of the erythrocytes’ membranes is caused by the presence in their architecture the significant part of the specific protein structures which, in its turn, are anisotropic from the optical point of view, that is, they are able to change the properties of the laser radiation during its passage through BT. Protein components of the

1 Bukovinian State Medical University, Ukraine, natasha.pavlyukovich@gmail.com
2 Bukovinian State Medical University, Ukraine, olexandr.pavlyukovich@gmail.com
3 Bukovinian State Medical University, Ukraine, m.garazdiuk@gmail.com
4 Bukovinian State Medical University, Ukraine, sudmed@bsmu.edu.ua
5 Bukovinian State Medical University, Ukraine, olexandr.harazdiuk@gmail.com
erythrocyte membrane, unlike lipid, have the clear complicated hierarchical structure due to their complex level of organization.

It is known by Korin, et al., (2007) and Steiner et al., (2009) that spectrin of the erythrocyte membrane has a penta- or hexagonal structure, which is formed by the tetramers of its molecules, that are linked to short actin microfilaments on both ends. It was shown by Krylov et al., (2010) that spectrin cytoskeleton of the erythrocyte maintains the definite form of the cell, therefore structural change in the ordering of the molecules can serve as a prerequisite change of the morphological structure of the erythrocyte membrane and the resulting disorder of its functional properties.

Aim: to investigate possible structural changes of the erythrocytes membranes in patients with coronary artery disease (CAD), diabetes mellitus (DM) type 2 and anaemia of different degrees of severity by means of laser polarimetry methods.

Material and Methods of Investigation. 88 patients with CAD, DM type 2 and anaemia, hospitalized to the cardiological department of the Chernivtsi Regional Hospital for War Veterans, were under investigation. They were randomized into subgroups according to the comorbid pathology: I – CAD patients with concomitant DM type 2 (n=12), II – patients with CAD, complicated by concomitant anaemia and DM type 2 (n=76). The control group for comparative studies comprised 12 patients with CAD without comorbid pathology.

For the objective assessment of the structural state of erythrocytes membrane, laser polarimetry of the red cell suspension smear was applied. Scheme of the optical laser polarimeter is presented in Figure 1.

**Figure 1: Optical laser polarimeter**

1 – He-Ne laser; 2 – collimator; 3, 5, 8 – quarter-wave plates; 4 – polarizer; 6 – object of investigation; 7 – object glass; 9 – parser; 10 – CCD camera; 11 – personal computer

Irradiation was conducted by the beam (Θ=104 mkm) of the He-Ne laser (1) with a wavelength λ=0.6328 mm. With the help of the polarizing film (quarter-wave plate and polarizer) different states of polarization of the illuminating beam were formed. Polarization images of the layers of the erythrocyte suspension (6) were formed in the plane of the light-sensitive pad (800x600) of the CCD camera (10) through the object glass (7), the resolution of which was sufficient for the measurements in the size range of structural laser images of the erythrocytes suspension (2-2000 microns).

To assess coordinate distributions of the random variables their histograms were used; after that we calculated a set of the statistical points of the 1st-4th grades.

**Results of the Investigation.** To determine the main 2D-parameters of the Stokes vectors distribution in the plane of the laser image of the erythrocyte suspension we determined the value of the Stokes vector of such images by means of six measurements of the intensity in case of the following polarization filtering conditions using a polarizer-analyzer.

The plane of the polarizer-analyzer transmission on the angle Θ=0º was oriented and intensity distribution I₀(m×n) of the laser images was measured (Figure 2). Then the plane of the polarizer-analyzer transmission on the angle Θ=90º was changed and coordinate intensity distribution I₉₀(m×n) of the laser images was detected (Figure 3). Based on the definition of the Stokes vector S we established its first parameter S₁ which characterized the full intensity I according to the following ratio – S₁=I₀+I₉₀ (Figure 4).
After that the plane of the polarizer-analyzer was oriented on the angle and coordinate distribution of $I_{45}(m\times n)$ of the erythrocytes suspensions laser images was measured (Figure 5). Later on, the plane of the polarizer-analyzer transmission on the angle was changed and coordinate intensity distribution $I_{135}(m\times n)$ of the red blood cells polarization images was measured (Figure 6). According to the ratio $S_3 = I_{45} - I_{135}$ the $S_3$ Stokes parameter was found which characterized the azimuth distribution of the laser images polarization (Figure 7).

To measure the fourth parameter of the Stokes vector $S_4$ quarter-wave-length plate was installed in the way of the laser beam, so that the axis of its maximum speed was oriented at the angle of 0° to the plane of the probe laser beam polarization. The plane of the polarizer-analyzer transmission was oriented on the angle and the coordinate intensity distribution of the right-circulating polarized light was measured (Figure 8).

Finally, we oriented the plane of the polarizer-analyzer transmission on the axis of the maximum speed of the quarter-wave-length plate on the angle and measured the intensity distribution of the left-circulating polarized light (Figure 9). According to the ratio coordinate distribution of the fourth parameter of the Stokes vector $S_4$ of the red cell suspension laser image was calculated (Figure 10), which described the birefringence of the biological layer of the erythrocytes suspension.
Having analyzed the images of the erythrocytes suspension samples, registered in the co-axial (Θ=0º) and crossed (Θ=90º) planes of the polarizer and analyzer transmissions, we established that all of them, regardless of the investigated group, are coordinating heterogeneous (Figure 11).

Figure 11: Images of the erythrocytes suspension samples of the investigated patients

<table>
<thead>
<tr>
<th>Control group</th>
<th>CAD+DM</th>
<th>CAD+DM+anemia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Θ=0º</td>
<td>Θ=90º</td>
<td></td>
</tr>
</tbody>
</table>

Source: Author

Red blood cells contained optically anisotropic areas of the substance, which were visualized in the form of the enlighten areas in the crossed polarizer and analyzer (Θ=90º). However, obvious signs of the changes of the images structure depending on the presence and type of pathology were not visually detected.

According to the above-mentioned facts we aimed at the determining of the objective (quantitative) criteria for the differentiation of the patterns of the polarization-inhomogeneous laser images and search for possible connections between the changes in the red blood cells structure and investigated comorbidity.

As the basis of such objective approach statistical analysis with histograms of the coordinate distributions of the random variables and statistical calculation of the statistical points of the 1st-4th grades was used. Figure 12 shows the coordinate (1, 3, 5) and probability (2, 4, 6) distribution of the values of the parameters of the Stokes vector $S_{1,3,4}(m \times n)$ at the points of the erythrocyte suspensions laser images of the patients of the control group. The obtained results clearly visibly represent the coordinate heterogeneous and individual types of the histograms of the distribution of the values of intensity ($S_{1}(m \times n)$), azimuth ($S_{3}(m \times n)$) and ellipticity ($S_{4}(m \times n)$) of the polarization of the erythrocyte suspensions laser images of the patients of the control group.
To have the quantitative criteria to characterize such complex images, we calculated a set of statistical points of the 1\textsuperscript{st}-4\textsuperscript{th} grades in the statistically significant groups according to the known algorithms. Average values of the obtained parameters and ranges of their difference within the control group are given in the Table.

Table 1: The set of statistical points of the 1\textsuperscript{st}-4\textsuperscript{th} grades of the coordinate distribution of Stokes vector parameters of the patients with coronary artery disease with comorbid diabetes mellitus and anaemia

<table>
<thead>
<tr>
<th>Statistical point</th>
<th>Control (n=12)</th>
<th>CAD+DM (n=12)</th>
<th>CAD+DM+anaemia (n=76)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$S_1$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\mu$ medium</td>
<td>0,67±0,072</td>
<td>0,69±0,017</td>
<td>0,69±0,019</td>
</tr>
<tr>
<td>$\sigma$ variance</td>
<td>0,15±0,012</td>
<td>0,11±0,009</td>
<td>0,095±0,012</td>
</tr>
<tr>
<td>$\alpha$ asymmetry</td>
<td>0,32±0,021</td>
<td>0,52±0,011</td>
<td>2,42±0,191*</td>
</tr>
<tr>
<td>$\varepsilon$ kurtosis</td>
<td>0,21±0,028</td>
<td>0,44±0,053</td>
<td>2,23±0,421*</td>
</tr>
<tr>
<td>$S_3$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\mu$ medium</td>
<td>0,01±0,003</td>
<td>0,03±0,005</td>
<td>0,03±0,004</td>
</tr>
<tr>
<td>$\sigma$ variance</td>
<td>0,09±0,015</td>
<td>0,07±0,032</td>
<td>0,07±0,028</td>
</tr>
<tr>
<td>$\alpha$ asymmetry</td>
<td>0,05±0,002</td>
<td>0,065±0,001*</td>
<td>0,14±0,002* §</td>
</tr>
<tr>
<td>$\varepsilon$ kurtosis</td>
<td>3,21±0,11</td>
<td>3,78±0,083</td>
<td>3,86±0,310</td>
</tr>
<tr>
<td>$S_4$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\mu$ medium</td>
<td>0,02±0,002</td>
<td>0,025±0,0023</td>
<td>0,07±0,02* §</td>
</tr>
<tr>
<td>$\sigma$ variance</td>
<td>0,26±0,037</td>
<td>0,14±0,059</td>
<td>0,12±0,076</td>
</tr>
<tr>
<td>$\alpha$ asymmetry</td>
<td>0,07±0,009</td>
<td>0,095±0,0080</td>
<td>0,14±0,012*</td>
</tr>
<tr>
<td>$\varepsilon$ kurtosis</td>
<td>2,14±0,33</td>
<td>2,310±0,19</td>
<td>4,52±0,25*</td>
</tr>
</tbody>
</table>

Source: Author
Analysis of the results revealed that all the statistical points of the 1st-4th grades, which described the coordinate distributions of the various parameters of the Stokes vector, had individual sets of values. Thus, we found the evaluability of the statistical parameters to distinguish the intensity, azimuth and ellipticity of the polarization of the red cell suspension laser images.

Figure 13 demonstrates that coordinate distributions of the Stokes vector parameters $S_{i=1,3,4}(m \times n)$ of the polarization-inhomogeneous image of the erythrocyte suspensions layer of the patients with coronary artery disease and comorbid diabetes mellitus type 2 are different from the previously analysed (Figure 10) — the spread of the random values of the polarization azimuth $S_{i=3}(m \times n)$ and ellipticity $S_{i=4}(m \times n)$ is gradually decreasing. This results in the decreasing of the variance $\sigma$, and, conversely, increasing of the asymmetry $A$ and kurtosis $E$.

| Figure 13: Coordinate and probability structure of the Stokes vector parameters $S_{i=1,3,4}(m \times n)$ at the points of the erythrocyte suspensions laser images of the patients with coronary artery disease and diabetes mellitus type 2 |
|---|---|
| $\sigma(S_{i=1,3,4})$ | $\sigma(S_{i=1,3,4})$ |
| $\sigma(S_{i=1})$ | $\sigma(S_{i=1})$ |
| $\sigma(S_{i=3})$ | $\sigma(S_{i=3})$ |
| $\sigma(S_{i=4})$ | $\sigma(S_{i=4})$ |
| $\sigma(S_{i=1})$ | $\sigma(S_{i=1})$ |
| $\sigma(S_{i=3})$ | $\sigma(S_{i=3})$ |
| $\sigma(S_{i=4})$ | $\sigma(S_{i=4})$ |
| Source: Author |

It was established that a set of the statistical points of the 1st-4th grades, which characterized the coordinate distribution of the Stokes vector parameters of the polarization-inhomogeneous images of the erythrocyte suspensions samples of the patients with coronary artery disease and diabetes mellitus type 2, the following differences compared with the same parameters of the samples of the control group are typical: medium $M(S_{i=1,3,4})$ — approximately unchanged; variance $-\sigma(S_{i=1,3,4})$ — decreased 1,36 times, $\sigma(S_{i=3})$ — 1,29 times, $\sigma(S_{i=4})$ — 1,86 times correspondently; asymmetry $-A(S_{i=1})$ — increased 1,63 times, $A(S_{i=3})$ — 1,30 times, $A(S_{i=4})$ — 1,36 times correspondently; kurtosis $E(S_{i=1})$ — increased 2,09 times, $E(S_{i=3})$ — 1,18 times, $E(S_{i=4})$ — 1,08 times correspondently.

The results of the laser polarimetry of the red blood cell suspension smears of the patients with CAD, DM type 2 and moderate anaemia are illustrated in Figure 14. It was found that the values of the statistical points of the 1st-4th grades, which characterized the coordinate distribution of the Stokes vector parameters of polarization-inhomogeneous images of the erythrocyte suspensions samples of
the patients with CAD, DM type 2 and moderate anaemia, differed statistically from the similar parameters of the samples of the control group (Table): medium $M(S_{i=1;3;4})$ – approximately unchanged; variance $\sigma(S_{i=1})$ – decreased 1.58 times, $\sigma(S_{i=3})$ – 1.28 times, $\sigma(S_{i=4})$ – 2.17 times correspondently; asymmetry $A(S_{i=1})$ – increased 7.56 times, $A(S_{i=3})$ – 2.8 times, $A(S_{i=4})$ – y 2.0 times correspondently; kurtosis $E(S_{i=1})$ – increased 10.62 times, $E(S_{i=3})$ – 1.20 times, $E(S_{i=4})$ – 2.11 times correspondently.

**Conclusion.** Thus, interconnections between the values of the sets of the statistical points of the 1st-4th grades $M; \sigma; A; E$, which characterized coordinate distributions of the intensity $S_i(m \times n)$, azimuth $S_3(m \times n)$ and ellipticity $S_4(m \times n)$ of the polarization of the erythrocytes suspension laser images of the elderly and senile patients with comorbidity were established by means of laser polarimetry. Methods of the laser polarimetry of the red blood cells smear with the following analysis of the statistical points of the 1st - 4th grade might be used for early diagnosis of the structural and functional changes of the erythrocytes in patients with a combined course of coronary artery disease, diabetes mellitus type 2 and anaemic syndrome, especially at pre-clinic stages.

**References**


CLASSIFYING THE SENSITIVE TYPE OF PATIENTS WITH A WEB BASED UNIT IN INFORMATION SYSTEMS FOR DOCTORS PRACTICING CLINICAL HOMEOPATHY

Zhivko Peychev, 1 Antonia Yaneva, 2 Sava Petrov, 3 Stela Peycheva 4

Abstract: In pathogenic experimentation in homeopathy on healthy volunteers, some individuals develop stronger reactions than others, i.e. they show more symptoms of the same biologically active substance. They are defined as sensitive type (ST) individuals. The aim of this work is to create a web-based module for determining ST patients in the homeopathic information system. Material and methods: We carried out an analysis of test questions relating to the definition of ST patients from a specialized homeopathy manual (Horvilleur, 2003). For the development of a web-based GUI, we used Oracle APEX. Results: For the implementation of the software module of ST and the disclosure of its features an electronic questionnaire was developed, containing 533 test questions. Processing the responses from the test allows the programming module to indicate one of 20 medications for ST patients in a specific clinical situation. Conclusion: The module for determining ST patients helps the doctor practicing clinical homeopathy to significantly shorten the time for prescribing the medicament for the terrain treatment in primary care.

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UDC Classification: 614.2

Keywords: sensitive type, clinical homeopathy, information systems.

Introduction

A homeopathic medical history contains information about the current, past and atopic diseases of the patient, of its behavioural effects, morphological signs, disease trends, modalities and related features that allow homeopathic doctors to detect a drug, i.e. most similar (Balzarini et al., 2000; Clausen et al., 2010; Siqueira, et al., 2016).

In modern society, web-technologies are becoming increasingly important (Clausen et al., 2014; Liberati et al., 2015; Murugesan et al., 2016; Teixeira, 2013). Currently, their effective use has become a critical success factor. Their use in homeopathic medicine helps at a great extent the specialists in search of a personal drug (P-drug) for a particular patient. The idea of developing an online poll to determine the sensitive type (ST) patients in the information system arose from the need to reduce the time to perform this process. In creating the survey was used the competence of experts in the field of homeopathy with many years of practical experience and poll issues of the specialized family guide to homeopathy (Horvilleur, 2003). The present work presents a web-based test to determine the ST patients introduced in the information system.

Aim

The purpose of this work is to create a web-based test in the homeopathic information system determining ST patients. Allowing for the minimization of errors in processing the results, as well as the time taken to calculate them.

Material and methods

Establishing the program module is implemented in two stages: first – analyzing data from a family guide to homeopathy (Horvilleur, 2003) and second – developing an online questionnaire by Oracle APEX, followed by creating an algorithm for finding the drug in accordance with these data.

Results

For the software implementation of the ST module and the disclosure of its features we developed an electronic poll containing 533 test questions that the patient should answer with “Yes” or “No.” To introduce the poll, we prepared data for import into a table format using MS Excel.

1 Medical University – Plovdiv, Bulgaria, Faculty of Public Health, zhpeychev@meduniversity-plovdiv.bg
2 Medical University – Plovdiv, Bulgaria, ayaneva@meduniversity-plovdiv.bg
3 Medical University – Plovdiv, Bulgaria, Faculty of Medicine Section Endocrinology and metabolic diseases, spetrov@meduniversity-plovdiv.bg
4 Medical University – Plovdiv, Bulgaria, Faculty of Dental Medicine, angelova_stela@abv.bg
The implementation of the electronic poll put into the system follows the following algorithm (Figure 1):\(^5\)

![Software algorithm to determine the ST patients](image)

The answer of the questions provides information on specific morphological features, individual behaviors and typical disease trends of the ST patient. The system displays the result on the basis of which the doctor prescribes the medicine for the ST, i.e. prescribing appropriate terrain treatment.

As a result of the established algorithm for ST patients, we practically tested the module created by a clinical case: A 51-year-old woman in perimenopause reports an irregular monthly cycle over the past year. Frequent fits of warm waves and blood pressure fluctuations, sleep disturbances, confusion and intolerance to the surrounding people. Refuses to carry out hormonal replacement therapy for climacteric. Prefers to use homeopathy as a safe therapeutic method for warm waves and climax.

In the specific clinical case, the patient responds positively to 8 of the questions. The data are presented in Table 1:

<table>
<thead>
<tr>
<th>№</th>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>I often get bruises without bumping into edges and furniture</td>
<td>Yes</td>
</tr>
<tr>
<td>15</td>
<td>I’m in menopause, or almost on the verge of it.</td>
<td>Yes</td>
</tr>
<tr>
<td>46</td>
<td>I often feel bad with a belt fastened when driving.</td>
<td>Yes</td>
</tr>
<tr>
<td>79</td>
<td>I am a woman who is often sweating suddenly</td>
<td>Yes</td>
</tr>
<tr>
<td>93</td>
<td>I am a woman who is often dreaming of death</td>
<td>Yes</td>
</tr>
<tr>
<td>121</td>
<td>I am often hot</td>
<td>Yes</td>
</tr>
<tr>
<td>127</td>
<td>I am a woman who can hardly tolerate aging</td>
<td>Yes</td>
</tr>
<tr>
<td>137</td>
<td>I often dream of snakes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Test data for a sensitive patient type are reflected in the web based information system, and as a result, the system outputs the homeopathic drug data presented in Figure 2:

\(^5\) Software algorithm to determine the sensitive type patients
As a leading drug the system lists Lachesis mutus, because the identification of a patient of Sensitive Type is performed in three sets of criteria. They are morphological features; behavioral reactions and disease trends.

The peculiarities of the morphological feature are: female patients, in menopause with a characteristic marbled face, violet red nose, dark red or violet lips.

Analysing the behavioral responses we found female patients prone to jealousy, mistrust, alternating volubility and depression again. Disease trends: during climacterium, capillary brittleness and mar; painful hemorrhoids are relieved by bleeding. Different phobias occur, such as fear of death, fear of falling asleep, fear of poisoning, pathological jealousy and sighs; intolerance to everything that tightens. Secondly, the system specifies Argentum nitricum (13%), and Sulfur in third place, based on a history of hyperemia and diseases of the cardiovascular system, the locomotor system and the skin.

**Discussion**

ST patients to a given substance are individuals who in pathogenic experimentation exhibit more symptoms than others and in carrying out the therapy are in need of a lower dose of the drug compared to the others (Horvilleur, 2003). There are three characteristics of the ST patients: similar morphological features, similar nature, and related pathological trends. The history and clinical patient data used until now, make the right choice of the homeopathic treatment difficult and slow. We offer a computerized-testing system that speeds up the process and ensures a high degree of similarity in the choice of treatment. The benefit of an information system for determining the ST consists in the fact that the clinician is oriented quickly in the choice of drug and can predict the development of the disease process. The manifested morphological and characterological features and pathological history of the patient directly to a particular drug. Since the phenotype of the individual is the visible part of its genotype, which determines the “terrain,” we can predict the disease progression and can use drug with a preventative role in disease trends of the individual. Some authors exaggerate the importance of the concept of the sensitive type. For example, Kent – the founder of classical homeopathy puts emphasis on the psychological nuances of the patient than on the real existing disease trends as a result of which a number of inconsistencies in the treatment occur (Jouanny et al., 1998).

Homeopathy is a sophisticated form of personalized medicine – treatment of a specific patient with his individual reactions to the disease factors. Each person responds to the disease in its own way depending on the immune system or their genetic predisposition to one or another disease. Therefore, every person has a kind of “terrain,” within which occurs the influence of environmental and genetic heredity (Germonpre et al., 2000).
“Terrain” is a basic concept in homeopathy, which combines data for a constitutional type, chronic way of reaction and a sensitive type. Each of these elements has its own subspecies. The constitutional type has four subtypes depending on the content of minerals in the body: carbon type, phosphorus type, fluorine type and a sulfur type. The chronic way of response is divided into: psoric, tubercular, sycotic and luetic type. About fifty prototypes of the ST are described. Three sets of criteria are used to identify the specific ST – morphological features, behavioral responses and disease trends. The ST is the basis of the so-called “homeopathic typology of personality” which is linked to a strictly defined homeopathic medicine (Bule et al., 2007). The ST is changeable and rarely remains the same during the whole lifetime of men. Virtually, pure ST does not exist, but rather there is a dominant type with features added from other types and constitutions, which from informational point of view makes their identification difficult.

**Conclusion**

A module for detecting the signs of a Sensitive Type of patient has been created to provide homeopathic physician with information on adequate terrain treatment in acute and chronic pathology. The module helps the doctor practicing clinical homeopathy to significantly shorten the time for prescribing the medicament for the terrain treatment in primary care thus ensuring effective use of a Physician’s resources in the diagnostic and healing process.

**References**


A RARE COMPLICATION OF BCG IMMUNOTHERAPY

Entela Kolovani,1 Ergys Ramosaço,2 Rovena Byku,3 Najada Çomo,4 Rezart Xhani,5 Ervin Rrapushi,6 Dhimiter Kraja7

Abstract: Intravesical Bacillus Calmette-Guérin immunotherapy is an effective agent for superficial bladder carcinoma. The main adverse effect of this treatment is cystitis. Arthralgia and migratory arthritis occur only in 0.5% of patients. Reiter syndrome is a very rare complication that can occur after intravesical apply of Bacillus Calmette-Guérin Immunotherapy. We report the first Albanian case of a patient who developed Reiter’s syndrome following intravesical Bacillus Calmette-Guérin. Diagnose of Reiter’s Syndrome was clinically based, excluding every other reason that could have caused it. Treatment was made with non-steroid and steroid anti-inflammatory drugs, followed by a full recovery result. Even though Reiter's Syndrome is rare, but significant complication of BCG immunotherapy, it’s important to identify it in time, in order we to offer an adequate treatment.

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Keywords: Bladder carcinoma, BCG immunotherapy, Reiter’s syndrome, diagnose

Introduction

Bacillus Calmette-Guérin (BCG), a live attenuated strain of *Mycobacterium bovis*, is the only agent approved for primary therapy of carcinoma in situ of the bladder. BCG therapy also reduces the risk of recurrence and the risk of progression in patients with high-grade non–muscle invasive bladder cancer (Syelvester et al., 2002).

Intravesical BCG is used as first-line therapy for carcinoma in situ of the urinary bladder. BCG therapy showed a complete response rate of 60-68% (Syelvester et al., 2002; Barmoshe et al., 2004). Persistent disease after a complete course of therapy is cause of concern (Herr et al., 1989).

However severe side effects continue to be reported in the literature. The most frequent local side effects are: cystitis in 35 % of cases, bacterial infections in 23.6 % of cases and macroscopic hematuria in 22 % of cases (Brausi et al., 2014). Fever and general malaise are the most frequent systemic side effects (Decaestecker et al., 2015).

The relationship between BCG and its side effects can be made easily, if clinical manifestations occur shortly after the administration of this therapy. Mild and short arthralgias, without consequences, occurs regularly during a BCG course. Reiter’s syndrome is a very rare adverse side (Salorta et al., 1996; Pancaldi et al., 1993; Palnaes Hansen et al., 1997; Hogarth et al., 2000; Murata et al., 2004). Reiter’s Syndrome is clinically presented with triad of symptoms: urethritis, arthritis and conjunctivitis. Diagnose must be done clinically; it’s very difficult to confirm diagnose by a specific test. This is important for not delaying treatment.

The aim of this article is to describe the first Reiter’s Syndrome Albanian case following intravesical BCG immunotherapy.

Material

We report the case of a patient who developed Reiter’s syndrome following intravesical BCG installations.

Case report

A male 39-years old patient, resident in Tirana, presented at Infectious Diseases Clinic, University Hospital Center of Tirana on June 13, 2016 with a 10 days history of dysuria, urethral discharge, high fever, bilateral red and itchy eyes and arthralgia including the left knee and talocrural joints. No previous rheumatologic disease was reported by the patient.

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1 Infectious Diseases Clinic, University Hospital Center “Mother Teresa”, Tirana, Albania vlasiovi@hotmail.com
2 Faculty of Technical Medical Sciences, University of Medicine, erdara1er@yahoo.it
3 Infectious Diseases Clinic, University Hospital Center “Mother Teresa”, rovenabyku1@gmail.com
4 Infectious Diseases Clinic, University Hospital Center “Mother Teresa”, nadacomo@yahoo.com
5 Urology Clinic, University Hospital Center “Mother Teresa”, rezixhani@yahoo.it
6 Rheumatology Clinic, University Hospital Center “Mother Teresa”, dr.ervini2006@yahoo.it
7 Infectious Diseases Clinic, University Hospital Center “Mother Teresa”, lulikraja@hotmail.com
On December 2015 he was firstly diagnosed with bladder carcinoma (high grade papillary urothelial carcinoma. The cancer was grown in the inner lining of bladder into the lamina propria and there was no evidence of muscularis propria invasion, lymph nodes or any other organ – T1, N0, M0). He had received weekly six intravesical installations of BCG and 3 months later he started the three weekly maintenance immunotherapy of BCG.

On the day of the third installation, he did not perform immunotherapy and was hospitalized in our clinic. On examination he had swollen painful joints, especially of genus and talocrural (fig 1) with limited movements and bilateral conjunctivitis (fig 2). He had no signs of urogenital lesions.

On blood tests we noticed leucocyte count of 14900/mm$^3$, E. Coli was grown in urine culture, urethral smear and STD tests were negative, Interferon gamma was negative also. Inflammatory tests were high erythrocyte sedimentation rate (ERS) 40mm/h, fibrinogen 736 mg/dl, C-reactive protein (CRP) 92 mg/dl. His left knee was presented with effusion on ultrasound. Diagnose was based on clinical manifestations, rheumatologist also confirmed it.

Initially we started treatment with NSAIDs and antibiotics (ciprofloxacin), but symptoms persisted, so 5 days after we started steroids (prednisolone). He was not put on therapy with anti-tubercular drugs. His conjunctivitis and urethritis were resolved 5 days after, and his arthritis after 20 days of treatment.

**Discussion**

Intravesical BCG is used as first-line therapy for carcinoma in situ of the urinary bladder. Cystitis, bacterial infections and macroscopic hematuria are the most common adverse effects that accompany
this treatment. More undesirable side effects are uncommon and include granulomatosis prostatitis, which can be an asymptomatic finding in 20% to 30% (Spence et al., 2006). Reiter’s Syndrome is a very rare complication that can be seen during this treatment. The syndrome developed after the third to eighth BCG intravesical administration, with conjunctivitis, aseptic urethritis and polyarthritis (Murata et al., 2004). Our patient developed Reiter’s syndrome on week third, 2 weeks after he restarted immune therapy with BCG, as a maintenance treatment, after he had performed successfully first six weeks therapy.

He interrupted therapy after the third application because he demonstrated bilateral conjunctivitis, swelling of genus and talocrural articulations. The presence of large joint oligoarthritis, urogenital tract infection and uveitis characterize Reiter's syndrome as a clinical subtype of reactive arthritis (Selmi et al., 2014). The diagnose was supported epidemiologically (a live attenuated strain of Mycobacterium bovis was intravesical instilled), clinically (triad of symptoms: nongonococcal urethritis, inflammatory arthritis, conjunctivitis) and laboratorically with high inflammatory tests (ESR, CRP), which later return to normal range when the inflammation subsided.

There is no confirmatory laboratory or radiological test that can confirm diagnosis. In addition, there are also differential diagnoses of gout, gonococcal urethritis and psoriatic arthritis that must be excluded. In our case the syndrome was diagnosed based on consultations with rheumatologist.

Cessation of the intravesical BCG immunotherapy in these cases is perhaps the most important treatment together with medications aimed for symptomatic relief (Keng Lim Ng et al., 2017). Treatment of Reiter’s syndrome usually revolves around providing symptomatic relief and this includes bed rest, NSAIDs, and eye ointments. Non-steroid and steroid anti-inflammatory drugs are effective in the majority of the cases with the recovery within 2 and 6 months, respectively of 70% and 93% of the patients (Bernini et al., 2013). These general symptomatic measures often will provide the remission of symptoms.

Initially our patient started treatment with non-steroidal anti-inflammatory drugs. On fifth day of the therapy, no improvement of signs and symptoms was seen. Then we continued treatment with prednisolone. Corticosteroids improved conjunctivitis and urethritis in five days, and arthritis in 3 weeks. Occasionally, steroids with or without isoniazid or rifampicin may be started if the symptoms prolong or worsen (Murata et al., 2004). There is no consensus for antibiotics use, but the urine culture of our patient was positive and E. Coli was grown, so we used Ciprofloxacin for 10 days. Our patient remained asymptomatic, without medication during last year of follow-up.

Conclusion

The side effects can occur at any moment from the first instillation to the last one. This makes the diagnose easier for the cause effect relationship is more evident. Even Reiter’s Syndrome is a quite rare complication of BCG treatment, it must be considered in order we to be in time for early diagnose and treatment of the patient.

References


CERVICAL BRUCELLOSIS, WITH OR WITHOUT BONE INJURY

Ergys Ramosaço,¹ Entela Kolovani,² Arben Rroji,³ Dhimiter Kraja⁴

Abstract: Brucellosis is a zoonotic infectious systemic, endemic in Albania, which is accompanied by multi-organ involvement. A common complication is also the vertebral affection. Manifestation in the lower lumbar spine is frequently seen, while cervical involvement is more rare. Diagnose of vertebral involvement is difficult because of non-specific clinical symptoms. We present two cases of cervical brucellosis, with various cervical injuries. Spondylodiscitis with epidual abscess were the cervical manifestation in the first patient, which is very rare and a serious complication and the second patient had epidual involvement without spondylodiscitis. The Rose Bengal, Wright test, ELISA were positive for both patients. The cervical injury was confirmed with MRI exams. After prolonged combination therapy with cervical immobilization, the follow up evaluation demonstrated resolution of the cervical injury. Because vertebral destruction is in the base of this complication, early diagnosis of vertebral brucellosis is important to prevent serious morbidity, if diagnosis and treatment are delayed. Standard Brucella tube agglutination (Wright) test is the primary test and should be performed as a first step in the differential diagnosis of spondylodiscitis. An MRI is recommended for early diagnosis of spinal involvement. Medically treatment of cervical brucellosis has a good prognosis with early diagnosis.

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Keywords: Brucellosis, cervical, diagnose, early, treatment

Introduction
Brucellosis is an endemic zoonosis in Albania. Microorganisms that most often can cause human brucellosis are B. Abortus, B. Melitensis and B. Suisus. Brucellosis is more prevalent in rural areas of Albania, being an occupational disease of veterinarians, farmers, hunters. The incidence in our country is high, the reason is connected even with the fact that 60% of people live in rural zones. Spondylodiscitis is a frequent complication, as a result of an Brucella infection. Estimates of the incidence of spondylitis range from 9% to 31% (Colmenero et al., 2008).

While lumbar spine involvement is the most common, cervical involvement is a rare, but more severe complication, accounting for 8.3% of cases of spondylodiscitis in a recent study. Recovery is observed in 60-90% of patients, with specific treatment (Tekkôk, 1993).

Spinal pain is a frequent complaint of today. It can be the only manifestation of vertebral brucellosis, making the diagnose difficult and delayed.

The aim of this study is to present the importance that Brucella etiology has for cervical diseases and for the early treatment of local damages.

Material
We present two different cases of cervical brucellosis, with various cervical injuries.

Case 1
A 55- year old male patient, a farmer, presented at our hospital. His symptoms were night sweats, headache, neck pain extending down the back, and myalgias, especially in the right arm. On examination, we revealed neurological deficits as paresis and functional disabilities of the upper extremities, with limited movement of the arm because of pain.

Laboratory results showed an erythrocyte sedimentation rate (ESR) of 39mm/h, a leukocyte count of 14.100/mm³ with81% neutrophils and 19% lymphomonocytes, a haemoglobin level of 13.3 g/dL and a platelet count of 238 000 /μm³. Liver function tests were normal and lactate dehydrogenase 158 U/L.

Blood urea, creatinine, total bilirubin and electrolyte levels were normal. Blood cultures were negative. There was an increase in C-reactive protein (CRP) to 33.42 mg/L and fibrinogen was 588 mg/dL.

Wright agglutination test was positive (1:640 I.U/ml). Brucella infection was confirmed with another test. ELISA was positive for Brucella IgG antibodies (16.6 U/mL). Cervical magnetic resonance
imaging (MRI) confirmed the C3-C4 spondylodiscitis and the existence of a minimal inflammatory paravertebral involvement, epidural abscess and medullary compression. (Fig 1).

The patient started treatment with oral doxycycline, 100mg 2 x day, oral rifampicin 600mg daily and intramuscular gentamicin 240 mg × day. The doxycycline and rifampicin regimen continued for a period of 12 weeks, while gentamicin was discontinued after 2 weeks. Cervical immobilization was applied.

Forty days after admission, the patient was discharged free of symptoms with amelioration of the neurological signs. The laboratory tests on his discharge were normal, including ESR and CPR.

Case 2

The second case was a female patient 67–year old, retired, living in village. She presented with a high fever (39-40°C), that had started 20 days previously and neck pain, without neurological deficits.

Laboratory results showed an ESR of 54 mm/h, a leukocyte count of 9.600 / mm3 with 66% neutrophils and 34% lymphomonocytes, a haemoglobin level of 10.3 g/dL and a platelet count of 281 000 /mm3. Liver function tests were normal and lactate dehydrogenase 280 U/L. Blood urea, creatinine, total bilirubin and electrolyte levels were normal. Blood cultures were negative. There was an increase in C-reactive protein value to 128.8 mg/L.

Wright agglutination test was positive (1:1280 I.U/ml). ELISA was positive for Brucella IgG antibodies (13.4 U/mL).

The Cervical MRI confirmed the soft tissue inflammation at the level of C5-C6 vertebrae and epidural inflammatory involvement (Figure 2). The regimen treatment was the same with the first patient. One month after admission, the patient was discharged free of symptoms and the laboratory tests were normal, including erythrocyte sedimentation rate and PCR.

Discussion

Brucellosis is one of the zoonosis with high incidence in Albania. History of brucellosis in Albania begins in 1925 with the diagnosis of several people affected by brucellosis in the south of the country. In 1935, the disease was confirmed also in some goats in the Permet district (Eltari, 1981). However, brucellosis appears to have been endemic to Albania since medieval times. Anthropological analysis of skeletal remains from the ancient Albanian city of Butrint, have confirmed the occurrence of brucellosis in recovered human bone (Motulo et al., 2012).
During the following forty years, 1960 to 1990 strict measures were taken to limit the infection in cattle and small ruminants in our country. In 1989, the country was declared free of bovine brucellosis and the infection in small ruminants had a very low prevalence in the few flocks in the south of the country (Ilirian et al., 2004). During 1990-2010, there has been reported a significant increase of the prevalence of brucellosis in Albania, which has influenced a great number of cases and the variety of complications, including those of bones. In Albania, an incidence of 25 per 100,000 inhabitants was reported in 2008 (Mariani et al., 2014). Musculoskeletal involvement typically occurs in men over 40 years of age. The lumbar spine is the most affected, followed by thoracic and cervical spine (Young, 2010, Doganay & Aygen, 2003). The incidence of spinal brucellosis is highly variable (2–54%) (Colmenero et al., 2008, Pourbagher et al., 2006, Mousa et al., 1987, Alp & Doganay, 2008). Involvement of the cervical region is in both our cases. The rate of isolated cervical spondylitis was reported to be 1.2-4% in some studies (Kurtaran et al., 2008, Zormpala et al., 2000).

Muscle, joint and bone pain, and sometimes neurological symptoms (power loss, paraesthesia, paraparesis) can be the manifestation of the musculoskeletal involvement (Young, 2010). Spondylodiscitis is a very insidious disorder, not always accompanied by specific signs. In patients with brucellar cervical spondylodiscitis, back pain has been the presenting complaint (Colmenero et al., 1996). For this reason, in the endemic areas of brucellosis, patients that present with back pain must be examined for Brucella spondylodiscitis also. The back pain was the presenting symptom of our first patient and in the second, it was neck pain.

The diagnosis of spinal brucellosis is the first step to ensure proper treatment. Despite the fact that the diagnosis of cervical brucellosis is not easy, it is very important to initiate specific treatment. Laboratory results alone are not efficient in establishing a correct diagnosis. The standard Brucella tube agglutination (Wright) test is the primary test and should be performed as a first step in the differential diagnosis of spondylodiscitis. Nevertheless, there are seronegative cases, false positive results that have also been reported in the literature (Ulu-Kilic, 2013). In our two cases, the etiologic diagnose was determined by the tube agglutination (Wright) test and serologic test ELISA for Brucella.

The reproduction of Brucella bacteria in cultures taken from appropriate samples is a criterion to diagnose spinal brucellosis. This examination was not performed, because it was refused by both patients. However, serological tests are particularly useful in spinal brucellosis, diagnoses and reducing the need for invasive procedures (Erdem et al., 2015).

MRI remains the gold standard for early diagnosis of spinal involvement. Because bone remodeling can progress slowly, radiographic changes might not be easy to differentiate from those of degenerative disease (al-Shahed et al., 1994). Also, MRI is the method of choice for the assessment of
the disease and follow-up of spinal involvement (Resnick, 1995). When neurologic complications are apparent, the evolution of local spine damages is attended by MRI (Irmak et al., 2004). The diagnose of cervical involvement and its local extension was made by spinal MRI in both cases. This examination was also performed after treatment to follow the effectiveness of it.

Medically treatment of cervical brucellosis has a good prognosis with early diagnosis. No antibiotic combination was proven to be superior, but 14 different regimens were used in the series studied (Pappas et al., 2004). The combination of doxycycline, rifampicin and an aminoglycoside, for two weeks, followed by doxycycline and rifampicin, for 8-10 weeks is the most effective regimen (Madkour et al., 2001). Therapeutic failure and relapse are still reported with this regimen (Ariza, 1985).

The two criteria of anti-brucella treatment efficacy are: first, a normal temperature after the first week of it and second, a normal CRP level within the first month (Ulu-Kilic et al., 2013). Treatment should be continued until the ESR decreases to normal levels and radiological recovery is maintained (Tekkök et al., 1993, Ural et al., 2013). By the end of medical treatment of the two patients, a normalization of ESR and a radiological recovery were evident.

Surgical treatments are performed in cases with neurologic complications, as spinal instability or progressive spinal cord compression (Solera et al., 1999, Samra et al., 1982). None of our patients underwent surgical treatment. Cervical immobilization was applied successfully in our first patient.

Conclusions
Brucellosis is an endemic disease in our country; it is because of that those patients with cervical vertebrae lesions must also be tested for Brucellosis. Early diagnose and treatment will diminish the possibility of serious complications that accompany vertebral involvement and mostly, a total recovery of bone damage. The standard Brucella tube agglutination (Wright) test should be performed as a first step in the etiologic diagnosis of spondylodiscitis. An MRI is recommended for early diagnosis and follow-up of spinal involvement.

References
DYNAMIC CHANGES OF SOME ANTHROPOMETRIC INDICES OF THE NEWBORN CHILDREN IN PLOVDIV FOR A PERIOD OF 70 YEARS (1939 – 2009)

Daniela Ivo Taneva

Abstract:
Introduction: The periodical tracking and comparison of the physical development indices give an idea of the dynamics of the acceleration and the efficiency of the social and medical events for a protection of maternity.

Aim: Tracing the accelerative changes of the newborn Bulgarian children for 70 years.

Materials and methodology: The study is retrospective longitudinal research and includes the period 1939 – 2009. The initial information of the last survey was obtained at the Clinic of Obstetrics and Gynaecology at University Hospital St George – Plovdiv for the period 1 Jan 2009 – 31 Dec 2009. For the statistical processing is used variation analysis.

Results and discussion: The dynamic changes of two anthropometric indices are traced – height and body mass. There are two periods in the survey. The first, a 46-year period, is characterized by an apparent increase in the values of the two indices until 1975, inclusive, after which the acceleration rate gradually slows down. During the second ten-year period, 1985 – 1995, there is a sharp decrease in the height and the body mass of the newborns, as their values are back to the level of 1946–47. The authors relate this negative tendency with the economic situation in the country, with the progressive impoverishment of the population, with the unemployment and the uncertainty in the future. In the last period, 1995 – 2009, there is a slight increase in the values.

Conclusions: This survey is the most extended study of the physical development of the newborn children in Bulgaria. The accelerative changes in the basic indices for physical development start in the antenatal period. The social factors are the basis for acceleration.

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Key Words: acceleration, new-born, body mass, height, dynamic changes.

Introduction
The periodical tracking and comparison of the physical development indices give an idea of the dynamics of the acceleration and the efficiency of the social and medical events. The in-depth literature review made possible the registration of several longitudinal surveys of the basic physical development indices of the newborn children. The longest survey was conducted in the Soviet Union and includes a period of 45 years (Novikov, 1981), in Japan – 26 years (Kazny, 2004), again in Russia – 15 years (Tretyak et al., 2005) and in Greece – 20 years (Karanica, 1999).

The tracking of the core anthropometric indices – height and body mass, of the newborn children in Plovdiv, includes a period of 70 years – from 1939 until 2009. The first study was conducted by Todor Zahariev in 1939 (Zahariev, 1968), (Zahariev, 1969), followed by a number of studies by I. Dimitrov, including the period from 1975 to 1995 (Dimitrov & Cochev, 1981; Dimitrov, 1990; Dimitrov, 1997) and by D. Taneva (Taneva, 2008).

Essential for the science of the physical development is the studying of the causes and the forms of the accelerated physical and neuropsychic development of children (Zeltser, 1978; Vlastovskii, 1988; Koleva, 1985; Volkova, 1988).

The aim of this study is to monitor the accelerative changes of newborn Bulgarian children for 70 years.

Methodology. In its nature, the study is a retrospective longitudinal research. In the statistical processing are used variation analysis and analysis of the dynamic changes.

The initial information about the physical development of the newborn was obtained at the Clinic of Obstetrics and Gynaecology at University Hospital St George – Plovdiv, for the period 1 Jan 2009 – 31 Dec 2009. The study, like all previous studies, does not include the prematurely born and born within multiple pregnancies. The accepted criteria for fetus maturity are body mass 2 500 g and height 45 cm (Koleva, 1985).

Results and discussion. Historically, the study includes several periods. The first one started before the beginning of World War II and includes the first years after the war, characterized by economic

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1 Medical University – Plovdiv, Bulgaria; Faculty of Public Health, taneva.daniela@abv.bg
crisis and a sharp decline in the standard of living. Economic stabilization represented the second period. The third period - the second half of the 80s and the first decade of the “democratic” transition, was associated with a sharp decline in the standard of living, irrational and inadequate feeding and with chronic psychoemotional stress. The last period – the first years of the 21st century was characterized by gradual improvement of the socioeconomic conditions in the country (Volkova, 1988).

The analysis of the data in Table 1 allows the tracking of the changes in the basic anthropometric indices influenced by the socioeconomic and psycho-emotional factors. The established changes in the height and the body mass in both genders of the newborns are in a certain dependency of the variations in the observed periods.

<table>
<thead>
<tr>
<th>Year</th>
<th>Boys</th>
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<th>Girls</th>
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<td></td>
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<td>Number</td>
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<tr>
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<td>3373 ± 17.24</td>
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<td>-</td>
<td>530</td>
<td>3219 ± 16.07</td>
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<td>397</td>
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<tr>
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<td>429</td>
<td>3237 ± 20.27</td>
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<td>&lt;0.001</td>
<td>2033</td>
<td>3319 ± 9.11</td>
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<td>3472 ± 15.42</td>
<td>462</td>
<td>&lt;0.001</td>
<td>850</td>
<td>3335 ± 14.27</td>
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<tr>
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<td>686</td>
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<td>337</td>
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<td>x ±</td>
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<tr>
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<td>1.32</td>
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Source: Author

As was mentioned before, in the first period there are two sub-periods. The first one includes the first two studies of T. Zahariev (Zahariev, 1968; Zahariev, 1969). The difficult social status in the first year after WWII results in a statistically significant reduction of the height and the body mass of both sexes compared to the study 1939-40 - 0.01 > P < 0.001 (body mass u = 3.49 (boys) and 2.90 (girls), and height u = 4.55 (boys) and u = 3.00 (girls)).

It takes only one year (1946-47) to bring the values of the monitored indices to the initial level (P > 0.05). According to many authors, the psycho-emotional factors have a significant role, which in this case is the peace (Novikov, 1981; Karanica, 1999; Zahariev, 1969; Koleva, 1985; Dimitrov, 1997).

Interesting is the comparison of the data from the survey of 1985-86, with the survey of T. Zahariev for 1944-45. In the 40-year period, noticeable accelerative changes have occurred: the body mass of the boys is bigger with 283 g and of the girls with 283 g. The height in both genders has increased with 1.2 cm. The differences are significant – P < 0.001 (body mass: boys u =11.65, girls u=5.99 and height: in
both genders 13.34). The positive accelerative changes in this 40-year period are a result of the stable socioeconomic status of the population, as well as the development of the healthcare system in the country, more specifically in the area of the maternity health care.

Impressive is the fact that the speed of the accelerative changes in this period is characterized by a tendency towards gradual slowing. Although the height of the children had increased with 0.4 cm – boys, and 0.3 cm – girls for a very short period of two years (from 1944-45 to 1946-47), the growth in both genders is only 0.1 cm in the last 10 years (1975-76 - 1985-86) of the sub-period. A significant delay is registered in the increase rate of the body mass. In the last period is recorded a similar slowing of the growth of the body mass and the height also in Moscow and Almaty (Volkova, 1988). A number of authors say that the gradual slowing of the acceleration rate is related to the improvement of the living conditions (Kazny, 2004; Karanica, 1999; Dimitrov, 1990; Vlastovskii, 1988; Koleva, 1985). When studying the interrelation between the acceleration processes and the material prosperity, Zeltser notices that the acceleration is much stronger in individuals, whose development has been impaired due to various influences (Zeltzer, 1978).

After 1985 the economic status of the population starts to decline, and after 1990 the adverse effects in the public and personal life have worsened. The results of these events are negative acceleration changes in the newborn children. The average value of the body mass of the boys decreases with 345 g compared to 1985 and is the lowest value registered in the 70-year period. The body weight of the girls has declined with 122 g compared to 1985 and is at the level of 1946-47. The inter-group comparison between 1985 – 1995 shows that the differences are statistically significant Р<0.001, with values of the criteria for normal distribution u = 12.51 for boys and u = 4.74 for girls. The height of the boys has decreased with 1.47 cm compared to 1985, and like the body mass is the lowest for the 70-year period. The height of the girls has declined with 0.90 cm, and like the body mass is at the level of 1946-47. The changes in the height have been confirmed with the alternative hypothesis – P <0.001 (u = 14.70 for boys and u = 9.57 for girls).

The hypothesis that the gradual improvement of the socio-economic conditions in the country after 1998 will result in positive acceleration changes in the newborn children compared to the preceding period was confirmed in regard to their body mass, more noticeable at boys, less at girls – Р<0.001 (u = 4.13 girls and u = 2.49 boys). With the height, another observed anthropometric index, the negative tendency continues at girls, in 2009 it is with 0.47 cm less than in 1995. With boys, there is stabilization with a slight increase of 0.17 cm.

<table>
<thead>
<tr>
<th>Table 2: Distribution of the newborn boys in percent of the body mass in the separate observed periods</th>
</tr>
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<tbody>
<tr>
<td>2500-3000</td>
</tr>
<tr>
<td>3001-3500</td>
</tr>
<tr>
<td>3501-4000</td>
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<tr>
<td>4001+</td>
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<tr>
<td><strong>Total</strong></td>
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</table>

Source: Author

The in-depth analysis of the observed anthropometric indices shows that negative changes in the physical development of the newborn children in Plovdiv are a result of the decreased relative share of the larger fetuses (see Table 2 and Table 3). Throughout the whole first period, except for 1944-45, there is a clear tendency of increasing the share of the newborns with body weight above 3 500 g. With boys, the range is between 23.0% in the pre-war year to 54.9% in 1985; it represents an increase of 31.9%. With girls, during the first survey, the share of the newborn above 3 501 g is 15%, to reach 41.8% in 1985. In the period 1985 – 1995 the body mass of the newborns with weight above 3 500 g decreases by 23.4% with boys and by 16.7% with girls (see Tab.3). As already mentioned, in the last period 1995 – 2009, there were some positive changes in the body mass, but with boys, it is still close to the values of 1946-47. With girls, the change is much better and is at the level of 1965-66.
Table 3: Distribution of the newborn girls in percent of the body mass in the separate observed periods

<table>
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<tr>
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</thead>
<tbody>
<tr>
<td>2500-3000</td>
<td>33.5</td>
<td>34.5</td>
<td>31.3</td>
<td>27.7</td>
<td>21.7</td>
<td>18.6</td>
<td>26.4</td>
<td>29.5</td>
</tr>
<tr>
<td>3001-3500</td>
<td>51.5</td>
<td>50.7</td>
<td>47.3</td>
<td>43.8</td>
<td>40.3</td>
<td>39.6</td>
<td>47.5</td>
<td>41.5</td>
</tr>
<tr>
<td>3501-4000</td>
<td>12.2</td>
<td>12.6</td>
<td>17.5</td>
<td>24.0</td>
<td>30.5</td>
<td>33.5</td>
<td>22.8</td>
<td>25.9</td>
</tr>
<tr>
<td>4001+</td>
<td>2.8</td>
<td>2.2</td>
<td>3.9</td>
<td>4.5</td>
<td>7.7</td>
<td>8.3</td>
<td>3.3</td>
<td>4.1</td>
</tr>
<tr>
<td>Total</td>
<td>100.00</td>
<td>100.00</td>
<td>100.00</td>
<td>100.00</td>
<td>100.00</td>
<td>100.00</td>
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</table>

Source: Author

Conclusions:
1. This survey is the most extended study of the physical development of the new-born children in the history, not only in our country but according to the literary sources, for the last 70 years in the world.
2. The dynamic changes in the height and the body mass of the newborns in the different sub-periods allows to categorically confirm the thesis that the accelerative changes start in the antenatal period.
3. The survey allows the assertion that the accelerative changes in the ontogenetic development are based on social factors.

References
THE IMPACT OF PHARMACEUTICAL CARE ON IMPROVING THE QUALITY OF LIFE IN PATIENTS WITH ALLERGIC RHINITIS

Anna Todorova,1 Antoaneta Tsvetkova,2 Silvia Mihaylova,3 Kalina Andreevska,4 Antonia Kondova,5 Mariana Arnaoudova6

Abstract:
Introduction: Allergic rhinitis (AR) is a chronic disease with great social and economic impact that is largely undiagnosed and inadequately self-treated. Healthcare professionals such as pharmacists play a key role in recognizing and assessing the severity of AR, dispensing of OTC drugs, counseling of patients and in severe cases, referring them to health care specialists for further treatment.

Objective: This study explores the impact of pharmaceutical care and patient counseling on the self-management of seasonal AR.

Methods: The participating pharmacists follow the stepwise algorithm of ARIA (Allergic Rhinitis and its Impact on Asthma) Pharmacist’s Guide. The effectiveness of the specialized pharmaceutical care is assessed by the changes in patients’ quality of life (QOL) before and after the provision of patient counseling and pharmacist monitoring on patient self-management. The quality of life is measured with the help of the generic tool 12v2 SF.

Results: As a result of the provided pharmaceutical care, the analysis indicates improvement of all assessed aspects of patients’ QOL. The analysis shows that the better scores of the indicators Physical functioning, Vitality, Physical health and Mental health are not accidental; rather, they are in a statistically significant correlation with the provided pharmaceutical care.

Conclusion: The study highlights the need for professional patient counseling and the education of patients to perform adequate disease management and improve their quality of life.

UDC Classification: 615.1; DOI: http://dx.doi.org/10.12955/cbup.v5.1064

Keywords: allergy, rhinitis, pharmacists;

Introduction

Pharmacists act as intermediaries between physicians and patients in ensuring effective prevention and treatment of chronic diseases. Pharmaceutical care encompasses patient counseling, disease prevention, monitoring, and evaluation of the treatment (Dessing, 2000). We should emphasize that the pharmacist’s role is to assist patients in self-treatment with OTC drugs only when disease control is achievable. The collaboration between patients, pharmacists, and physicians aims at establishing the optimal therapy and managing good disease control.

Literature review

AR is a chronic disease with great social and economic impact due to numerous factors: its high prevalence, the disease-related impairment of patients’ quality of life, patients’ inability to perform various professional and academic activities, the economic burden of AR, and its comorbidity asthma and other allergic diseases (Baiardini et al., 2006, Bousquet et al., 2008). The contemporary holistic approach to socially significant chronic diseases encompasses not only the medical treatment, but also the management of disease symptoms, prevention of disease complications and improvement of the quality of life of patients (Meltzer et al., 2012).

AR is largely undiagnosed and inadequately treated, thus being a predisposing factor for the subsequent development of asthma (Pawankar et al., 2011).

To prevent disease progression, the World Health Organisation (WHO) launched various initiatives for health education and provides recommendations for the treatment of AR through ARIA guideline. (Allergic Rhinitis and Its Impact on Asthma). In compliance with ARIA guidelines pharmacists, being the most accessible health care professionals, have to identify allergic rhinitis, assess the symptom

1 Faculty of Pharmacy, Medical University of Varna, annitodorova@abv.bg
2 Education and Research Center, Medical College of Varna, Medical University of Varna, antoaneta_cvetkova@abv.bg
3 Education and Research Center, Medical College of Varna, Medical University of Varna, s_mihaylova@mail.bg
4 Medical University of Plovdiv, Faculty of Pharmacy, andreevska@abv.bg
5 Faculty of Pharmacy, Medical University of Varna, antoniakondova@mail.bg
6 Medical University-Varna, marnaudova@hotmail.com
severity, and provide patient counseling while dispensing OTC drugs when disease control is maintainable. (ARIA Pocket Guide for Pharmacists, 2003).

According to the disease severity and symptom frequency, ARIA guidelines classify AR as intermittent or persistent. Depending on the severity of the disease and the extent to which it affects the quality of life of the patient, AR is classified as mild or moderate/severe (Brozek et al., 2010). ARIA classification reflects patient’s condition and is the determinant factor for the selection of the therapeutic regimen and the assessment of the maintained disease control (Pawankar et al., 2011). The stepwise approach that pharmacists need to adopt in the selection of alternative pharmacological treatments and patient counseling according to the AR type is part of the algorithm developed by ARIA (Fig.1).

![Figure 1: Pharmacists’ selection of allergic rhinitis treatment](source: ARIA Pocket Guide for Pharmacists (2003))

According to ARIA and WHO, disease control in patients with AR can be maintained through patient education, health promotion and disease prevention (avoidance of specific allergens or triggering factors), a healthier environment, and drug therapy and immunotherapy (Allergic Rhinitis and Its Impact on Asthma). The role of the pharmacist is directed towards improving public health through the promotion of a healthy lifestyle (Guidelines on Good Pharmacy Practice, 2009). As health care professionals, pharmacists do not simply handle and dispense medications, but they also provide valuable information about the disease symptoms that can be subject to self-medication, potential adverse drug reactions, contraindications, and special treatment of patients with chronic diseases. (Tsvetkova et al., 2015).

The objective of the study is to analyze the results of pharmaceutical care provided to patients with allergic rhinitis who practice self-medication by monitoring as well as evaluate the quality of life before and after the intervention of the pharmacist.

**Data and methodology:** Pharmaceutical care was provided in compliance with ARIA guidelines for pharmacists, including individual training, patient counseling at the dispensing of appropriate OTC products, monitoring the effectiveness of the treatment, and in cases of no positive treatment outcome, referring the patients to a physician.

The effectiveness of the pharmaceutical care was analyzed by assessing the quality of life in patients before and after the provided consultation and the treatment monitored by the pharmacist.

The study was conducted in community pharmacies in the city of Varna. Pharmaceutical care was provided to patients with AR who sought professional advice at the corresponding pharmacy, self-medicated with OTC drugs, and followed no therapy regimen prescribed by a physician at the time of the study.

The study spanned over the pollen season (from March to June) when the acute phase of the disease was more likely to be triggered.
The survey participants were adults 20 to 45 years of age. This specific age group has the highest morbidity rate, and therefore it was in the focus of our study.

The patients’ quality of life was assessed with the help of the generic tool SF12 v2 (the shorter version of SF 36). SF-12v2 Health Survey is a questionnaire validated for Bulgaria, intended to assess the physical health, the mental health, and the social functions within a 4-week recall period. SF-12v2 is a health survey, consisting of 12 questions that address eight domains in order to evaluate the physical and mental health of patients and their social functions. It provides two composite scores which assess the physical health and the mental health. The SF-12V2 questionnaire is based on the data obtained from the Quality Metric 2009 Norming Study conducted in the USA in 2009 by The National Research Corporation (NRC). It served as a basis for the scale used in this survey. The norm for the studied health composite summaries was set at 50 points with a minimum value of 20 pts. and a maximum value of 80 pts. The higher the score, the better the quality of life.

After a prior consent and instructions on how to fill out the questionnaire, participants replied in writing to self-assess their quality of life.

The study used a Student’s t-test for assessing the statistical significance of the results obtained after the provided pharmaceutical care. Hypothesis testing was performed with a significance level set at 0.05.

**Results and Discussion:** The baseline survey involved 71 patients with pronounced AR symptoms seeking medical advice in the pharmacy. A follow-up survey of patients QL was performed after the provided pharmaceutical care, including patient counseling and patient education, dispensing of the appropriate OTC product, and health status monitoring in accordance with ARIA algorithm. The follow-up SF12v2 test involved 63 patients. Eight of the baseline participants dropped out from the follow-up test because they did not meet the survey inclusion criteria and were referred to a medical specialist by the corresponding pharmacist.

The summarized results of the assessment of the Physical Component Summary (PCS) and the Mental Component Summary (MCS), before and after the provision of pharmaceutical care, compared to the norm are presented in Figure 2 and Figure 3.

<table>
<thead>
<tr>
<th>Figure 2: Summary results before the provision of pharmaceutical care.</th>
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<td>![Figure 2](source: Authors)</td>
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Source: Authors

<table>
<thead>
<tr>
<th>Figure 3: Summary results after the provision of pharmaceutical care.</th>
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<td>![Figure 3](source: Authors)</td>
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In 66% of the respondents in the baseline test, the Physical Component Summary is within the norm and for the remaining 34% it is above the norm. Highly prevalent are the patients (92%) whose mental
wellbeing is below the norm in the survey scale. The mental health is within the norm in only 8% of the respondents.

Following the provided pharmaceutical care, the Physical Component Summary (PCS) scores better; it is within the norm in 59% of the respondents and above the norm in the remaining 41%. Impressive is the improvement of the Mental Component Summary (MCS) - it is below the norm in only 63% of the patients, which is a 40% decrease in comparison with the baseline test. The share of patients (24%) with MCS within the norm is increasing. In the follow-up test, the MCS score is above the norm in 14% of the patients, whereas there were no patients registered in this category during the baseline test.

Figure 4 displays the share of patients that are at risk of depression before and after the provision of pharmaceutical care correspondingly.

<table>
<thead>
<tr>
<th>Figure 4: Risk of depression before and after the provision of pharmaceutical care</th>
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<tr>
<td><img src="image" alt="Graph showing risk of depression before and after the provision of pharmaceutical care" /></td>
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<td>Source: Authors</td>
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</table>

The general population norm for high-risk patients was set at 20% by the Quality Metric 2009 Norming Study, the primary goal of which was the development of representative norms for survey tools such as the SF-12V2 questionnaire.

The baseline test results show that 74% of the respondents are at risk of depression. As a result of the provided pharmaceutical care, there is a significant decrease of 43% in the share of patients that are at risk of depression; the total share falling to 31%. In the baseline test, the depression risk indicator was 54% above the general population norm, whereas in the follow-up test, it declines to 11% above the norm. The comparison between the baseline and the follow-up survey shows that the provided pharmaceutical care resulted in a remarkable decline of 50% in the share of patients who are at risk of depression. Other studies have found that symptoms such as mood swings, anxiety, and depression are much more frequent in patients with allergic rhinitis than in healthy controls (Cuel et al., 1999). A previous research on the QOL in patients with seasonal AR who resort to self-medication has found that symptoms of AR and the disease-related complaints are risk factors for the emotional well-being, social functioning, and mental health of AR patients (Todorova et al., 2015).

Figure 5 shows the comparative analysis of the results from the tests conducted before and after the provision of pharmaceutical care.

All indicators for physical, psychological, and social health score higher in the QL follow-up survey. Most pronounced is the change in the Vitality indicator with an increase of 11 points. The increase in the rest of the indicators is within the range of 3-5 points. The results are similar for the BP, GH, and SF indicators (a 3-points increase) and for the PF (a 5-points increase). The higher score of the Vitality indicator in the follow-up test evidences the QL improvement associated with the provided pharmaceutical care. We assume that patient-centred care and effective communication between pharmacists and patients enhance the adequate self-treatment and improve patients’ mental and physical wellbeing.
The statistical significance of the improvement data in the QOL indicators as a result of the provided pharmaceutical care is analyzed and the results are summarised in Table 1.

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>PF = Physical Functioning</th>
<th>RP = Role Physical</th>
<th>BP = Bodily Pain</th>
<th>GH = General Health</th>
<th>VT = Vitality</th>
<th>SF = Social Functioning</th>
<th>RE = Role Emotional</th>
<th>MH = Mental Health</th>
<th>PCS</th>
<th>MCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>N=71</td>
<td>47.53</td>
<td>43.99</td>
<td>52.65</td>
<td>53.04</td>
<td>44.22</td>
<td>44.87</td>
<td>38.64</td>
<td>45.30</td>
<td>51.53</td>
<td>41.05</td>
</tr>
<tr>
<td>N=63</td>
<td>53.19</td>
<td>48.40</td>
<td>55.58</td>
<td>56.02</td>
<td>58.75</td>
<td>48.43</td>
<td>44.15</td>
<td>48.91</td>
<td>55.69</td>
<td>47.40</td>
</tr>
</tbody>
</table>

Source: Authors

According to the null hypothesis, the changes are due to random processes alone. The alternative hypothesis states that there is a statistically significant difference, and the changes are consequent upon the pharmaceutical care. The Hypothesis testing was performed with a significance level set at 0.05.

The analysis shows that the improvement in the composite scores for physical health and mental health (PCS and MCS), as well as in the Physical functioning indicator and in the Vitality indicator is not a random process. There is a statistically significant dependence of this improvement on the pharmaceutical care provided according to ARIA algorithm. The statistically significant improvement in the PCS and MCS in patients with AR highlights the need for patient training and specialized pharmaceutical care.

Low public awareness of allergies as serious chronic diseases has been identified as a major health issue. Patients suffering from respiratory allergies are not fully aware of the importance of the allergies and the complications associated with the disease progression. Patients, especially those with milder forms of allergies, tend to adapt to their condition or resort to self-medication without consulting a physician (Bousquet, Cauwenberge, Khatlave, 2003). According to data published, just 45% of patients with allergic rhinitis in Europe seek medical advice or treatment (Canonica et al., 2007).
Patient education and environmental control measures are effective mechanisms for AR management. Self-monitoring and deliberate avoidance of triggering environmental factors are the first steps towards the control of respiratory allergies. Studies examining the impact of patient education and specialised pharmaceutical care indicate better QL and fewer disease complications in patients who have been subject to pharmaceutical care and have participated in specially designed educational programs.

The optimal therapeutic regimen is a multifaceted process. Its efficacy depends on the adequate selection of drugs, drug dosage and treatment duration, which is accomplishable only with the participation of a health professional. We should be aware that a common behaviour pattern of patients with diagnosed AR is to resort to self-treatment with no prior medical consultations or allergy tests. Notwithstanding the improvement in patients’ QL, their attention should be drawn to the fact that pharmacotherapy is effective for treating only the symptoms of the disease. In no way can pharmacological treatment affect the cause and the disease triggering factors. The contemporary approach to disease treatment requires an unambiguous proof of the allergic nature of patients’ complaints and allergen detection. The effective management of socially significant chronic diseases should address not simply the disease symptoms, but the cause and the triggering factors as well.

Conclusion

Timely treatment of AR should be considered a crucial component of asthma management and an essential part of the disease control and prevention. The study confirms the belief that AR constitutes a serious threat to patients’ wellbeing. The effect of the pharmaceutical care provided in compliance with ARIA guidelines indicates that pharmacists can successfully enhance the adequate self-management and improve the QL in patients with intermittent and light persistent AR.

Pharmacists are a valuable resource that can be managed more effectively to make their unique contribution in protecting and enhancing public health and wellbeing even better.

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NEOPTERIN AND RECURRENT SPONTANEOUS ABORTION (RSA): THE EFFECT OF CELLULAR IMMUNE SYSTEM ACTIVATION ON SUBSEQUENT PREGNANCY

Songül Ünüvar¹, Zübeyde Tanrıverdi²

Abstract:
Background: Recurrent miscarriages are common complications in pregnancy. Neopterin is one of the immunologic biomarkers of several diseases related to activation of the cellular immune system. RSA is associated with immune system related abnormalities.
Objectives: We aimed to investigate the effectiveness of neopterin levels in the early diagnosis of RSA.
Methods: Eighty RSA patients and forty-three healthy controls were included in the study. The neopterin concentrations were determined by the enzyme-linked immunosorbent assay (ELISA) method. For the statistical analysis, Mann-Whitney U test and Pearson correlation test were used the; p<0.05 was considered statistically significant.
Results: Serum mean neopterin levels were 16.47±0.095 nmol/L in RSA group and 6.14±0.041 nmol/L in control group, respectively. Compared to the control group, a statistically significant increase (p=0.0183) in the serum neopterin levels of the patients was observed. There was a negative correlation between serum neopterin level and age in both the control (R=0.0774, p=0.6236) and RSA groups (R=0.1415, p=0.2089). However, this correlation was not statistically significant (p>0.05).
Conclusions: With overstimulation of interferon-γ (INF-γ) during pregnancy, the production of neopterin increases by monocytes/macrophages. The measurement of neopterin levels in the serum contributes to the early diagnosis of pregnancy losses.

UDC Classification: 615.4; DOI: http://dx.doi.org/10.12955/cbup.v5.1065
Keywords: Pregnancy, neopterin, INF-γ

Introduction
Two types of pregnancy loss have been described, namely sporadic and recurrent pregnancy loss. Recurrent pregnancy loss is observed at a rate of about 1%, while the rate of sporadic pregnancy loss is reported to be higher (25 to 50%) and is mostly observed to develop in association with chromosome abnormalities during advanced age pregnancies (Rai & Regan, 2006). RSA is one of the most common complications of pregnancy and adversely affects many pregnant women (Smith & Cowchock, 1988). RSA is defined as the occurrence of three or more failed pregnancies between the last day of menses and 20th week of gestation, or fetal rejection less than 500 g of fetal body weight (Rai & Regan, 2006; Strobino & Warburton, 1995; Kwak-Kim et al., 2000).

Factors associated with pregnancy loss include disorders related to genetic, hormonal, metabolic, or uterine anatomy, infections, environmental and occupational exposure (lead, mercury, ethylene, oxide, radiation), and personal habits (alcohol consumption and cigarette smoking), thrombophilia or the immune system (Kwak-Kim et al., 2000; Pandey et al., 2004). Immunological mechanisms are suggested to play a role as a possible explanation for pregnancy losses, in the absence of identification of any of these etiologies (Bellingard et al., 1995).

Neopterin is secreted from T-lymphocytes through the GTP (guanosine triphosphate) cyclohydrolase I enzyme by overexpression of IFN-γ from activated monocytes, macrophages, and dendritic cells. The activity of this enzyme is greatly increased by IFN-γ and other cytokines (Milich et al., 1995; Fuchs et al., 1992; Muller et al., 1991).

Neopterin Levels in Subsequent Pregnancy
Study Groups
A total of eighty women with a history of at least three abortions of unknown etiology which occurred during the first trimester were included in the study. The control group consisted of forty three healthy women. The mean age of the RSA group was 29.11±0.07 (year), whereas that of the control group was 31.18±0.19 (year).

¹ Faculty of Pharmacy, İnönü University, Malatya, Turkey. songul.unuvar@inonu.edu.tr
² Faculty of Pharmacy, İnönü University, Malatya, Turkey. zubeyde8644@gmail.com
All individuals in the control group were thoroughly scrutinized about their health status. This study was approved by the Institutional Ethics Committee and conducted in accordance with the principles of the Declaration of Helsinki. A written informed consent was obtained from each participant.

Neopterin Measurement

Blood samples were collected into 10 cc biochemistry tubes for biochemical and histological tests required for routine follow-up blood sampling. Blood samples were collected into heparin-containing vacuum tubes and centrifuged at 3,500 rpm. Supernatants were collected and stored at -20 °C. Serum neopterin levels were measured using the ELISA (DRG Diagnostics GmbH, Germany) method. Neopterin concentrations were expressed in nmol/L.

Statistical Analysis

Statistical analysis was performed using the SPSS version 11.50 software. Descriptive data were expressed in mean±standard error (SE). The Mann-Whitney U test was used to compare two independent groups, whereas the Pearson correlation test was used to analyze possible relationships between the variables. A P value of <0.05 was considered statistically significant.

Discussion

The elevated serum concentrations of neopterin have been demonstrated in various infections (malaria, measles and septic shock), chronic inflammatory diseases (Crohn disease, ulcerative colitis) and autoimmune disorders (rheumatoid arthritis, thyroiditis), cardiovascular diseases, malignancies and organ transplantations (Muller et al., 1991; Fuchs et al., 1993; Eisenhut, 2013; Yanchun&Zhidong, 2011). Neopterin is a sensitive indicator of cell-mediated immune activation (Eisenhut, 2013; Yanchun&Zhidong, 2011; Huber et al., 1984). Neopterin levels can be used as an indicator in the assessment of immunogenic stimulations induced by the fetus and placenta during pregnancy since its production reflects cellular immune response (Munn et al., 1998).

The mean serum neopterin level was 16.47±0.095 nmol/L in the women with RSA and 6.14±0.041 nmol/L in the control group, indicating statistically significantly higher levels in the women with a history of RSA (p=0.0182).

In addition, we found a negative correlation between the serum neopterin levels and age both in the control group (R=0.0774, p=0.6236) and in the RSA group (R=0.1415, p=0.2089) (Figure 1). However, this correlation was not statistically significant (p>0.05).

Figure 1. The distribution of neopterin concentrations according to the age.

Source: Author

A healthy pregnancy is characterized by depression of cell-mediated immune response in addition to an increase in humoral immune response (Kaleli et al., 2005). The production of Th2 cytokines by decidual T-cells contributes to the progress of pregnancy; however, the excessive increase in Th1 response poses a risk for the survival of the fetus. The predominance of Th1 may be associated with pathological conditions such as RSA and preeclampsia (Kaleli et al., 2005; Lin et al., 1993).

Women with recurrent pregnancy losses and/or inadequate implantation have been reported to possess significantly increased peripheral blood Th1 cells compared to normal fertile women. Increased
proinflammatory cytokines have been suggested to play an important role in recurrent pregnancy losses (Kwak-Kim et al., 2000). Excessive activation of Th1 cytokines and natural killer (NK) cells has been reported to be the most important alloimmune cause of RSA (Pandey et al., 2004). NK cells in the uterine mucosa have been reported to contribute to the cytokine response at the maternal-fetal interface. This cytokine response is generally caused either by type Th1 (interleukin 2, INF-γ and tumor necrosis factor alpha (TNF-α) production) or type Th2 (interleukin 4, 6 and 10) cells. A normal pregnancy may be the result of Th1-type cytokine response. On the other hand, women with a history of RSA present with a predominantly Th1-type response during embryonic implantation and during pregnancy (Rai & Regan, 2006; Piccinni et al., 1998).

Many studies have been conducted which suggest that complications of pregnancy which lead to disorders of placentation such as preeclampsia and fetal growth retardation are associated with increased decidual cellular immunity (Erkenekli et al., 2015; Bartha &Comino-Delgado, 1999). About 20% of pregnancies result in spontaneous abortion. About 60% of spontaneous abortions are due to genetic, infectious, hormonal and immunological factors. Under certain conditions, the immune tolerance mechanism may be impaired and the fetus immunologically rejected. The effect of immune mechanisms is also associated with the gestational period during which the abortion occurred. During preimplantation and until the end of implantation, cell-mediated immunity is said to be responsible for early abortion. Immunocompetent decidual cells or cytokines have been reported to be responsible for these immunological mechanisms (Giacomucci et al., 1994). The production of IFN-γ activates decidual macrophages, causing injury by stimulating the production of nitric oxide and TNF-α, which cause apoptosis and inhibit the secretion of granulocyte macrophage colony stimulating factors from the uterine epithelium. Th1 cytokines, which are secreted as a result of IFN-γ activity, result in the termination of pregnancy through embryo and trophoblast toxicity. As a result, during RSA, paternal lymphocytes immunotherapy is thought to have a beneficial effect on the provision of specific and non-specific T-cell suppression. The risk of the next pregnancy loss is approximately 24% in women with a history of two abortions, 30% after the third, and 40% after four abortions (Regan et al., 1989). There is a possibility of RSA in women with previous live births. History of previous delivery is an independently associated indicator of the result of the next birth. The risk of abortion increases after each consecutive pregnancy loss and the prognosis worsens with increased maternal age. In advanced age pregnancies, the risk of abortion increases with the decrease in the number and quality of oocyte present. The risk is higher particularly in women over the age of 35 (Green-top Guideline, 2011).

Women with RSA were found to have local and systemic immunological changes when compared to women with normal pregnancy. Implementation of immunological tests to these patients would be beneficial during the appropriate period of pregnancy (Pandey et al., 2004; Magid et al., 1998).

Conclusion

In conclusion, evaluation of neopterin levels with routine clinical tests during pregnancy would contribute to the prognosis. The measurement of neopterin levels in body fluids using the ELISA method is rare in the clinical practice. The addition of neopterin measurement to routine clinical laboratory practice may contribute to early diagnosis of diseases.

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EFFECT ASSESSMENT OF A COGNITIVE TRAINING PLATFORM IN HEALTHY OLDER ADULTS

Antonia Yaneva¹, Nonka Mateva²

Abstract: Cognitive interventions, especially cognitive training, may improve cognitive functions in healthy older adults. Computerized cognitive training platforms offer several advantages over traditional programs for cognitive training and stimulation. The focus of this article is the methodology of the studies that apply a particular online training program. We investigate the effectiveness of several studies for cognitive training in healthy elderly people and evaluate reported outcomes and potential bias and what factors determine, influence or contribute to the positive or negative results. The post-intervention scores demonstrate that computerized cognitive training may enhance some cognitive functions and the overall cognitive status but there is need for additional research to prove its effectiveness.

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UDC Classification: 614.4

Keywords: computerized cognitive training, assessment, older adults

Introduction

The ability of people to perform different cognitive tasks decreases with age. This may be due to normal aging or an indication of the onset of dementia or mild cognitive impairment (MCI). Cognitive decline leads to deterioration of the quality of life of these patients as well as difficulties or inabilities to perform activities of daily living. Currently, there is no cure for Alzheimer's disease and it is necessary to look for alternative methods to prevent and mitigate the consequences of the occurrence of this type of impairment. Many studies have shown that cognitive rehabilitation can prevent cognitive decline and even delay the onset of dementia (Papp et al., 2009). In one classification, cognitive interventions are grouped into 3 categories – cognitive rehabilitation, cognitive stimulation and cognitive training (CT) (Clare et al., 2003). CT is defined by Martin et al. (2011) as “an intervention provided structured practice on tasks relevant to aspects of cognitive functioning, using standardized tasks” and “intended to address cognitive function and/or cognitive impairment directly.” Based on this and other similar definitions, Gates & Valenzuela (2010) determined that cognitive training is a specific form of cognitive intervention that aims to stimulate residual neuroplasticity in normal aging adults as well as those with mild cognitive impairment and Alzheimer's disease. In addition, they underline the increasing popularity of computer-based platforms that have the potential to produce more effective results on both general cognition and specific cognitive domains. Another systematic review (Kueider et al., 2012) investigated the efficacy of computer-based cognitive interventions and emphasized that they have significant advantages over traditional programs. Computer-based cognitive interventions offer the opportunity for personalized training taking into account the individual needs of the patient and allowing to focus only on those areas that need improvement. These programs are a much cheaper alternative that suggests much wider spreading among the elderly.

Cognitive training platforms

Recently, commercial cognitive training platforms have been becoming very popular. The most well-known among them are Posit Science, CogniFit, Cogmed, Brain Age, My brain Trainer, Dakim and Lumosity. Despite the fact that these programs are available, easy to use and could be adapted to different types of users, there is insufficient evidence for their clinical validity. A review of Shah et al. (2017) assesses the number and quality of studies that evaluate the empirical relevance of these platforms for cognitive function in healthy elderly (Shah et al., 2017). They group trials into three categories - I, II and III, level of evidence using PEDro scale (Physiotherapy Evidence Database scale) for randomized clinical trials. This scale consists of 11 criteria and helps to establish the validity of a randomized control trial (RCT) and if there are enough statistics that explain results. (Pedro et al., 1999). The authors have identified 2 programs with a level of evidence I - Posit Science and CogniFit.

¹ Faculty of Public Health, Medical University of Plovdiv, ayaneva@meduniversity-plovdiv.bg
² Faculty of Public Health, Medical University of Plovdiv, nmateva@meduniversity-plovdiv.bg
CogniFit training program

CogniFit is a program designed specifically for the effective training of a variety of important cognitive skills. It covers a wide range of abilities, such as: visual search, time estimation, naming, categorization, visual short term memory, auditory short term memory, location memory, spatial orientation, planning, ability to inhibit planned action, speed of reaction and hand-eye coordination. Initially, CogniFit evaluates the starting point for each user and on the basis of this information it designs an individual training program. The training itself consists of tasks to be worked on for about fifteen to twenty minutes, three times a week. The software measures the person's progress and provides feedback on ongoing performance. (www.cognifit.com) (Breznitz)

Objective

The purpose of this review is to evaluate the effectiveness of cognitive training platform CogniFit in healthy older adults. Therefore, studies examining computer-based cognitive training are analyzed with regards to training effectiveness. Our goal is to assess the reported outcomes and potential bias and what factors determine, influence or contribute to the positive or negative results.

Methodology

Criteria for studies selection

This review focuses on RCTs for which adequate information was provided. The selected studies must be published and presented in a journal article. The participants must be over 50 years of age, healthy older adults with no diagnoses of dementia or Alzheimer’s disease. The studies have to describe computer-based cognitive training interventions that targeted specific cognitive domains, or the overall cognitive status improvement. Control groups are defined as no training and the participants included receive no-cognitive training or stimulation. The studies must report participants’ performance both in the beginning and at the end. The pre- and post-tests are evaluated regarding their relevance. To identify the appropriate studies, a search in healthcare databases was initiated using the following keywords: “cognitive training” or “cognitive stimulation” or “cognitive training platforms” or “CogniFit” and all terms are searched in the fields Title, Abstract and Keywords. The healthcare databases PubMed, Scopus, Web of Science and Springer were searched.

Results

We identified 29 articles that met the above-mentioned keywords criteria. Three of the studies were selected for inclusion in this review. These studies presented RCTs with healthy older adults with no diagnosis of dementia or MCI (Bellotti, 2014; Peretz et al., 2011; Stern et al., 2013). They included pre- and post-intervention tests of cognitive status and provided sufficient statistical data for the effect assessment of computerized cognitive training platform CogniFit. Over 26 studies were excluded because they focused on participants with multiple sclerosis, intellectual or developmental disabilities as well as older adults with insomnia (Haimov & Shatil, 2013; Siberski et al., 2015; Shatil et al., 2010; Cimermanová & Ram, 2013).

Design of the studies

All studies were randomized-controlled studies as per the inclusion criteria of the present paper. Two of the studies had one control group that used classic computer games or games that are especially designed for the study but have no cognitive training purpose (Bellotti, 2014, Peretz et al., 2011). One study included 4 groups – the first group was engaged in cognitive training, the second in mild aerobic training, the third in the combination of both and the fourth was not involved in any training but the patients included in it were engaged in book-reading activities (Stern et al., 2013).

Patient recruitment

The participants were healthy volunteers and some of them owned personal computers and the ability to use them. Individuals with corrected vision below 20/40 and impaired hearing as well as those with a history of clinical stroke or head trauma were excluded. Other exclusion criteria were alcohol dependence, any neurological diseases as well as the use of drug that could influence cognitive functions.

Test for baseline evaluations

Several neuropsychological tests were used for the evaluation of patients’ performance before and after the training. Three of the studies used Mini-Mental Status Exam (MMSE) for the exclusion criteria. The
test consists of 11 questions with a total score of 30 points. Results close to 0 indicate a significant cognitive deficit and those close to 30 - the absence of dementia or cognitive impairments (Folstein et al., 1975). Two other tests, Trail Making Test (TMT) and Digit Span (DS), respectively, are used to measure executive functions such as complex visual-motor conceptual screening and test the working memory (Bellotti, 2014).

In addition to the above mentioned neuropsychological tests, the Schedule for the Evaluation of Individual Quality of Life (SEIQoL) was also used, which allows people to assess their quality of life by identifying the priority domains of life and also measure their satisfaction from each of them (O’Boye et al., 1993).

In order to evaluate the overall level of intelligence of the participants, the TONI-3 - Test of Non-Verbal Intelligence was used. This test is suitable for children over 6 years of age to adults 89 years and 11 months old and is a tool that assesses the cognitive function, capacity and abstract thinking of people with serious language problems. The test is well suited not only for English speakers but also for people who do not understand spoken or written English, either for cultural reasons or due to a trauma, a disease, or a disability (Brown, 2003).

An important part of the implementation of the CogniFit platform for cognitive training is the neurocognitive evaluation that is done before and after the intervention with the CogniFit Neuropsychological Evaluation. It consists of 15 tasks measuring multiple cognitive functions such as working memory, divided attention, planning and hand-eye coordination. The difficulty of the cognitive tasks involved in the cognitive training is adapted in accordance with the results from this assessment.

Duration of interventions
The training sessions lasted from eight weeks to 16 weeks, 3 times weekly, 20-30 min each session.

Efficacy
To evaluate the effect of the platform for cognitive training, mixed-effects models are used and Cohen’s $d$ is calculated for the effect size between the two compared groups and within each group.

In the study of Peretz et al. (2013) the cognitive training group was compared with the control group that was engaged in playing classic computer games in order to evaluate eight cognitive domains: Focused attention, Sustained attention, Memory recognition, Memory recall, Visuospatial learning, Visuospatial working memory, Executive functions, Mental flexibility. The overall cognitive effect was presented in both groups. The within-group comparison shows that while in the group of cognitive training, an effect was observed in each of the 8 domains. The effect in the control group was only in 4 cognitive domains - Focused attention, Sustained attention, Memory recognition and Mental flexibility. Regarding the within-group differences, a borderline significance was found in the overall cognitive score. There was a highly significant improvement in the cognitive training group as compared to the control group in 3 domains: visual-spatial working memory, visual-spatial learning and focused attention. The effect was not significant in the 5 remaining domain, although the trend was in the same direction (Peretz et al., 2011).

The study of Bellotti (Bellotti, 2014) also showed improvement of working memory and executive function tasks for cognitive training group compared to the control group which completed a TV-based program of personally benefiting activities. A positive effect is also reported in the within-group comparison. The cognitive training group showed significant improvement on both the Digit Span Test and the Trail Making Test. Cohen’s $d$ calculated for those abilities fell in the small to medium range -0, 40 to 0, 58.

Cohen’s $d$ is used when interpreting the effect of an intervention. Cohen’s $d$ is the difference between the average scores on pre- and posttests firstly for the cognitive training group and then for the control group. Scoring was small or weak at $d = 0.20$, medium at $d = 0.5$ and large $d = 0.8$ (Cohen, 1977).

In the study (Stern et al., 2013) there were 4 groups of participants. The effect of the training platform CogniFit was evaluated using The General Linear Model for Repeated Measures (SPSS v.18). In both groups, for cognitive training, and for cognitive training and physical exercises, a significant improvement in several verbal and nonverbal cognitive skills was reported: Hand-Eye Coordination, GVM (working memory and long-term memory), Speed of Information Processing, Visual Scanning, and Naming. Cohen’s-, calculated for these improvements revealed medium-size ($d=0.6$ or $0.7$) or large-
size effects (d=0.8). In the cognitive training group significant improvements were found at the end of the study in terms of Divided Attention, Avoiding Distractions, Hand-eye Co-ordination, Naming, Speed of Visual-Spatial Information Processing, Visual Scanning, and Global Visual Memory.

**Conclusion**

Computer-based platforms may provide objective data on patients’ performance during the training. The studies included in this paper provide information and evidence that regular mental stimulation could result in improved cognitive ability. We suggest that relatively small improvements are due to duration of the study. But none of them reported if the acquired skills are sustainable and how long this effect lasts. Personalized and dynamically adapted cognitive training regarding individual capacity indicates a positive effect compared to computer games where the effect is haphazard, not so good or missing. In addition, combining cognitive training with physical activities would significantly increase the cognitive benefits compared to cognitive training and physical training separately.

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NATURAL SCIENCES AND ICT
Abstract: Business applications are difficult to use for the average user. An adaptive user interface improves employees' productivity and is presented as a solution to this problem. However, developing user interfaces that are adapted to the needs and culture of the enterprise is time-consuming and expensive. We developed a software prototype for generating adaptive user interfaces that makes this process less time-consuming and more efficient. We propose an extension to the Cameleon Reference Framework project by Information Society Technologies, on the implementation level by adding an additional step for defining the Area of Business Operations. That way the prototype can extract business tasks for the selected industry therefore, presenting to the developer a more intelligent selection of predefined tasks. In this article, we also present a programming approach for transforming a task model, as defined by the ConcurTaskTrees notation, into an abstract user interface.

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Keywords: adaptive user interfaces, ConcurTaskTrees notation, abstract user interface, usability

Introduction

An adaptive user interface is defined as a user interface that is aware of the context of use and is capable of (automatic) changes according to the context (W3C Incubator Group, 2010). The context of use consists of the users, their tasks, the equipment (hardware, software, materials), as well as the physical and social environment in which the product is used according to ISO/IEC 25063:2014. One of the approaches for building adaptive user interfaces is model-based user interface development (Criado et al., 2010; Taktak et al., 2016; Akiki et al., 2016). In this approach models of high abstract level are defined which helps designers specify and analyze interactive software applications from a semantic point of view rather than focusing on the implementation. The aim is to increase the level of abstraction in a way that different adaptations could be easily applied on the different abstraction levels. The final goal is to produce a user interface that is capable of automatic change according to user skills, abilities, needs and environment (Pavlov, 2014; Pavlov et al., 2016).

The Cameleon Reference Framework (CRF), developed in a project by Information Society Technologies, defines four levels of abstraction in the UI development cycle (Calvary et al., 2003): Task and Domain, Abstract User Interface, the Concrete User Interface, and the Final User Interface. The final report from the W3C Incubator Group concerning this project is to start standardization in the area of Model-Based User Interfaces with the following work items: Unified Reference Framework for MBUI - A W3C recommendation that will formalize the CRF; Task, AUI and CUI meta-models’ recommendations and other (W3C Incubator Group, 2010).

The first level in the development life cycle in the CRF is Tasks and Domain. In this step the logical activities that the users should perform to achieve their goals are defined. The next level is Abstract User Interface which is a formal platform-independent description of a user interface without details of the visual layout or behavior of the system (Constantine, 2003). The next level - Concrete User Interface is platform-dependent expression of the UI and defines more concretely what visual components should be used. The Final User Interfaces consists of the source code and it can be interpreted or compiled. CRF is used as a base for developing model-driven interactive systems (Blumendorf et al., 2006; Wu and Hua, 2013; Akiki et al., 2016).

We have developed a software prototype for generating adaptive user interfaces extending the Cameleon Reference Framework’s four levels of UI development cycle. As the prototype is designed for building user interfaces for business information systems, we propose a modification to the CRF on the implementation level by adding an additional step for defining functional areas of operations (Figure 1). That way the prototype can extract business tasks for the selected industry, therefore presenting to the developer a more intelligent selection of predefined tasks. The UI

1 Faculty of Mathematics and Informatics, University of Plovdiv Paisii Hilendarski, Bulgaria; margarita.hr.atanasaova@gmail.com

2 Faculty of Mathematics and Informatics, University of Plovdiv Paisii Hilendarski, Bulgaria; malinova@uni-plovdiv.bg
developers/designers can make a technology selection for the generated Final User Interface when they create their initial project.

Figure 1: Our extension of the four abstraction levels defined by the CRF

In this article, we also describe how we implemented the transformation of the Task model into an Abstract User Interface. We developed a modern programming approach for that purpose.

**Functional Areas of Operations**

From a functional perspective, there are four types of information systems: Sales and Marketing, Manufacturing and Production, Finance and Accounting, Human Resources (Laudon and Laudon, 2015). Therefore, we implemented the selection of functional areas and business functions as a first step of the UI development process. We also developed the functionality of adding and deleting functional areas. We give the UI designers detailed descriptions for every business function as well as the ability to select more than one functional area. That way we enable them to easily build user interfaces for multifunctional information systems as CRM\(^3\), ERP\(^4\) and SCM\(^5\).

**ConcurTaskTrees Notation**

In our software prototype, we have implemented sample task models using the CTT notation (Paternò, 2003; W3C, 2012) for different business tasks so that we ease and speed up the process of creating user interfaces for business applications. All these predefined tasks are stored in a library for quick access and reuse. The predefined tasks are limited on the second step by analyzing the selected functional areas from the user. We have also implemented the functionality of creating new tasks and saving them in a personal library for reuse.

This notation is specifically built for the aims of a model-based user interface development approach. Therefore, we chose it for base task notation in the task modeling step. ConcurTaskTrees notation focuses on the actions, has a hierarchical structure, has graphical syntax, which helps when describing different types of tasks and operators between them, supports object attributes and supports Task allocation. There are four task types in CTT: User Task, System Task, Interaction Task, and Abstract Task. CTT defines around 10 types of operators between tasks of the same hierarchical level.

**Building ConcurTaskTrees Editor**

Dealing with abstract user interfaces and task tree models requires an editor created to aim at maximum adaptability. Designers developing multiplatform adaptable user interfaces should be capable of doing it via a wider range of devices and operating systems (Rahnev and Stoeva, 2010) hence selecting a technology stack suitable for the Web seemed most reasonable. We built our own CTT editor as part of the software prototype, described in this paper, instead of using the CTT environment (Mori et al., 2002) because of several reasons: we wanted the task editor to have build-in

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3 CRM – Customer relationship management systems
4 ERP – Enterprise resource planning systems
5 SCM – Supply chain management systems
functionality in our prototype so that the UI developers do not need to install different products in order to create a user interface; the task modelling step needed to be connected to the first step (the selection of functional areas).

To use an open-source approach, we built the CTT editor described in this article using PHP, MySQL, JavaScript, HTML and CSS, and GoJS (Northwoods Software, 2017). The GoJS library is used for implementing the interactive diagrams for three of the five steps of the development cycle – Task Model, Abstract UI and Concrete UI. The engine for creating diagrams was chosen after a detailed research of several other libraries (e.g. GraphStream, Treant.js, Dracula Graph) that are used mainly for drawing graphs. GoJS works with specific JSON format, while the CTT environment generates different XML. If we were using this environment separately, instead of our own task editor, the UI developers should install this environment, build their own tasks, upload the generated XML into our system, then generate the rest of the UI model. If there were changes needed in the task model, they should have made them in the CTT environment and go again through all the steps that follow. With the CTT editor created in our web-based prototype, we save the users’ time as they can traverse through all steps immediately with the only need to click the “Save” button to apply their changes in the models.

In the development process of the CTT editor several challenges arose: unclear and incomplete documentation of the graphing libraries; lack of examples; lack of opportunity to describe different node types and different types of the relations between them, which is a must-have feature for the selected notation as there are different types of tasks and links between them (Figure 2); none of the researched JavaScript libraries provided ready-to-use examples of hierarchical representation of graphs that have different types of connections between elements of the same level (siblings).

![Figure 2: Simplified CTT notation model – different task types and relations between them.](image)

In Figure 2 a simplified CTT notation model is presented – this is what we need to build the task model data structure. The different node shapes represent different task types. The links between them have different symbols. This indicates the diversity of relations that two tasks can have. The structure should be a directed graph.

For our CTT editor we selected the GoJS library, which has several advantages: many different data structures can be described, multiple different relations between nodes can be described. It also renders HTML5 Canvas element or SVG without any server-side requirements. It is very convenient for building an integrated development environment as it has many advanced features for user interactivity such as drag-and-drop, copy-and-paste, in-place text editing, tooltips, context menus, templates, data binding and many other.

The development of the CTT editor went through several iterations of feature enrichment. First, we built a basic diagram with a tree structure. Then we added a toolbar with different types of tasks and relations. Functionality of adding and deleting tasks, children of the root element was created. We also created a graphical representation of different tasks: different icons according to task types plus labels under the tasks. Next we implemented the capability of renaming the task label as well as button “Save” to save the data structure in the database in JSON format with the task types and labels. Afterwards, we added the functionality of linking two sibling tasks with different types of relations (operators). In order to maintain horizontal structure between linked sibling tasks we defined a second layout for the linked siblings with a Horizontal link template. They ought to be in a horizontal line, not in vertical as placed by default by the graphs engine. Last, we implemented two-way data binding.
mechanism so that when the user makes edits on the JSON model and clicks the “Load” button, the changes are applied to the graph in the canvas and vice versa.

A result was achieved through which structures of tasks according to the CTT notation (Figure 3) can be successfully described, including: adding different types of tasks, using different icons and labels; the option of editing labels; connecting subtasks with different types of operators (links).

Figure 3: End result - CTT modeling editor. Example task model of Create Organisation task.

One of the main difficulties during this module creation was linking tasks, while their hierarchical structure remains untouched. In other words, creating a representation of a multigraph where multiple edges are two or more edges that connect the same two vertices. A loop is an edge (directed or undirected) that connects a vertex to itself; it may be permitted or not, according to the application. In this context, an edge with two different ends is called a link. Two sibling nodes may have a directed link but this does not make the former node a parent of the latter. To achieve this, a new horizontal layout template had to be defined. This template was applied only to those elements that have relation to the same hierarchical level. In GoJS isLayoutPositioned ignores the diagram layout direction, which by implementation is vertical, representing a tree view. After that a TemplateMap object should be defined. This object is used to store templates from different object types – groups, links or node. In our case, we use two templates – the default one which supports vertical layout and horizontal.

In GoJS, there is a function model.toJson(), which transforms the model drawn in the HTML5 canvas into a JSON data structure. There is also a reversed function model.fromJson which takes the JSON and applies it to the model. An important detail here is that in order to keep the changes in the tasks names in the JSON file and vice versa, we added a two-way communication binding.

Transforming Task Model into an Abstract User Interface

In this section, we propose a programming approach for the process of automatic transformation of the task model into an abstract user interface model.

To build the structure of the abstract user interface, the topology of the tasks tree should be analyzed (Molina et al., 2012). First, every task that is a leaf is identified. These are the tasks that do not have any children. They will be the basic elements in the abstract user interface. Then we go up to the next level of the tree structure, which appears to be the container elements. They hold the basic elements. Then we go up in the tree structure using a recursive function and we define the other containers until we reach the root element which appears to be the main container.

Depending on the task type (abstract, interactive, system or user) and node type (parent or leaf), the task can be transformed into different abstract interactive objects (Montero and López-Jaquero, 2006). If the node is a parent it is always transformed into an Abstract Container. The only exception to the rule is if the task is a User type, because there is no abstract representation as this is a cognitive action.
performed by the user. The Abstract task type is always transformed into an Abstract Container as this task needs to be decomposed into simpler ones. If the Interactive task type is a leaf in the task tree structure, then it might be one of the four Abstract Interactive Objects - input, output, control or navigation. This choice is made by the user as this cannot be automatically selected. When the System task type is a leaf, it may be transformed into an output or navigation as this is a task performed by the software system. The result from the transformation of the task tree presented in Figure 3 is shown in Figure 4.

Figure 4: Generated Abstract User Interface of the Login task.

Our process of automatic transformation of the task model into an abstract user interface model follows these steps:

- Fetch the CTT model in a tree structure.
- Convert the CTT tree structure recursively into a list structure.
- Iterate the list structure node by node to extract data needed for the AUI model.
- Populate the missing data with the user’s provided input. Through the IDE the user has to select the type of the facets which cannot be explicitly determined by the transformation rules.
- Store all data in a list structure.
- Convert the final list structure to a format needed for rendering the AUI (JSON in the described case).

**Conclusion**

The creation of adaptive user interfaces benefits a lot from the model-based user interface development approach. That way the designers can focus more on the user tasks rather than the implementation. On the other side users are able to be part of the whole process as no code development is required when a proper development environment is used. Furthermore, designers can specify different adaptations for the different levels of abstraction. This paper details a programming algorithm for transforming the task model into an abstract user interface. This is part of a larger system that helps designers create context-aware user interfaces using a model-driven development approach. An evaluation study has to be conducted to evaluate the usability of the system and the development time of the final user interface. Future work includes adding a prior step of selecting a technology for building the final user interface so that the user is not only limited to HTML and CSS.

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AN INVESTIGATION OF BRUCELLOSIS KNOWLEDGE, ATTITUDE AND PRACTICE AMONG LIVESTOCK OWNERS IN THE WEST BANK

Elena Awwad,1 Osama Awwad,2 Mohammad Farraj,3 Tamer Essawi,4 Kamel Adwan,5 Assad Manasra,6 Stelian Baraitareanu,7 Maria Rodica Gurau,8 Doina Danes9

Abstract: Brucellosis is endemic in Palestine and therefore since 1998 a national program of brucellosis control has been launched. In the traditional breeding area of small ruminants, brucellosis is often reported in humans, mainly as a food borne disease. Any control strategy requires a well-functioning surveillance system, the co-operation with owners and a sustainable financial support. The aim of this study is sizing up of the current situation of knowledge, of the attitude and practice (KAP) regarding brucellosis, among sheep and goat farmers. A cross-sectional survey was conducted in 118 participants through an anonymous questionnaire to assess to which extent the flock owners are familiar with the knowledge and practices related to brucellosis of small ruminants. The designs of the questionnaire consider the implementation of KAP. Results shown that farmers, independent on their education, heard about brucellosis (100%) and all of them consider the washing of hands as necessary after close contact with animals or their products, and animal vaccination as being necessary to prevent brucellosis. Despite the educational level, almost all owners are aware about the risk of exposure of their family to animals infected with Brucella: they are considering the heating of cheese at boiling point and the use of gloves, as appropriate practices to reduce the exposure to Brucella. Great majorities of the participants (89.8%) have good knowledge about the transmission of Brucella from animals to humans, but only 37.3% correctly answered about the transmission of brucellosis by drinking raw milk, eating unpasteurized cheese, eating raw meat, liver, spleen and kidney or by contact with an aborted foetus and placenta fluid. Referring to the brucellosis’ prevention, 83% answered that boiling of milk and cheese and wearing of gloves when handling an aborted foetus could prevent it: these answers fit with the level of knowledge. From the questioned owners, 28.8% knew that boiling the milk affect his nutritive value; 84.7% think that owners of animals and their families are more exposed to brucellosis and 11.9% of their families have been diseased. Relative good general knowledge of owners about brucellosis was recorded, but high-risk behaviors still exist. Awareness campaigns on the control and prevention of the brucellosis are success stories, and government agencies should continue the public education.

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Keywords: KAP, investigation, awareness, prevention, sheep, goat, Palestine

Introduction

Globally, brucellosis is still an important issue of the public health authorities (Doganay & Aygen, 2003; Gul & Khan, 2007). In the traditional breeding area of small ruminants, brucellosis is often reported in humans, mainly as a food borne disease - by ingestion of raw dairy products, or as an occupational disease - by exposure to infected livestock (Sanco, 2001; Doganay & Aygen, 2003; Zvizdic et al, 2006; Kaoud et al, 2010; Saleem et al, 2010). This infection is also associate with high economic losses, as a result of abortions, weak offspring, reduced milk production and the commercial banning of the products (WHO, 1998; FAO, 2010). Many countries are carrying on programs of brucellosis eradication, but they have not yet fully succeeded. Any control strategy requires a well-functioning surveillance system, the co-operation with owners and sustainable financial support (Refai, 2002; FAO, 2010). The brucellosis control program must consider public health education as an essential activity performed within this framework, among all the concerned population, and underlining the key factors in the disease spreading (WHO, 2009; FAO, 2010).

Public health education is a difficult and extremely complex task, which includes culture, beliefs, traditions, educational level, social status, occupation, and age. Therefore, health education programs should be firstly aimed at physicians, veterinarians and farmers. These groups should be directed not

1 Faculty of Veterinary Medicine, University of Agronomic Science and Veterinary Medicine of Bucharest, Romania; Central Veterinary Laboratory, General Directorate of Veterinary Services and Animal Health, Ramallah, Ministry of Agriculture, Palestine, eleenaawwad@yahoo.com
2 Central Veterinary Laboratory, General Directorate of Veterinary Services and Animal Health, Ramallah, Ministry of Agriculture, Palestine, eleenaawwad@yahoo.com
3 Master Program in Clinical Laboratory Science (MCLS), Birzeit University, Palestine, mfarraj@birzeit.edu
4 Master Program in Clinical Laboratory Science (MCLS), Birzeit University, Palestine, tessawi@birzeit.edu
5 Department of Biology and Biotechnology, An-Najah National University, Nablus, Palestine, adwank@yahoo.com
6 Central Veterinary Laboratory, General Directorate of Veterinary Services and Animal Health, Ramallah, Ministry of Agriculture, Palestine, vet_asad@yahoo.com
7 Faculty of Veterinary Medicine, USAMV B, Romania, doruvet@gmail.com
8 Faculty of Veterinary Medicine, USAMV B, Romania, otelea_maria@yahoo.com
9 Faculty of Veterinary Medicine, USAMV B, Romania, dans.doina@gmail.com
only at specific measures, but should also emphasize the responsibility of their own and community safety by defining their own problems, to understand what can be done to deal with it using their own resources and external support and to decide appropriate resolutions. Secondly, the whole community should be involved through health education in schools, in the workplace and in all the population (WHO, 2009).

The aim of this study is sizing up of the current situation of knowledge, of the attitude and practice (KAP) regarding brucellosis, among sheep and goat farmers, after 15 years of implementation of this project. This study showed relative good general knowledge of owners about brucellosis, but they still have high-risk behavior. It is therefore recommended that government agencies pay more attention to public education, by creating awareness campaigns on the control and prevention of brucellosis, as one of the most important steps in the eradication of brucellosis.

Material and Methods

Area of study and population

West Bank is the part of Palestine with a population of 2754722. The terrain is mostly rugged dissected upland, some vegetation in the west, but somewhat barren in the east. There are few natural resources in the area except the highly arable land, which comprises 27% of the land area of the region. It is mostly used as permanent pastures (32% of arable land) and seasonal agricultural uses (40%) (CIA, 2014). The value of the agricultural sector is about 60% of the plant and 40% of the livestock production. (MOA, 2013). The study was performed in seven districts of the West Bank territory (Palestine): Jenin, Tubas, Nablus, Jerusalem, Bethlehem, Hebron and Dura. These districts have been selected considering the high density of humans, animal and of familial farming of sheep and goats. The query was done only on livestock owners, which not only consume, but also sell their dairy production. The livestock sector is dominated by small ruminants: 732,399 sheep and 240,136 goats. There are also 39,625 cattle, 1,506 camels and 3,603 horses. In poultry farms, there are 36.5 million layers and 1.6 million broilers. The number of traditional and modern beehives is 44,278 and the total quantity of fish is 1,318 tons. A quarter of livestock owners (25.3 %) is basing their livelihood on agriculture (MOA, 2011; MOA, 2013; EU, 2013).

Study design

We carried out an anonymous questionnaire survey to assess to which extent the flock owners were familiar with the knowledge and practices related to brucellosis of small ruminants. The designs of the questionnaire consider the implementation of KAP (WHO, 2009). The questionnaire was submitted to 118 flock owners.

Ethic consideration

All participants have been informed about the purpose and methods of the study. Owners agreed to participate voluntarily and anonymously.

Statistical analyses

The provided data were analyzed with the software SPSS (version 20, IBM, Chicago, IL, USA), by descriptive statistic, ordinal and binary logistic regression models and correlation between groups. To determine the relationship between associations two or more variables was used with a chi-square test with p value of 0.05 considered as the level of significance. Using the binary version of each category (of knowledge) as a response, a logistic regression models was fitted to investigate potential predictions and associations between the level of knowledge about brucellosis, the practice of drinking dairy products, boiling of cheese and other important predictor variables. The correct answer was considered as code: “0”, don’t know: “1”, and not correct was coded: “2”. Multivariate logistic regression analyses were performed separately to determine the predictors of knowledge, and the adoption of management practices at a farm level. Also, an ANOVA was used as a homogeneity test (significance more than 5%) which showed that present equal deviation between variables and significance less than 5% in its mean and present differences between the types of variables.

Results and Discussion

The Table 1 presents the socio-cultural pattern of respondents: the most prevalent profile is “male, from rural area, medium education level”.

1043
Table 1: Data concerning the respondents

<table>
<thead>
<tr>
<th>Variables</th>
<th>Type of variables</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>District</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jerusalem</td>
<td></td>
<td>12</td>
<td>10.17</td>
</tr>
<tr>
<td>Jenin</td>
<td></td>
<td>22</td>
<td>18.64</td>
</tr>
<tr>
<td>Nablus</td>
<td></td>
<td>38</td>
<td>32.2</td>
</tr>
<tr>
<td>Tubas</td>
<td></td>
<td>22</td>
<td>18.64</td>
</tr>
<tr>
<td>Hebron</td>
<td></td>
<td>11</td>
<td>9.32</td>
</tr>
<tr>
<td>Dura</td>
<td></td>
<td>7</td>
<td>5.93</td>
</tr>
<tr>
<td>Bethlehem</td>
<td></td>
<td>6</td>
<td>5.08</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variables</th>
<th>Type of variables</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male (husband)</td>
<td>94</td>
<td>79.66</td>
</tr>
<tr>
<td></td>
<td>Female (wife)</td>
<td>24</td>
<td>20.34</td>
</tr>
<tr>
<td>Area of residency</td>
<td>Urban</td>
<td>29</td>
<td>24.58</td>
</tr>
<tr>
<td></td>
<td>Rural</td>
<td>85</td>
<td>72.03</td>
</tr>
<tr>
<td></td>
<td>Camp</td>
<td>4</td>
<td>3.39</td>
</tr>
<tr>
<td></td>
<td>Illiterate</td>
<td>8</td>
<td>6.78</td>
</tr>
<tr>
<td></td>
<td>Below high school</td>
<td>86</td>
<td>72.88</td>
</tr>
<tr>
<td></td>
<td>High school</td>
<td>17</td>
<td>14.41</td>
</tr>
<tr>
<td></td>
<td>After high school</td>
<td>7</td>
<td>5.93</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variables</th>
<th>Type of variables</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education</td>
<td>Illiterate</td>
<td>8</td>
<td>6.78</td>
</tr>
<tr>
<td></td>
<td>Below high school</td>
<td>86</td>
<td>72.88</td>
</tr>
<tr>
<td></td>
<td>High school</td>
<td>17</td>
<td>14.41</td>
</tr>
<tr>
<td></td>
<td>After high school</td>
<td>7</td>
<td>5.93</td>
</tr>
</tbody>
</table>

Source: Authors

The respondents have been answered to basic questions, related to their knowledge concerning: diseases transmitted from animals to humans, minimal personal hygiene rules, the risks of the processing or of the ingesting of animal products (Table 2).

Our study shows that farmers, independent on their education, heard about brucellosis (100%). All respondents consider the washing of hands as necessary after closed contact with animals or their products. They are considering animal vaccination as being also necessary to prevent brucellosis. Other aspects of the KAP study had a significant difference of level of education and knowledge (Table 2).

The next questions targeted the “beliefs” of respondents in terms of their insight about: occupational exposure, cooking practices, the personal hygiene, the vaccination and the specific knowledge, on brucellosis (Table 3).

Despite the educational level, almost all owners are aware about the risk of exposure of their family to animals infected with Brucella: they are considering the heating of cheese at boiling point and the use of gloves, as appropriate practices to reduce the exposure to Brucella.

Table 2: Respondents’ knowledge about brucellosis

<table>
<thead>
<tr>
<th>Variables</th>
<th>Type of variables</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have you heard about brucellosis?</td>
<td>Yes</td>
<td>118</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>Is this disease transmittable from animal to man?</td>
<td>Yes</td>
<td>106</td>
<td>90.83</td>
</tr>
<tr>
<td></td>
<td>Don’t know</td>
<td>6</td>
<td>5.08</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>6</td>
<td>5.08</td>
</tr>
<tr>
<td>From which animal is disease transmitted to man?</td>
<td>Sheep, goat, cattle</td>
<td>108</td>
<td>91.53</td>
</tr>
<tr>
<td></td>
<td>Don’t know</td>
<td>10</td>
<td>8.47</td>
</tr>
<tr>
<td></td>
<td>Other animals</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>The disease is transmitted from animals to man by:</td>
<td>Drinking unpasteurized milk, eating raw cheese, contact with aborted foetuses or placenta fluids eating meat, liver, spleen not well cooked</td>
<td>44</td>
<td>37.29</td>
</tr>
<tr>
<td></td>
<td>Insects bites</td>
<td>3</td>
<td>2.54</td>
</tr>
<tr>
<td></td>
<td>All choose</td>
<td>71</td>
<td>60.17</td>
</tr>
<tr>
<td>Do you think that Brucellosis could be caused by drinking fresh milk without boiling?</td>
<td>Yes</td>
<td>102</td>
<td>86.44</td>
</tr>
<tr>
<td></td>
<td>Don’t know</td>
<td>9</td>
<td>7.63</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>7</td>
<td>5.93</td>
</tr>
<tr>
<td>Do you think that boiling the milk affects its nutritive value?</td>
<td>Yes</td>
<td>34</td>
<td>28.81</td>
</tr>
<tr>
<td></td>
<td>Don’t know</td>
<td>19</td>
<td>16.10</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>65</td>
<td>55.08</td>
</tr>
<tr>
<td>Do you think that eating fresh raw cheese may cause Brucellosis?</td>
<td>Yes</td>
<td>76</td>
<td>64.41</td>
</tr>
<tr>
<td></td>
<td>Don’t know</td>
<td>26</td>
<td>22.03</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>16</td>
<td>13.56</td>
</tr>
<tr>
<td>The disease can be prevented by:</td>
<td>Boiling milk, cheese and wearing gloves when handling aborted fetus</td>
<td>98</td>
<td>83.05</td>
</tr>
<tr>
<td></td>
<td>Eating honey</td>
<td>2</td>
<td>1.69</td>
</tr>
<tr>
<td></td>
<td>All choose</td>
<td>18</td>
<td>15.25</td>
</tr>
</tbody>
</table>

Source: Authors
Even if the questions previously assessed proved a satisfactory level of knowledge and an appropriate attitude toward brucellosis, the practices are far to be in accordance.

The great majorities of the participants (89.8%) have good knowledge about the transmission of Brucella from animals to humans, but only 37.3% correctly answered about the transmission of brucellosis by drinking raw milk, eating unpasteurized cheese, eating raw meat, liver, spleen, and kidney or by contact with aborted foetuses and placenta fluid. Referring to the brucellosis’ prevention, 83% answered that boiling of milk and cheese and wearing of gloves when handling aborted foetuses could prevent it; these answers fit with the level of knowledge, as revealed in table 2. From the questioned owners, 28.8% knew that boiling the milk affects its nutritive value; 84.7% think that owners of animals and their families are more exposed to brucellosis (Table 3), and 11.9% of their families have been diseased (Table 4).

<table>
<thead>
<tr>
<th>Variables</th>
<th>Type of variables</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you think that animal owners and their families are more exposed to Brucellosis?</td>
<td>Yes</td>
<td>100</td>
<td>84.75</td>
</tr>
<tr>
<td></td>
<td>Don’t know</td>
<td>11</td>
<td>9.32</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>7</td>
<td>5.93</td>
</tr>
<tr>
<td>Do you think that boiling cheese is necessary before consuming?</td>
<td>Yes</td>
<td>111</td>
<td>94.07</td>
</tr>
<tr>
<td></td>
<td>Don’t know</td>
<td>5</td>
<td>4.24</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>2</td>
<td>1.69</td>
</tr>
<tr>
<td>Do you think that using gloves when you deal with animals is necessary?</td>
<td>Yes</td>
<td>109</td>
<td>92.37</td>
</tr>
<tr>
<td></td>
<td>Don’t know</td>
<td>5</td>
<td>4.24</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>4</td>
<td>3.39</td>
</tr>
<tr>
<td>Do you think that washing hands is necessary after closed contact with animals or their products?</td>
<td>Yes</td>
<td>118</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Don’t know</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>Do you think that animal vaccination is necessary to prevent Brucellosis?</td>
<td>Yes</td>
<td>118</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Don’t know</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>Do you think that you need more information about Brucellosis?</td>
<td>Yes</td>
<td>103</td>
<td>87.29</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>15</td>
<td>12.71</td>
</tr>
</tbody>
</table>

Source: Authors

*Brucella* accidentally infects humans. The pathogen infects directly or is mediated, either through injured/broken skin, a mucous membrane or by ingestion of contaminated products, mainly fresh milk products. The greatest risk of infection is through direct contact with aborted animals, during lambing or the kidding period. Products such as unpasteurized milk and homemade cheese are the main source of infection for people who do not have direct contact with animals. Brucellosis is primarily an occupational risk in exposed professions, veterinarians, farmers, laboratory technicians, abattoir workers, and others who work with animals and their products. People living near infected premises may also be infected (Sanco, 2001; Corbel, 2006; Rumosa Gwaze et al., 2009; Smits, 2012). Therefore, the knowledge of livestock owners regarding brucellosis play an important role in the taking of preventive measures that could stop or reduce the spreading of the disease. The level of knowledge could be monitored through the KAP survey, as a quantitative method, with questions formatted in standardized questionnaires that provides access to information. KAP surveys reveal misconception, which represent obstacles to the activities and can raise potential barriers to behavior change (WHO, 2009; USAID, 2011; Macias & Glasauer, 2014).

Knowledge is the information of which a person, group of people, organization or other entity becomes aware of something and improves his attitude and practice through learning, education or by experience, perception or reflection. Attitude is the mental state about an issue or subject and is manifested through the practice or behavior of a person or organization. Practice generally depends on knowledge, economic stability and the socio-economic condition of farmers. The poor knowledge about brucellosis and the natives’ population is interfering in Brucellosis’ control and its spread (WHO, 2009; Addo et al., 2011; USAID, 2011; Khan et al., 2013). In Palestine, since 1998 the Ministry of Agriculture in cooperation with the UNDP/PAPP organization started the implementation of the Brucellosis Control Program, financially supported by Argentina, Japan and Spain, and technically by the WHO, FAO and OIE organizations.
This study revealed that only 46.6% participants have information about brucellosis, more than half (53.4% participants) consume raw milk and 89% of respondents consider the use of gloves while dealing with animals (Ramlawi, 2000). This project improved the control strategy, proposing the mass vaccination of small ruminants and all other activities, including the awareness campaigns about brucellosis among all population. Since 1999 the Brucellosis Control Program has been implemented at a national level (UNDP, 2010). In our study, the status of knowledge, attitude and practices was assessed through discussion with farmers and gave us a general picture for the 15 years of the brucellosis control: the implementation of Brucellosis Control Program generated many achievements, including the change of farmers’ mentality. Before starting Brucellosis Control Program less than 50% of owners heard about brucellosis as being a dangerous infectious disease, but in the current study all of them are aware (100%). Most of the participants (87.3%) have been interested and requested more information about education in public health. The interest manifested toward knowledge by the respondents is a promising factor for early improvement of practices of animal husbandry and milk processing; this general interest acts as a factor for reducing exposure, not only to *Brucella* spp, but also to other zoonotic pathogens.

The current study found that the level of education was an important predictor and was positively associated with the adoption of preventive practices: this correlation was observed in many KAPs surveys (Xiang et al., 2010; Holt et al., 2011; Khan et al., 2013; Lindahl et al., 2015). This study can help to develop appropriate policies of preventive measures by improving the knowledge and practice of farmers in sanitation, hygiene and waste management.

**Conclusion**

This study showed relative good general knowledge of owners about brucellosis, but they still perform high-risk behavior. It is therefore recommended that government agencies pay more attention to public education, by creating awareness campaigns on the control and prevention of brucellosis, as one of the most important steps in the eradication of brucellosis.

**References**


**Table 4: Respondents’ practice about brucellosis**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Type of variables</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk consumed by your family is:</td>
<td>Pasteurized and dried</td>
<td>51</td>
<td>43.22</td>
</tr>
<tr>
<td></td>
<td>Only fresh</td>
<td>65</td>
<td>55.08</td>
</tr>
<tr>
<td></td>
<td>All types</td>
<td>2</td>
<td>1.69</td>
</tr>
<tr>
<td>If your family uses fresh raw milk, do you boil it before drinking?</td>
<td>Yes</td>
<td>103</td>
<td>87.29</td>
</tr>
<tr>
<td></td>
<td>Sometimes</td>
<td>12</td>
<td>10.17</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>3</td>
<td>2.54</td>
</tr>
<tr>
<td>Do you and your family members eat fresh white cheese?</td>
<td>Yes</td>
<td>7</td>
<td>5.93</td>
</tr>
<tr>
<td></td>
<td>Sometimes</td>
<td>11</td>
<td>9.32</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>100</td>
<td>84.75</td>
</tr>
<tr>
<td>Your family usually eats spleen, liver, kidney or kubah?</td>
<td>Well cooked</td>
<td>110</td>
<td>93.22</td>
</tr>
<tr>
<td></td>
<td>Half cooked</td>
<td>4</td>
<td>3.39</td>
</tr>
<tr>
<td></td>
<td>Raw</td>
<td>4</td>
<td>3.39</td>
</tr>
<tr>
<td>Have any of your family members Brucellosis?</td>
<td>Yes</td>
<td>14</td>
<td>11.86</td>
</tr>
<tr>
<td></td>
<td>Don’t know</td>
<td>2</td>
<td>1.69</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>102</td>
<td>86.44</td>
</tr>
</tbody>
</table>

Source: Authors


Smit, H. L. (2012). Control and prevention of brucellosis in small ruminants: time for action. Veterinary Record, 170(4), 97-98. DOI:10.1136/vr.e666


A NOTE ON SOME THEOREMS OF R. DATKO
Cristina Andreea Băbăiță¹, Raluca Mureșan², Petre Preda³

Abstract:
The asymptotic behavior of the evolution families is a widely interesting topic in mathematics over time. In 1930, O. Perron was the first one who established the connection between the asymptotic behavior of the solution of the homogeneous differential equation and the associated non-homogeneous equation, in finite dimensional spaces. Further, the result was extended for infinite dimensional spaces. The case of dynamical systems described by evolution processes was studied by C. Chicone and Y. Latushkin. One of the most remarkable results in the theory of stability of dynamical systems has been obtained by R. Datko in 1970 for the particular case of \( C_0 \)-semigroups. Practically, R. Datko defines a characterization for uniform exponential stability of the \( C_0 \)-semigroups. Later, it was proved that a similar characterization is also valid for two-parameter evolution families.

In this paper, we obtain different versions of a well-known theorem of R. Datko for uniform and nonuniform exponential bounded evolution families. More precisely, we obtain theorems that characterize the nonuniform and uniform exponential stability of evolution families with uniform and nonuniform exponential growth. We show that, if we choose \( K \) dependent of \( t_0 \) in the form of Datko’s theorem used by C. Stoica and M. Megan, we obtain a result of nonuniform exponential stability, which is no longer possible in the original form of Datko’s theorem.

In conclusion, we generalize the results initially obtained by Datko (1972) and Preda and Megan (1985), by presenting some sufficient conditions for the nonuniform exponential stability of evolution families with nonuniform exponential growth.

UDC Classification: 517.9; DOI: http://dx.doi.org/10.12955/cbup.v5.1069

Keywords: Evolution family, Nonuniform exponential stability, Datko method

Introduction
In the present paper we study the asymptotic behavior of evolution families. As a starting point for a vast amount of literature concerning this subject, we mention the pioneering work of O. Perron (Perron, 1930), who was the first who establish the connection between the asymptotic behavior of the solution of the differential equation
\[
(A) \quad \dot{x}(t) = A(t)x(t)
\]
and the associated non-homogeneous equation
\[
(A,f) \quad \dot{x}(t) = A(t)x(t) + f(t)
\]
in finite dimensional spaces, where \( A \) is a \( n \times n \) dimensional, continuous and bounded matrix and \( f \) is a continuous and bounded function on \( \mathbb{R}_+ \). This idea was later developed by W. A. Coppel (Coppel, 1978) and P. Hartman (Hartman, 1964) for differential systems in finite dimensional spaces.

In (Massera & Schäffer, 1958) and (Massera & Schäffer, 1966), J. L. Massera and J. J. Schäffer study the same problem as O. Perron for differential systems in infinite dimensional spaces and prove that if the pairs \((L^1, L^\infty)\) and \((L^p, L^\infty), p > 1\), are admissible to \((A)\), then it is a uniform exponential dichotomic differential system.

Further developments for differential systems in infinite dimensional spaces can be found in the monograph of J. L. Daleckij and M. G. Krein (Daleckij & Krein, 1974). The case of dynamical systems described by evolution processes was studied by C. Chicone, Y. Latushkin (Chicone & Latushkin, 1999).

¹ PhD Student Cristina Andreea Babaita, Department of Mathematics, Faculty of Mathematics and Computer Science, West University of Timisoara, tyna19eu@yahoo.com
² Assistant Lecturer Raluca Muresan, Department of Mathematics, Faculty of Mathematics and Computer Science, West University of Timisoara, rmuresan@math.uvt.ro
³ Professor Preda Petre, Department of Mathematics, Faculty of Mathematics and Computer Science, West University of Timisoara, petre.preda@e-uvt.ro
One of the most remarkable results in the theory of stability of dynamical systems has been obtained by Datko (Datko, 1970) in 1970 for the particular case of $C_0$-semigroups. Thus in (Datko, 1970) it was established that all the trajectories $T(\cdot \cdot) \cdot x$ of a $C_0$-semigroup $\{T(t)\}_{t \geq 0}$ have an exponential decay as $t \to \infty$ (i.e. $\{T(t)\}_{t \geq 0}$ is uniformly exponentially stable) if and only if, for all vectors $x \in X$, the function $t \to \|T(t)x\|$ lies in $L^2(\mathbb{R}_+)$, and later, A. Pazy shows in (Pazy, 1972) and (Pazy, 1983) that the result remains valid if we replace $L^2(\mathbb{R}_+)$ with $L^p(\mathbb{R}_+)$, where $p \in [1, \infty)$.

In 1972, R. Datko extends (in Datko, 1972) the above result for two-parameter evolution families stating that an evolution family $\{\Phi(t, t_0)\}_{t \geq t_0 \geq 0}$ (with uniform exponential growth) is uniformly exponentially stable (i.e. there exist $N, \nu > 0$ such that $\|\Phi(t, t_0)\| \leq Ne^{-\nu(t-t_0)}$, for all $t \geq t_0 \geq 0$) if and only if there exists $p \in (0, \infty)$ such that $\sup_{t \geq 0} \int_0^t \|\Phi(\tau, t)\|^{p} d\tau < \infty$, for all $x \in X$. It is worth noting that the above Datko's theorem already appears in (Daleckij & Krein, 1974) for the special case of differential systems.

A similar characterization for uniform exponential stability of evolution families was obtained by S. Rolewicz in 1986, in (Rolewicz, 1986). More precisely, the author proved that if, for a continuous non-decreasing mapping $F : \mathbb{R}_+ \to \mathbb{R}_+$, with the properties $F(0) = 0$ and $F(t) > 0$ for all $t > 0$, and for an evolution family $\{\Phi(t, t_0)\}_{t \geq t_0 \geq 0}$ on a Banach space $X$, with exponential growth, the following relation holds $\sup_{t \geq 0} \int_0^t F(\|\Phi(\tau, t)\|) d\tau < \infty$, for all $x \in X$, then the evolution family is uniformly exponentially stable.

Datko's result was extended to dichotomies by Preda and Megan (Preda & Megan, 1985) in 1985. We also mention the contributions of M. Megan, A. L. Sasu and B. Sasu, who in (Megan & Sasu, 2002) and (Megan & Sasu, 2003) obtained generalizations of some results of Datko, Rolewicz and van Neerven. Other generalizations of Datko’s theorem for asymptotic stability of evolution families were obtained by C. Buşe in (Buşe, 1994) and (Buşe, 1997).

Generalizations of the above Datko’s theorem for skew-evolution semiflows appear in (Stoica & Megan, 2010). Also, in this paper, Datko’s theorem is used in an equivalent form, i.e. an evolution family with uniform exponential growth is uniformly exponentially stable if and only if there exist $p \in (0, \infty)$ and $k > 0$ such that $\int_0^\infty \|\Phi(\tau, t)\|^{p} d\tau < k \|x\|$, for all $t \geq 0$ and $x \in X$.

In 2010, L. Barreira and C. Valls introduced in (Barreira & Valls, 2010) some appropriate adapted norms (which can be seen as Lyapunov norms), to show an equivalence between the admissibility of their associated $L^p$ spaces ($p \in [1, \infty]$) and the nonuniform exponential stability of certain evolution families. The result is extended by the same authors in 2011 (Barreira & Valls, 2011) to the case of nonuniform exponential dichotomy where they also establish a collection of admissible Banach spaces for any given nonuniform exponential contraction.

The aim of our paper is to obtain theorems that characterize the uniform and nonuniform exponential stability of evolution families with nonuniform and uniform exponential growth using the Lyapunov norms introduced by L. Barreira and C. Valls in (Barreira & Valls, 2010) and Datko’s method. We show that, if we choose $K$ dependent of $t_0$ in the form of Datko’s theorem used by C. Stoica and M. Megan in (Stoica & Megan, 2010), we obtain a result of nonuniform exponential stability, which is no longer possible in the original form of Datko’s theorem.

Preliminaries

Let $X$ be a Banach space and $\mathbb{B}(X)$ the space of all linear and bounded operators acting on $X$. The norms on $X$ and on $\mathbb{B}(X)$ will be denoted by $\| \cdot \|$.

**Definition 1:** An evolution family $\{\Phi(t, t_0)\}_{t \geq t_0}$ on $\mathbb{R}_+$ is a family of operators $\Phi(t, t_0) \in \mathbb{B}(X)$, $t \geq t_0 \geq 0$, satisfying:

(i) $\Phi(t, t) = I$, for all $t \in \mathbb{R}_+$, where $I$ denotes the identity on $X$;

(ii) $\Phi(t, s)\Phi(s, t_0) = \Phi(t, t_0)$, for all $t \geq s \geq t_0 \geq 0$;

(iii) the map $\Phi(\cdot, t_0)x$ is continuous on $[t_0, \infty)$ for all $x \in X$ and $\Phi(t, \cdot) x$ is continuous on $[0, t]$ for all $x \in X$. 

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If there exist $M, \omega > 0$ such that
\[ ||\Phi(t, t_0)x|| \leq Me^{\omega(t-t_0)}||x||, \text{ for all } t \geq t_0 \geq 0 \text{ and } x \in X, \]
then it is said that the evolution family $\{\Phi(t, t_0)\}_{t \geq t_0}$ has uniform exponential growth.

If there exist $M : \mathbb{R}_+ \to \mathbb{R}_+$ and $\omega > 0$ such that
\[ ||\Phi(t, t_0)x|| \leq M(t_0)e^{\omega(t-t_0)}||x||, \text{ for all } t \geq t_0 \geq 0 \text{ and } x \in X, \]
then it is said that the evolution family $\{\Phi(t, t_0)\}_{t \geq t_0}$ has nonuniform exponential growth.

We denote $||x||_{t_0} = \sup_{t \geq t_0} e^{-\omega(t-t_0)}||\Phi(t, t_0)x||$. It is easy to see that $|| \cdot ||_{t_0}$ defines a norm on $X$, for all $t_0 \geq 0$, and
\[ ||x|| \leq ||x||_{t_0} \leq M(t_0)||x||, \text{ for all } t_0 \geq 0. \]

If $\{\Phi(t, t_0)\}_{t \geq t_0}$ has a uniform exponential growth, then $|| \cdot ||_{t_0}$ is uniformly equivalent (with respect to $t_0$) to the norm $|| \cdot ||$.

**Remark 1:** If $\{\Phi(t, t_0)\}_{t \geq t_0}$ has uniform exponential growth, then
\[ ||\Phi(t, t_0)x||_t \leq e^{\omega(t-t_0)}||x||_{t_0}, \text{ for all } t \geq t_0 \geq 0 \text{ and } x \in X. \]

Indeed we can see that for all $t \geq t_0 \geq 0$ we have that
\[ ||\Phi(t, t_0)x||_t = \sup_{t' \geq t} e^{-\omega(t-t')}||\Phi(t', t_0)x|| = \sup_{t' \geq t} e^{-\omega(t-t_0-t+t_0)}||\Phi(t', t_0)x|| = e^{\omega(t-t_0)} \sup_{t' \geq t} e^{-\omega(t_0-t')||\Phi(t', t_0)x||} \leq e^{\omega(t-t_0)}||x||_{t_0}, \text{ for all } x \in X. \]

We can also see that for all $t_0 \geq 0$ and $x \in X$ the function $[t_0, \infty) \ni s \mapsto ||\Phi(s, t_0)x||_s \in \mathbb{R}_+$ is lower semi-continuous, therefore it is measurable.

**Main results**

In what follows we will present some sufficient conditions for nonuniform exponential stability of evolution families with nonuniform exponential growth in terms of Datko’s theory, which was also highlighted by C. Stoica and M. Megan in (Stoica & Megan, 2010).

**Theorem 1:** Let $\Phi$ be an evolution family with nonuniform exponential growth. Then there exist $K : \mathbb{R}_+ \to \mathbb{R}_+, \ p > 0$ such that
\[ \left( \int_t^{\infty} ||\Phi(\tau, t_0)x||_\tau^p d\tau \right)^{1/p} \leq K(t_0)||\Phi(t, t_0)x||_t, \text{ for all } t \geq t_0 \text{ and } x \in X \]
if and only if there exist $N, \nu : \mathbb{R}_+ \to \mathbb{R}_+$ such that
\[ ||\Phi(t, t_0)x||_t \leq N(t_0)e^{-\nu(t-t_0)}||x||_{t_0}, \text{ for all } t \geq t_0 \geq 0. \]

**Proof.** Necessity. Let $x \in X, \ t \geq t_0 + 1$ and $\varphi : [t_0 + 1, \infty) \to \mathbb{R}_+, \ \varphi(t) = \int_{t_0}^{t} ||\Phi(\tau, t_0)x||_\tau^p d\tau$. It is obvious that
\[ \varphi(\tau) \leq -K^p(t_0)\varphi(\tau) \text{ for all } \tau \geq t_0 + 1. \]
Therefore, by integrating on the interval \([t_0 + 1, t]\) with respect to \(\tau\),
\[
\frac{1}{K^p(t_0)}(t - t_0 - 1) \leq \ln \frac{\varphi(t_0 + 1)}{\varphi(t)} \text{ for all } t \geq t_0 + 1.
\]

It follows that
\[
\varphi(t)e^{\frac{1}{K^p(t_0)}(t - t_0 - 1)} \leq \varphi(t_0 + 1) \leq -K^p(t_0)\varphi(t_0 + 1) = K^p(t_0)||x||^p_0.
\]

The last relation is equivalent to
\[
\int_{t_0}^{\infty} ||\Phi(\tau, t_0)||^p_0 d\tau \leq e^{-\frac{1}{K^p(t_0)}(t - t_0 - 1)}K^p(t_0)||x||^p_0, \text{ for all } t \geq t_0 + 1 \text{ and } x \in X. \tag{3}
\]

Let \(t \geq t_0 + 1, \tau \in [t - 1, t]\) and \(x \in X\).

We have that \(||\Phi(t, t_0)x||_t \leq e^{\alpha t}||\Phi(\tau, t_0)x||_t\). We integrate the last relation on \([t - 1, t]\) with respect to \(\tau\) and by (3) it follows that
\[
||\Phi(t, t_0)x||_t^p \leq e^{\alpha t} \int_{t_0}^{t} ||\Phi(\tau, t_0)x||^p_0 d\tau \leq e^{\alpha t} e^{-\frac{1}{K^p(t_0)}(t - t_0)}K^p(t_0)||x||^p_0.
\]

Therefore
\[
||\Phi(t, t_0)x||_t \leq e^{\alpha t}K(t_0)e^{\frac{1}{K^p(t_0)}(t - t_0)}e^{-\frac{1}{K^p(t_0)}(t - t_0)}||x||_0, \text{ for all } t \geq t_0 + 1 \text{ and } x \in X. \tag{4}
\]

Let \(t \in [t_0, t_0 + 1)\) and \(x \in X\). In this case
\[
||\Phi(t, t_0)x||_t \leq e^{\alpha t}e^{\frac{1}{K^p(t_0)}(t - t_0)}e^{-\frac{1}{K^p(t_0)}(t - t_0)}||x||_0 \leq e^{\alpha t} e^{\frac{1}{K^p(t_0)}(t - t_0)} e^{-\frac{1}{K^p(t_0)}(t - t_0)}||x||_0, \tag{5}
\]

We denote \(N(t_0) = e^{\alpha t_0}e^{\frac{1}{K^p(t_0)}} \max\{1, K(t_0)\}\) and \(v(t_0) = \frac{1}{pK^p(t_0)}\). By relations (4) and (5) we can conclude that
\[
||\Phi(t, t_0)x||_t \leq N(t_0)e^{-v(t_0)(t - t_0)}||x||_0, \text{ for all } t \geq t_0 \geq 0 \text{ and } x \in X.
\]

Sufficiency. Only some simple calculations are needed in order to draw the conclusion.

\[\square\]

Remark 2: The above result can be considered as the stronger version of the main result of the article (Stoica & Megan, 2010).

This is proved by the following corollary.

Corollary 1: Let \(\{\Phi(t, t_0)\}_{t \geq t_0}\) be an evolution family with uniform growth. If there exist \(K: \mathbb{R}_+ \rightarrow \mathbb{R}_+^*\) and \(p > 0\) such that
\[
\left( \int_0^\infty ||\Phi(\tau, t_0)x||^p d\tau \right)^{1/p} \leq K(t_0)||\Phi(t, t_0)x||, \text{ for all } t \geq t_0 \text{ and } x \in X,
\]
then there exist \(N, v: \mathbb{R}_+ \rightarrow \mathbb{R}_+^*\) such that
\[
||\Phi(t, t_0)x|| \leq N(t_0)e^{-v(t_0)(t - t_0)}||x||, \text{ for all } t \geq t_0 \text{ and } x \in X.
\]

\[\square\]

Proof. It follows from Theorem 1.
Remark 3: If $\sup_{t_0 \geq 0} K(t_0) = K < \infty$, for all $t_0 \geq 0$, in the corollary above, then, there exists $p > 0$ such that
\[
\left( \int_t^\infty \|\Phi(\tau, t_0)x\|^p d\tau \right)^{1/p} \leq K\|\Phi(t_0)x\|, \text{ for all } t \geq t_0 \text{ and } x \in X,
\]
if and only if there exist $N, v > 0$ such that
\[
\|\Phi(t_0)x\| \leq Ne^{-v(t-t_0)}\|x\|, \text{ for all } t \geq t_0 \text{ and } x \in X.
\]

Proof. Sufficiency. If $\tau \geq t \geq t_0$, then
\[
\|\Phi(\tau, t_0)x\| \leq Ne^{-v(t-t_0)}\|\Phi(t_0)x\|.
\]
It follows that
\[
\left( \int_t^\infty \|\Phi(\tau, t_0)x\|^p d\tau \right)^{1/p} \leq \frac{N}{(vp)^{1/p}}\|\Phi(t_0)x\|, \text{ for all } t \geq t_0 \geq 0 \text{ and } x \in X.
\]

Necessity. It is obvious by Theorem 1. \qed

Remark 4: The converse of Corollary 1 is false.
Indeed, let $X = \mathbb{R}$ and $\Phi : \{(t, t_0) \in \mathbb{R}_+^2 : t \geq t_0\} \to \mathbb{R}$, $\Phi(t, t_0) = \frac{t^{d+1}}{t_0^{d-1}}$.

We have that
\[
\int_t^\infty \frac{t_0^2 + 1}{\tau^2 + 1} d\tau = (t_0^2 + 1)\left(\frac{\pi}{2} - \arctan t\right) \leq \frac{\pi}{2} (t_0^2 + 1) = K(t_0).
\]
We now assume that there exist $N, v : \mathbb{R}_+ \to \mathbb{R}_+$ such that $\|\Phi(t, t_0)\| \leq Ne^{-v(t-t_0)}$, for all $t \geq t_0$. If $t_0 = 0$, then it follows that
\[
\frac{1}{t^2 + 1} \leq N(0)e^{-v(0)t}, \text{ for all } t \geq 0.
\]
Therefore
\[
\frac{e^{-v(0)t}}{t^2 + 1} \leq N(0), \text{ for all } t \geq 0.
\]
If $t \to \infty$, the last relation is equivalent to $\infty \leq N(0)$, which is absurd.

Therefore we can conclude that there do not exist two functions $N, v : \mathbb{R}_+ \to \mathbb{R}_+$ such that $\|\Phi(t, t_0)\| \leq N(t_0)e^{-v(t-t_0)}$, for all $t \geq t_0$. This shows that it is impossible to choose $K$ independent of $t_0$ in (6).

Corollary 2: Let $\{\Phi(t, t_0)\}_{t \geq t_0 \geq 0}$ be an evolution family with uniform growth. The following statements are equivalent:

(i) there exist $N, v > 0$ such that $\|\Phi(t_0)x\| \leq Ne^{-v(t-t_0)}\|x\|$, for all $t \geq t_0 \geq 0$ and $x \in X$;
(ii) there exist $k, p > 0$ such that $\left( \int_t^\infty \|\Phi(\tau, t_0)x\|^p d\tau \right)^{1/p} \leq k\|x\|$, for all $t \geq 0$ and $x \in X$;
(iii) there exist $k, p > 0$ such that $\left( \int_t^\infty \|\Phi(\tau, t_0)x\|^p d\tau \right)^{1/p} \leq k\|\Phi(t_0)x\|$, for all $t \geq t_0 \geq 0$ and $x \in X$.

Proof. It follows from Remark 3 and Theorem 1. \qed
Conclusion

In this paper are obtained different types of R. Datko theorems which characterize the uniform and nonuniform exponential stability of evolution families with uniform and nonuniform exponential growth. Practically, the result initially obtained by Datko (1972) and Preda and Megan (1985) was extended using so-called Lyapunov norms (i.e.

$$||x||_{t_0} = \sup_{t \geq t_0} e^{-\omega(t-t_0)} ||\Phi(t,t_0)x||, \forall t_0 \geq 0, \forall x \in X$$

introduced by L. Barreira and C. Valls in (Barreira & Valls, 2010).

We shown that, if we choose $K$ dependent of $t_0$ in the form of Datko’s theorem used by C. Stoica and M. Megan, we obtain a result of nonuniform exponential stability of the evolution family, which is no longer possible in the original form of Datko’s theorem. So, considering $\Phi$ an evolution family with nonuniform exponential growth, then there exist $K : \mathbb{R}_+ \rightarrow \mathbb{R}_+^+$, $p > 0$ such that

$$\left( \int_{t_0}^{\infty} ||\Phi(\tau,t_0)x||_{t_0}^p d\tau \right)^{1/p} \leq K(t_0)||\Phi(t,t_0)x||_t, \text{ for all } t \geq t_0 \text{ and } x \in X$$

if and only if there exist $N, \nu : \mathbb{R}_+ \rightarrow \mathbb{R}_+^+$ such that

$$||\Phi(t,t_0)x||_t \leq N(t_0)e^{-\nu(t)|t-t_0|}||x||_{t_0}, \text{ for all } t \geq t_0 \geq 0.$$

It was also proved, that the main result obtained in this paper (Theorem 1) is even stronger then the already existing results in the literature.

In conclusion, in this paper, we presented some new sufficient conditions for the nonuniform exponential stability of evolution families with nonuniform exponential growth in terms of Datko’s theory.

References


A NOVEL SOLUTION FOR QOS IMPLEMENTATION IN DATA NETWORKS

Marius C. Breabăn,1 Adrian Graur,2 Alin D. Potorac,3 Doru G. Bălan4

Abstract: Current data networks carry a multitude of data types. These include high-definition video streams and other data sensitive to network delays as well as real-time voice transmissions.

Active network node equipment fulfills requests, while providing network management without affecting the data availability. Starting out from this model, a new idea is based on moving the network bandwidth control at the user’s communication interface. This paper presents a new approach to setting up QoS parameters based on local upstream traffic limitation management. This approach is quite useful in providing a certain guaranteed bandwidth for the users. So, this software ensures a specific network bandwidth according to with the rights coming up from their association with a certain “Active Directory” group of users. The necessary active network equipment in terms of basic QoS management can be replaced by a local application for data traffic limitation, while for the involved participants the remaining bandwidth for other communications has a higher degree of availability. An efficient bandwidth control can be implemented when extracting specific AD fields and transferring pre-calculated user related parameters to a local running limiter.

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Keywords: QoS, bandwidth limitation.

Introduction

The continued development of organizations, as well as the diversification of activity has also implicitly led to the rapid development of network infrastructure. Due to the complexity of the types of information conveyed, this infrastructure must be efficient, flexible and manageable. Unfortunately, the existing solutions partially meet these requirements, being susceptible to changes such as hardware and software upgrades, exponential growth in organizational development, centralized management, and efficiency improvements to major reconfiguration changes.

Another major issue is providing access to network resources based on the need to access certain information or applications.

Thus, in managing a private network by limiting the traffic rate, network administrators can control the input and output traffic rate, ensuring that no user or application exceeds the maximum transmission rate or monopolizes the band.

Network administrators can set policies to allocate bandwidth to specific users, user groups, or applications.

A traffic limitation policy is a network policy that allows the network administrator to evaluate traffic flows by allowing the policy to apply to all traffic from or to a particular network interface.

Bandwidth management is a requirement of data traffic, necessary for the efficient operation of data network corporations or institutions with many users, while ensuring the quality of data services regardless of the area of activity.

The solution for data traffic limitation

Current traffic patterns allow setting QoS rules on a distributed model at the traffic source using proper equipment.

According to the new approach of traffic limitation management, we propose a java application solution, which would provide traffic limitation options for a specific user, depending on his affiliation with a certain group of users.

This application can provide traffic limitation management avoiding the use of a layer three data switch and setting specific bandwidth availability for other client workstations.

The novelty of this implementation consists in the fact that, by applying upstream data traffic limitation at the network interface level, it provides, data upload traffic limitation at each user’s level. (Breabăn, 2016)

1 Ștefan cel Mare - University of Suceava, Romania, marius.breabun@gmail.com
2 Ștefan cel Mare - University of Suceava, Romania, adrian.graur@usv.ro
3 Ștefan cel Mare - University of Suceava, Romania, alinp@eed.usv.ro
4 Ștefan cel Mare - University of Suceava, Romania, dorub@usv.ro
We focused on the following research directions:

- transferring the traffic limiting java file, after the user authentication on the workstation; (Microsoft, 2003)
- file transformation, which use commands to launch the java application as a Windows service and run it automatically when the operating system starts up;
- reading user’s rights and account proprieties, using a Microsoft Windows tool, gpresult command (https://technet.microsoft.com/en-us/library/cc733160(v=ws.11).aspx, 2017), and then placing the user in the user’s group membership, as it is defined in the Active Directory server; (Microsoft, 2003)
- providing a specific bandwidth limit for the outgoing traffic through the network interface of the workstation;

For the tests, there were two HP Probook 640 series computers used, with Intel i5 processors, 4 GB RAM, Gigabit Ethernet network cards and a switch Cisco Catalyst without the QoS settings (Cisco, 2010). The topology is presented in Figure 1.

Figure 1: Client-server topology

![Client-server topology](source)

On the HP Probook 640 series computer having the IP address 192.168.10.15, we installed a Virtual Machine Windows 2003 Server, with a running Active Directory and DNS (Domain Name Server) (Microsoft, 2003) server while at the other end the host workstation is engaged.

On the “Active Directory” server, we created groups, respectively users, as presented in Figure 2.

Figure 2: Groups and users in Active Directory server

![Groups and users in Active Directory server](source)

For the automatic run, we proceeded in copying a “bandwidth.bat” file from the Active Directory server to the workstation, and converting it as a Windows service able to automatically run after the user logon. The “bandwidth.bat” file contains the following elements:
• compare if the directory named “Bandwidth” exists on “C:\"drive, if not it will be created;
• copy the “bandwidthUser.jar” file from the server to the workstation in “C: \ Bandwidth”
directory already created;
• run the “bandwidthUser.jar” file.

All those operations are presented in Figure 3. We mention that Java(TM) SE Runtime Environment
(build 1.8.0_112-b15) (Java SE, 2017) was used, both for the server and for the workstation.

The conversion as Windows Service was made using “NSSM” (http://www.nssm.cc) freeware
software, as presented in Figure 4.

For the automatic run after the user’s logon, we setup the “bandwidth” service to run automatically, as
presented in Figure 5.

The “bandwidthUser.jar” file has the following functions:
• reading the user’s rights, using Microsoft Windows “gpresult” command and placing the user in
the user’s group membership, as it is defined on the Active Directory server,
• creating a string buffer in which information from the “gpreport” file are stored,
• selecting from the string buffer only the lines with the information regarding the security group;
• building a security groups list by ordering decreasingly using an associated UDP buffer value
for the maximum outgoing data bandwidth to be tied with the workstation network interface. An UDP
datagram has a 1470 byte length. So, for a 100 Mbps bandwidth we have an UDP buffer size of 1470 bytes. From this point, we calculate the buffer size for respectively 70 Mbps, 50 Mbps, 30 Mbps and 10 Mbps:

- going along the list of the assigned security groups and check if the user is in one of the listed security groups. The loop stops at the first security group found in the list, and the amount of bytes that can be transferred in a time unit by each group member is extracted.

- the last step consists in displaying the user information;

![Figure 5: Bandwidth Window service run automatically](image)

Figure 5: Bandwidth Window service run automatically

We should mention that, the last step - user’s information display, represent a necessary option, so that to show the java file execution. Normally, the application runs automatically, without displaying a message.

Thus, after running the “bandwidthUser.jar” file, the workstation displays the user’s information, according to the security group membership.

So after logging the user belonging to a certain user group, a buffer size value is allocated representing bandwidth, as presented in table 1.

<table>
<thead>
<tr>
<th>User</th>
<th>Group</th>
<th>Buffer (byte)</th>
<th>Bandwidth (Mbps)</th>
</tr>
</thead>
<tbody>
<tr>
<td>user10</td>
<td>admin10</td>
<td>109</td>
<td>10</td>
</tr>
<tr>
<td>user30</td>
<td>admin30</td>
<td>424</td>
<td>30</td>
</tr>
<tr>
<td>user50</td>
<td>admin50</td>
<td>728</td>
<td>50</td>
</tr>
<tr>
<td>user70</td>
<td>admin70</td>
<td>1038</td>
<td>70</td>
</tr>
<tr>
<td>user100</td>
<td>admin100</td>
<td>1470</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Authors

Figure 6 shows the displayed message for a user belonging to a group having the associated bandwidth of 30 Mbps. This message is displayed after logging in into AD domain. For user10, user50, user70, user 100 included in specific security groups the messages are similar except for the transferred traffic parameter numerical value which is a specific one for each individual group.
Conclusions

As presented above, this is a new approach as a software solution, in granting access to a larger or smaller traffic bandwidth to a group of users according to the user’s position in the hierarchy and to the specificity of their activity among an organization.

The application for data traffic limitation is actually a system comprising of combined and distributed elements that offer an integrated solution to successfully replace the hardware data switch types of equipment for the implementations of local one-way data flow limitation but based on a centralized management.

As a further developing direction, the use in intensive data traffic conditions is about to be tested, based on the iperf (https://iperf.fr, 2107) tool, with an UDP (Postel, 2017) data transport between the two systems, continuously, at a 100 Mbps constant speed.

After the authentication, based on the predefined user’s rights, the provided bandwidth should automatically be allocated in a group personalized manner, offering the necessary bandwidth allocation as part of QoS policy implementation.

Acknowledgment

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INVESTIGATION OF INDIGO DYEING USING SODIUM BOROHYDRIDE AS REDUCING AGENT
Banu Yeşim Buyukakinci,1 Nihal Sokmen2

Abstract: Indigo, one of the oldest dyes, has a very important role for the textile sector. It is primarily used to dye cotton clothes, and blue jeans and over one billion pairs of jeans around the world are dyed blue with indigo. Although Sodium Hydrosulfite (Na₂S₂O₄) is used as a reducing agent in most indigo dyeing processes, it is environmentally unfavorable because of the resultant contaminated toxic wastewater. In addition, the color fastnesses of dyed samples using Na₂S₂O₄ as reducing agent are not good enough.

In the present paper sodium borohydride (NaBH₄) were used as ecologically safe reduction systems for the indigo dyeing of cotton fabric. After dyeing processes, the color yield and fastnesses according to washing and rubbing were measured, and results were compared.

It was found when NaBH₄ was used as reducing agent instead of Na₂S₂O₄, the color yield and the fastness properties of the dyed samples improved.

JEL Classification Numbers: L65, L67, Q53; DOI: http://dx.doi.org/10.12955/cbup.v5.1071

UDC Classification: 677

Keywords: Indigo, dyeing, sodium borohydride, reducing agent

Introduction
Indigo, one of the oldest colorants, is widely used for dyeing cotton yarn for blue jeans. Because of the popularity of blue jeans, indigo is still one of the most important of all dyes in present use. The water-insoluble, blue pigment gives a pale yellow, water-soluble leuco form on reduction (Figure 1).

Although sodium dithionite (Na₂S₂O₄) has been used as reducing agent in most indigo dyeing processes because of its low cost, it is considered to be environmentally unfavorable because of the resultant contaminated toxic wastewater (Yao, 2015).

In this work, 100% knitted cotton fabric samples (produced by Kadifeteks) were dyed with indigo dye using sodium borohydride as reducing agent instead of sodium dithionite.

Using of the environmentally friendly boron and boron compounds will have very an important roll in the textile industry in the future. Sodium borohydride is a well-known reducing agent and has been extensively employed in chemical synthesis and in some hydrogen generation processes. This compound is non-toxic and has minimal effects on the environment (Dincer 2015, Meksi 2007).

Sodium borohydride is an effective and very selective specialty reducing agent used in organic -biochemical reactions and in the manufacture of pharmaceuticals. It is alternative to Na₂S₂O₄ as reducing agent for indigo dyeing processes with its ecological properties.

1 Engineering Faculty, Istanbul Aydın University, Istanbul, Turkey, byesimb2@gmail.com
2 Technology Faculty, Marmara University, Istanbul, Turkey. nsokmen@marmara.edu.tr
Indigo dyes usually have good washing fastness. The light fastness varies from moderate to good in heavy shades. In addition to cotton, other fibres, for example, silk and wool and polyester have also been dyed using different methods in the past. (Baig, 2011; Tichaa, 2013; Meksi, 2007-2010)

Experimental
Materials: In the present study, 100% knitted cotton fabric samples (130g/m²) were dyed with Indigo 4B coll. liq., supplied by DyStar. It was found that the color yield and the fastness properties were improved when using NaBH₄ giving fastness properties better than those obtained with Na₂S₂O₄ as reducing agent (Merck).

Methods: Dyes were applied at 1% depth of shade (owf), and the liquor/fabric ratio was 20:1. The dyeings were initiated at 40 °C, then the temperature was raised to 60 °C. After keeping at this temperature for 30 min, the samples were removed from the bath and kept at atmospheric conditions to be oxidised.

The reflectance values of the dyed materials were measured using a SF600 Plus Datacolor spectrophotometer, and the CIELab values were calculated using illuminant D65 / 10° standard observer. K/S, the color strength values of the samples were calculated by using Kubelka Munk equation (Eqn 1) (McDonalds, 1997)

\[ K/S = (1-R)^2 / 2R \]  

Where K is the absorption coefficient of the substrate, S is the scattering coefficient of the substrate and R is the reflectance of dyed fabric at \( \lambda_{\text{max}} \).

The rubbing and wash fastnesses of the dyed cotton fabrics were determined according to ISO105-X12 and ISO105:C06 (A1S ) standards, respectively.

Results and Discussions
The colorimetric parameters, color strength (K/S) and fastness values are given in Table 1 and Table 2 respectively.

| Table 1: Color Values and Color Strength of Cotton Dyed with Indigo (when used Na₂S₂O₄ and NaBH₄ as reducing agent) |
|---|---|---|---|---|---|---|
| Reducing agent | L* | a* | b* | C* | h° | \( K/S \) (max K/S in 600nm) | \( \Delta E \) |
| Na₂S₂O₄ | 30.22 | 1.04 | -32.04 | 32.06 | 271.85 | 19.06 | 6.508 Darker redder less blue |
| NaBH₄ | 24.43 | 3.34 | -30.15 | 30.34 | 276.32 | 26.97 |

Source: Author

The K/S values are 26.97 and 19.06 for the NaBH₄ and Na₂S₂O₄ used samples, respectively and the color difference is 6.508. The sample which was dyed by using Na₂S₂O₄ as reducing agent is darker redder and less blue than the using NaBH₄.

| Table 2: Colour Fastness Values of Dyed Samples (when used Na₂S₂O₄ and NaBH₄ as reducing agent) |
|---|---|---|---|---|---|---|---|---|
| Reducing agent | Colour change | Staining* | Rubbing* |
| | | CA | Co | PA | PES | PAN | Wo | Dry | Wet |
| Na₂S₂O₄ | 4.5 | 4.5 | 4.5 | 5 | 5 | 4-5 | 5 | 4-5 | 4 |
| NaBH₄ | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4-5 |

Source: Author

As shown in Table 2, it was determined that the results of the samples used NaBH₄ were slightly better, although there was no significant difference in color fastness values of the painted samples using both reducing agents.

Conclusion
It can be concluded that using NaBH₄ enhances the dye uptake of cotton fabric and dyed samples can be obtained with good color strengths and fastnesses. Using non-harmful chemicals like NaBH₄ in the indigo dyeing processes is very important for the ecosystem. From an environmental point of view, it
is possible to replace the toxic reducing agents (sodium dithionite) by the ecological product as the NaBH₄ in the reduction process of indigo dye.

References


A STUDY OF UNMANNED GLIDER DESIGN, SIMULATION, AND MANUFACTURING

Anil Demircali,¹ Huseyin Uvet²

Abstract: This paper describes a mini unmanned glider's design, simulation, and manufacturing with a wing-folding mechanism. The mini-glider is designed for the CANSAT 2016 competition, which has the theme of a Mars glider concept with atmosphere data acquisition. The aim is to facilitate transportation and to land it to the destination point. Having a light and compact design is important since it is a glider without an engine and it uses power only for the transmission of sensory data. The glider is produced with a wingspan which is 440 mm, and its longitudinal distance is 304 mm. The wings can be packaged in a fixed size container whose dimensions are 125 mm in diameter and 310 mm in height. The glider's weight is only 144 gr, and it can increase up to 500 gr with maximum payload. The mechanism, which includes springs and neodymium magnets for wing-folding, is capable of being ready in 98 ms for gliding after separation from its container. The mini-glider is capable of telemetry, communications, and other sensory operations autonomously during flight.

UDC Classification: 621.7; DOI: http://dx.doi.org/10.12955/cbup.v5.1072

Keywords: MAV, Autonomous System, Wing-Folding, Reconnaissance

Introduction

The international CANSAT competition concept is somehow identical to typical gun-launched air-vehicle systems (Lozano et al., 2013). The wing-folding structure allows it to be covered with a small volume and thus to be placed in a protective container (Steven, 2007). Recent research and industrial works related to gun-launched drones are principally focused on foldable fixed-wing configurations (Koehl, Arnaud, et al., 2012; Wood et al., 2014). Our goal in this work is to ensure that the wing-folding mechanism operates quickly and reliably immediately after separation from the rocket. It must fulfill its assigned tasks successfully in terms of control regulations (CanSat, 2016). In order to gather information about the atmosphere, there are fixed-wings and larger-sized heavier systems (U. S. Navy, 2004) or measurements with different approaches (Ru-Shan et al., 2015; Phillipona et al., 2016) instead of foldable wing systems. As a matter of fact, in many control applications in order to find an optimal solution for a stable glider flight, PID, Adaptive and Neural network are widely used. However, in our scenario, a phugoid mode is necessary, thus our system is a glider and will not have any motors assembled. Meanwhile, we designed the glider systems' center of gravity and the inertia matrices, we conducted a production that would ensure that the system would fly in a phugoid mode. At this point, the system has already had mechanical control embedded (Smith, Andrew J., 2015).

Our aim is to combine all electronic equipment such as telemetry, communications, and sensory operations into a small PCB (Printed Circuit Board) card while maintaining a light and compact design. Our work is not just a mini-glider production for a competition, but it can also be used in areas with developments to be made in the future. Those areas are: transportation of medical and surgical supplies, search for chemical and radioactive areas, search and rescue operations, in communication systems, and agriculture. In our work, 6 degree of freedom movement systems were first created and simulations were done with the MATLAB/Simulink® program. The mechanical design and analysis of the planer were done in the 3D Solidworks® program, and the electronic card design is also made through the Proteus program. In the second part of the work, measurement models used with satellite kinematic and dynamic equations are presented. In the third part, the system and the simulated studies are analysed, and finally in the fourth part, the result section was discussed and evaluated.

Mathematical Model

In this section, the small wing-folding glider's dynamic properties are expressed as fundamental calculations. The wing design, dynamic model of the glider, and the aerodynamics calculations are given in detail. The basic principles of hovering flight can be demonstrated with a MATLAB® simulation after autonomous separation of the glider from the container (Cox et al., 2003; Bachuta, M. J., et al., 2012). The glider is designed in accordance with the rule stating: "The container shall fit in a cylindrical envelope". The operational scheme as shown in Figure 1 is in compliance with the

¹ Yildiz Technical University, Department of Mechatronics Engineering, Istanbul, Turkey, demircalianil@gmail.com
² Yildiz Technical University, Department of Mechatronics Engineering, Istanbul, Turkey, huvet@yildiz.edu.tr
CANSAT 2016 competition rules (CanSat, 2016). Firstly, operational schematic should be known and should be expressed as in Figure 1. The glider is launched from point A and follows the trajectory B, it is separated from the capsule at point C, which is 600 meters above ground level. The glider has to be separated autonomously at point D at the height of 400 meters and the collected data during the flight has to be observed by the ground station at point F.

![Figure 1: The application scheme of the CANSAT 2016 competition.](image)

Source: Author

**Wing Design**

The glider's longitudinal length and wingspan of the folding position are imposed by the container size. The pre-designed model and container including the materials are shown in Figure 2. In order to determine the dynamic behavior of the glider, lift coefficient $C_{L, \text{required}}$ must be calculated according to the maximum pre-designed glider's established mass. Also, the thrust force of the glider should be observed under gliding condition together with the drag coefficient $C_D$ acting on it. The pre-designed container mass is calculated as 248 gr by using Kevlar. Then, it is important to determine $C_{L, \text{required}}$ with respect to the glider’s maximum estimated mass (252 gr). The maximum hovering speed $V_{\text{max}}$ (m/s) can be calculated by determining the $C_{D,0}$.

![Figure 2: Container sizes are determined according to the standards of the competition. Eppler 793 Airfoil, $C_L$, $C_M$, $C_D$, $C_L/C_D$ graph results for $\alpha=-9.5^\circ$ to $9.5^\circ$ and Reynolds number, Re=5x10^4 with respect to estimated glide speed.](image)

Source: Author

$C_L/C_D - \alpha$ graph allows the maximum lift coefficients $C_L$ to be described as a variable value of the AoA, which is selected $2^\circ$- $6^\circ$ to have maximum $C_L$. Also, similar stability effects are shown in $C_M -$
\( \alpha \) for the same range of \( \alpha \). By calculation of \( \alpha = 5.5^\circ \) from \( C_L - \alpha \) graph showing stable and reliable flight can be observed. At the point of minimum drag \( C_{D,0} = 0.07 \) and (K: Aspect Ratio, AR) \( K = 9.466 \) are determined for the determined AoA. Dynamic behaviour of the glider can be expressed,

\[
V = \frac{2W}{\sqrt{\rho S c_R^2 \cos^2 \left( \frac{\alpha}{2} \right)}}
\]

\[
V_{\text{max}} = \frac{2W}{\rho S} \sqrt{\frac{K}{C_{D,0}}}
\]

\[
C_L = \frac{2L}{\rho SV^2}
\]

\[
K = \frac{1}{\pi AR e_0}
\]

\[
Re = \frac{\rho V^2 L}{\mu}
\]

where air density \( \rho \) (kg/m\(^3\)), descending speed with container+payload \( V \) (m/s), total wing area \( S = 0.0205 \) (m\(^2\)), outer diameter of parachute \( R \) (m), inner diameter of parachute \( r \) (m), total mass \( W \) (N), drag force \( D \) (N) (Yechout, Thomas R., 2003). In that case, \( C_L, V, V_{\text{max}}, \alpha \) can be calculated and shown in Table 1.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>( C_{L,\text{required}} )</td>
<td>0.4855</td>
<td>-</td>
</tr>
<tr>
<td>( V_{(\text{total})} )</td>
<td>8.2</td>
<td>m/s</td>
</tr>
<tr>
<td>( V_{(\text{container})} )</td>
<td>6.1</td>
<td>m/s</td>
</tr>
<tr>
<td>( V_{\text{max}} )</td>
<td>12.5</td>
<td>m/s</td>
</tr>
<tr>
<td>( \alpha )</td>
<td>5.5</td>
<td>degree</td>
</tr>
</tbody>
</table>

Source: Author

The thrust force, which will determine enough lift to stable flight, can only be solved by introducing another equation or by determining of \( C_{L,\text{required}} \). By using \( V_{\text{total}} \):(container+payload together) and \( V_{\text{container}} \):(container only) the descending speed and duration of the glide could be expressed. \( V_{\text{max}} \) represents the maximum lifting force of \( \alpha \).

**The Dynamic Model of the Glider**

The primary goal of calculations is to determine the dynamic behavior of the glider. To obtain a simulation of the system, a mathematical model has to be derived by Newton motion laws with 6 degrees of freedom (DOF) (Garza, Frederico, Eugene A., 2003). Non-linear equations could be yielded,

\[
X - mg \sin(\theta) = m(U + QW - RV)
\]

\[
Y + mg \cos(\theta) \sin(\phi) = m(\dot{V} + RU - PW)
\]

\[
Z + mg \cos(\theta) \cos(\phi) = m(\dot{W} + PV - QU)
\]

where glider mass \( m \) (kg), position \( X, Y, Z \), axial speeds \( U, V, W \) (m/s), axial acceleration \( \dot{U}, \dot{V}, \dot{W} \) (m/s\(^2\)), and angular speeds \( P, Q, R \) (rad/s). Axial acceleration can be expressed as (9-11) and angular speeds can be calculated as (12-14) where rolling moment \( L \), pitching moment \( M \), yawing moment \( N \). Axial acceleration and angular speeds are expressed,

\[
\dot{U} = RV - QW - g \sin(\theta) + X/m
\]

\[
\dot{V} = PW - RU + g \cos(\theta) \sin(\phi) + Y/m
\]

\[
\dot{W} = QU - PV + g \cos(\theta) \cos(\phi) + Z/m
\]

\[
\dot{P} = (c_1 R + c_2 P)Q + c_3 L + c_4 N
\]

\[
\dot{Q} = c_5 PR - c_6 (P^2 - R^2) + c_7 M
\]

\[
\dot{R} = (c_8 P - c_2 R)Q + c_4 L + c_6 N
\]
where \( c_1 = l_{xx}, c_2 = -l_{xy}, c_3 = -l_{xz}, c_4 = -l_{yx}, c_5 = l_{yy}, c_6 = -l_{yz}, c_7 = -l_{zx}, c_8 = -l_{zy}, c_9 = l_{zz} \) (Etkin, Bernard, Lloyd Duff Reid, 1996). By using (9-14) equations, the glider stability analysis are done. Solving the equations of (9-14) yields Euler angle’s derivatives in (15-17). The Euler angles could be expressed by,

\[
\dot{\phi} = P + \tan(\theta)(Q \sin(\phi) + R \cos(\phi)) \\
\dot{\theta} = Q \cos(\phi) - R \sin(\phi) \\
\dot{\psi} = \frac{Q \sin(\phi) + R \cos(\phi)}{\cos(\theta)}
\]

By specifying the Euler angles, the resulting specific instant speed of the glider can be obtained which is defined on the body axis, then the equation (18-20) could be expressed including axial velocity,

\[
\begin{align*}
\dot{x} &= Uc(\theta)c(\phi) + V(s(\phi)s(\theta)c(\psi) - c(\phi)s(\psi)) + W(c(\phi)s(\theta)c(\psi) + s(\phi)s(\psi)) \\
\dot{y} &= Uc(\theta)s(\phi) + V(s(\phi)s(\theta)s(\psi) + c(\phi)c(\psi)) + W(c(\phi)s(\theta)s(\psi) - s(\phi)c(\psi)) \\
\dot{z} &= -Us(\theta) + V(s(\phi)c(\psi)) + W(c(\phi)c(\theta))
\end{align*}
\]

where (cos = c, sin = s). A method of evaluating the glider’s positions on the airframe is to calculate the glide duration.

**Aerodynamics Calculation**

The goal of the XFLR5® aerodynamic analysis is to determine the position of the glider on a X, Y, and Z axis after the instant speed of the glider is obtained in section B. To determine the position of the glider, stability and control coefficients have to be calculated, which will be show in the (Figure 5). The results of the coefficients are shown in Table 2 where X direction \( c_x \), Y direction \( c_y \), Z direction \( c_z \), rolling moment \( c_i \), pitching moment \( c_m \), yawing moment \( c_n \). The obtained coefficients are used to calculate X, Y, Z, L, M, N (Dilão, Rui, João Fonseca, 2013).

<table>
<thead>
<tr>
<th>Table 2: Aerodynamic coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Longitudinal</strong></td>
</tr>
<tr>
<td>( c_{L,x} )</td>
</tr>
<tr>
<td>( c_{L,q} )</td>
</tr>
<tr>
<td>( c_{m,a} )</td>
</tr>
<tr>
<td>( c_{m,q} )</td>
</tr>
<tr>
<td>( c_{n,r} )</td>
</tr>
</tbody>
</table>

Source: Author

The result of the designed model for the completed equipments are shown in Figure 3.

**Figure 3:** The model is designed by 3D Solidworks® and shown as an isometric view including the equipment.
The communication & GPS unit provide the glider's position, images are captured by camera during flight, when it is launched, the first separation inside of container, and after separation of container and glider happen. Moreover, the ground station should acquire flight information data during gliding which are provided by circuit board including variety of sensors such as a pitot tube, pressure, and altitude. A battery is used to provide the necessary energy. The equipment is modelled individually according to the weights on the sensitive scale; the center of gravity is placed of the wing's leading edge (1/3) in the glider.

**Simulation and Analysis**

The designed model of the glider is given in Figure 3 of the mathematical model section. The analysis should be achieved with ready-made equipment in the design model to carried out further improvements easily. Location of the center of gravity, estimation of the size of horizontal and vertical stabilizers and maximum lift were obtained in the previous section. The aim of the simulation is to compare parametric verification of the results with the calculations. Figure 3 in Aerodynamics Calculation section shows the completed design of the glider. To obtain the aerodynamic behaviour of the system, analysis is done by XFLR5®. The result is shown by using the Vortex lattice method, (VLM). It is applied for range of the $\alpha = -5^\circ$ to $15^\circ$ and $\text{Re} = 5\times10^4$ to $12.6\times10^4$ (Mueller, Thomas J., 2001).

The most folding theories are concerning with either the speed of the stowed mechanism or its effect of the thrust force, but they neglect the strength of the wings and the folding mechanism. Deployment of the glider just needs a simple action from the user, since usage of basic components which are springs and magnets are shown in Figure 4.

![Figure 4: Wings are deployed in 98 ms. Left: Picture of instant position. Middle: The duration of deployment. Right: Picture of the completed deploy of the wings.](source)

To verify the mathematical model of the system in SIMULINK®, the weights of the equipment to be used must be taken into account. The hardware design of the glider is done in this way. For given simulation (figure 5), it is possible to observe the dynamic behavior of the glider. The Glider force and moment stability could be achieved during 13 (m/s) flight speed and $\alpha = -3^\circ$. According to the obtained speed and $\alpha$; X, Y, Z positions of glider and glide duration time could be calculated. Glide duration and helical path could be controlled by 2 different control input which are the elevator and the rudder. The helical path, whose diameter is a maximum 60 m, could be followed when rudder = $1^\circ$ in 117.37.

During descent, at the first 1.5 cycle of descent path whose diameter has bigger helical cycles than remaining path, the glider does not reach limit speed which is required for stable state of phugoid motion. However, when the glider is about 310 m above ground level, equal helixes are seen since maximal speed is reached. Moreover, the glider is separated from the container with an initial speed of 0 (m/s) so, the necessary time for landing must be calculated. It can also be noted that the helical path diameter from the longitudinal distance and lateral distance with respect to the time graphs show that...
stable flight takes 23.7 seconds to achieve. Also, linearity, which gives information about stable flight, could be seen from the height-time graph. As a result, the glider shall be stable around 310 meter above ground level and at 23.7 seconds after releasing. According to the analysis and the simulations, this section shows that the wing-folding structure is safe; the glider can fly and hover according to the operational rules.

**Figure 5:** Helical path is followed by the glider which shows a stable flight during descent.

Source: Author

**Results**

Along with the direction of the iteration stages of the targeted criteria and the simulation, the wing design has been achieved successfully. The sizing studies have been optimized through the XFLR5® program. The wing angles, the position of the center of gravity and the static margin values were determined, depending on the polar plot of the selected wing profile and planer. The glider system, modeled in the Solidworks 3D® design program, has successfully opened its wings when it left the container, just as it did in the test result. The wing-folding mechanism works very well and fast as seen in Figure 6.

**Figure 6:** Wings are deployed in 98 ms. Left: Picture of instant position. Middle: The duration of deploy. Right: Picture of the completed deployment of the wings.

Source: Author

The prototype was made using a 3D printer, successfully completing the competition goals.

**Acknowledgement**

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Precise Positioning of DiMagnetically Levitated Microrobot

Anil Demircali,1 Huseyn Uvet,2 Yusuf Kahraman,3 Tunc Kose,4 Serhat Sisu,5 Kadir Erkan6

Abstract: In this article, we present a microrobot manipulation technique with high precision positional ability to move in a fluid environment with diamagnetic levitation. Untethered manipulation of microrobots by means of externally applied magnetic forces has been emerging as a promising field of research, particularly due to its potential for medical and biological applications. The decreased size of the robots makes them suitable for both in vitro applications such as sorting, moving, filtering micro particles (e.g. cells) within lab-on-a-chip platforms and in vivo applications such as minimally-invasive surgeries or targeted drug delivery inside a human body. Precise (nano) positioning of the levitated microrobot on the pyrolytic graphite is demonstrated in the liquid. Positioning is achieved by the movement of a “lifter” magnet on the sensitive microstage. The suspended microrobot successfully tracked the identified roots. Our study is about controlling the microrobot suspended on the pyrolytic graphite with nano-precision via fixed lifting magnets. The purpose of the presented method is to eliminate the friction force between the surface of the substrate and the microrobot. Thus, high accuracy motion can be achieved.

UDC Classification: 606 DOI: http://dx.doi.org/10.12955/cbup.v5.1073

Keywords: Microrobots, Magnetic Levitation.

Introduction

Microrobots are used in biological and medical applications for a number of purposes such as drug delivery, biopsy, marking, cell manipulation, microparticle transport, etc., with minimal damage to the desired site (Mooney et al., 2014; Arai et al., 2012; Arai et al., 2010; Cui et al., 2011; Abbott et al.; 2010). In the microfluidic environment, principles of physics change with decreasing dimensions. The change in the number of Re (Reynolds Number) indicates that the environment has laminar or turbulent flow characteristics. In the environment with laminar flow characterization, micro-objects move in the water to transport the viscous medium character (Nelson et al., 2013). Under the mentioned conditions, microfluidic channels are seen in different structures from microrobots for control of the intended processes. Microrobotic applications can benefit from factors such as optical tweezers, thermal gradients, electrostatic forces, di-electrophoresis forces, chemical concentration differences (Ohta et al., 2012; Nelson et al., 2015). The use of microrobots in such applications is more advantageous than other applications when considering the effect on ambient conditions, the force to be applied and the precision of motion (Arai et al., 2012).

Recent studies show that Metin Sitti and Arai use magnetic levitation and acoustic levitation, respectively. These studies have controlled microrobots in the fluid environment by cutting off the contact with the surface. In both systems, the forces applied to retrieve position information and data collected from the sensors must change interactively. For this reason, ultrasonic vibrations affecting the positioning of microrobots are still present in the environment, and as a result, vibrations affect the objects in the environment. At this point, it can be seen that the last trend of studies to increase positioning accuracy and efficiency of applied force is based on levitation. Current levitation procedures require continuous energy consumption and feedback (Arai et al., 2016; Sitti et al, 2015). In the course of the work, it shows that microrobots systems are difficult to position precisely.

By cutting the surface contact; Diamagnetic levitation technique is an important method for precise positioning. With a permanent magnet to be positioned on the diamagnetic material, the microrobot can be levitated without the need for an active control mechanism. The diamagnetically levitated microrobot application was originally developed by Ron Pelrine et al. (Pelrine et al., 2012).

1 Yildiz Technical University, Istanbul, Turkey, demircalianil@gmail.com
2 Yildiz Technical University, Istanbul, Turkey, huvet@yildiz.edu.tr
3 Yildiz Technical University, Istanbul, Turkey, yus_kah@hotmail.com
4 Yildiz Technical University, Istanbul, Turkey
5 Yildiz Technical University, Istanbul, Turkey
6 Yildiz Technical University, Istanbul, Turkey, kerkan@yildiz.edu.tr
For the first time in the literature, we present a new method of using diamagnetic levitation in microrobotics in liquid media. Using this method, the theoretical background of a robotic work that can do 3-dimensional nano-positioning was established and confirmed by experimental results. In this way, innovative microrobotic systems can be developed that can integrate with lab-on-a-chip applications in a liquid environment.

**System Modelling**

Using the diamagnetic force, precise levitation and contactless manipulation of the microrobot arm can be performed (Pelrine et al., 2012; Chen, Zhou, Meng, 2008; Kustler, 2007). Movement limits within the fluid can be calculated by determining the system dynamics of the robot. According to the mathematical model of the system, the stability point of the robot can be determined in the liquid. The parameters used in the system model are given in Table-1. In Figure 2, the forces acting on the robotic arm z-axis are shown on the schematic given system. In addition, the forces resulting from moving the lifting magnet on the x-axis are also expressed by the x-axis components.

### Table 1: System Model Parameters

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Explanation</th>
<th>Parameters</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>$F_B$</td>
<td>Buoyant force</td>
<td>$V_p$</td>
<td>Volume of a Particle</td>
</tr>
<tr>
<td>$F_g$</td>
<td>Diamagnetic force</td>
<td>$m_r$</td>
<td>Robot mass</td>
</tr>
<tr>
<td>$F_D$</td>
<td>Drag force</td>
<td>$g$</td>
<td>Gravitational acceleration</td>
</tr>
<tr>
<td>$F_m$</td>
<td>Magnetic force</td>
<td>$V_r$</td>
<td>Robot volume</td>
</tr>
<tr>
<td>$F_r$</td>
<td>Gravitational force</td>
<td>$\rho_f$</td>
<td>Fluid density</td>
</tr>
<tr>
<td>$B$</td>
<td>Magnetic flux density</td>
<td>$\rho_r$</td>
<td>Robot density</td>
</tr>
<tr>
<td>$H$</td>
<td>Magnetic field strength</td>
<td>$c_d$</td>
<td>Drag coefficient</td>
</tr>
<tr>
<td>$M$</td>
<td>Magnetization vector</td>
<td>$A$</td>
<td>Cross sectional area</td>
</tr>
<tr>
<td>$\chi$</td>
<td>Magnetic insulation coefficient</td>
<td>$v$</td>
<td>Velocity</td>
</tr>
<tr>
<td>$\mu_r$</td>
<td>Relative permeability</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Author

The forces shown in Figure 2 can be expressed as (1-3).

\[ F_r = m_r g \]  
\[ F_B = V_r \left( \rho_r - \rho_f \right) g \]
\[ F_D = \frac{1}{2} c_d \rho f A v^2 \]  

(3)

According to (1-3) equations, the dynamic model can be expressed by (4) for z axis.

\[ \ddot{z} = \frac{1}{2 \mu_0 \mu_r} \left( \frac{\mu_r - 1}{2} \right) \oint_{\nu} \nabla B^2 \, dv + \frac{v |v|}{m_r} \left( \rho_r - \rho_f \right) - g + \frac{(F_{m,x} + F_{g,z})}{m_r} \]  

(4)

\( v^2 \) for the equation given in (3), is shown as \( v |v| \) in the equation (4-6). Such an expression has been used for the positive and negative positional effects in the axes to be observed in the drag force expression. In the determination of \( F_m \) and \( F_g \) forces not shown in the equation set, basic physics is used first. The reason for this is the correct determination of the boundary conditions of the simulation in the analysis to be done in COMSOL\textsuperscript{®}. Thus, the magnetic force acting on the microrobot arm for the permanent magnet is theoretically expressed as follows.

\[ F_m = \frac{\mu_r - 1}{2 \mu_0 \mu_r} \oint_{\nu} \nabla B^2 \, dv \]  

(5)

\[ F_m = \frac{\mu_r - 1}{2 \mu_0 \mu_r} \oint_S B^2 \, ds \]  

(6)

Considering the Thomson’s formulation for the microrobot arm,

\[ F_m = \frac{V_p \chi}{2 \mu_0 \mu_r} (B \nabla) B \]  

(7)

the force between the lifting magnet and the robot arm is formulated. There are boundary conditions such as \( \nabla B^2 > 0 \) and \( \mu_r - 1 < 0 \) to ensure stability at the equilibrium point. From this equation, a magnetic field gradient is needed so that a linear force can be generated on the robot. The position of the microrobot can be controlled by positioning the gradient of the magnetic field within it relative to the microrobot. In calculating the diamagnetic force, which is another magnetic force, calculation is made assuming that the material used is uniform. If the diamagnetic force components in Z direction is simplified according to Ostrogradsky’s divergence law (Katz, 1979) as \( F_{dia,z} \),

\[ F_{dia,z} = \frac{X_{dia}}{\mu_0} \oint_S |B|^2 n_z \, ds \]  

(8)

where \( n_x, n_y, n_z \) are the surface normal vector component of the diamagnetic material in x, y, z direction respectively; \( ds \) is the surface area unit of the diamagnetic material. The force between the diamagnetic material and the floating magnet can be calculated through equations (8). In addition, the net force (9) can be expressed by a single parameter to simplify the sum of the magnetic forces acting on the microrobot.

\[ F_{net} = F_m + F_g \]  

(9)

After the mathematical model is formed, the relevant parameters have to be calculated except \( c_d \) and \( F_{net} \). Numerical analysis is necessary to calculate them. Because the drag coefficient, \( c_d \) varies depending on the stress, which is also depending on the velocity of the robot. Thus, (3) Number of equation is reshaped and \( c_d \) left alone,

\[ c_d = \frac{2 F_D}{\rho_f A v^2} \]  

(10)

\( F_D \) shall be calculated to determine drag force coefficient. To do this, the FSI (fluid structure interface) module in time-dependent is used. Time-dependent analyzes allow the simulation conditions to vary with time. For this reason, instead of "stationary", "time-dependent" analysis method is used in drag force calculation. Moreover, \( F_{net} \) can be calculated with the MNFC (magnetic field no
currents) module when stationary analysis mode is applied according to distance between the microrobot and the magnetic materials as well.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>(m_r)</td>
<td>2.929751x10^{-6}</td>
<td>kg</td>
</tr>
<tr>
<td>(g)</td>
<td>9.81</td>
<td>m/s^2</td>
</tr>
<tr>
<td>(\rho_r)</td>
<td>1798.374</td>
<td>kg/m^3</td>
</tr>
<tr>
<td>(\rho_f)</td>
<td>998.2071</td>
<td>kg/m^3</td>
</tr>
<tr>
<td>(A_x)</td>
<td>1.229066 x10^{-6}</td>
<td>m^2</td>
</tr>
<tr>
<td>(A_y)</td>
<td>1.229066 x10^{-6}</td>
<td>m^2</td>
</tr>
<tr>
<td>(A_z)</td>
<td>8.15402 x10^{-6}</td>
<td>m^2</td>
</tr>
<tr>
<td>(V_r)</td>
<td>1.61911 x10^{-9}</td>
<td>m^3</td>
</tr>
</tbody>
</table>

After the theoretical values have been determined in Table 2, the relevant experimental setup is shown for the calculation of \(c_d\) and \(F_{net}\).

Figure 3: The overall view of the test setup, the materials used and the measurements are shown. The system was placed in a global air environment of \(r = 50\) mm. Pyrolytic graphite: 1.5 mm map mesh, water: max 3 mm and min 0.05 mm extra fine mesh were applied. In the remaining domains, a tetrahedral mesh was applied with a max element size of 8 mm and a min element size of 0.2 mm. Sensitivity is increased by regular refinement in all simulations.

On the basis of the analysis given in Figure 3, the interaction of the robot arm with water was focused on and analysed. The microrobotic arm in the steady DI-water has been subjected to a certain axial movement, and the \(c_d\) has been obtained due to the stretching on its surface. In the analysis performed, the stresses for the \(-Z\) axis were calculated and the surfaces were selected. The robot arm in the container filled with water of dimensions 4x4x2 mm was moved in the \(-Z\) direction. At the speed range of 0-6.83 mm / s, the stress between 16.6-348 Pa was observed on the robot surface. The analysis results are calculated as \(c_d = 7.681\) and max \(F_{D,z} = 0.781\) μN.

Since the \(F_D\) speed depends on the speed, the micro manipulator in which the lifting magnet is placed will vary according to the speed of the stage. Since the speed limits of the stage used in the experiments are in the range of (-5 - 5) mm/s, drag force and speed relation will show a parabolic variable behaviour in this range. According to the simulation results, it is calculated that the force generated for the maximum stage speed of 5 mm/s is 0.781 μN.
The other forces are fixed, except for the magnetic forces acting on the robot. For this reason, the determination of the magnetic forces after the drag force analysis, i.e., calculation of $F_{\text{net}}$, is necessary. As a result of the analysis, $F_{\text{net}}$ shows the point where the forces acting on the robot are zero. In the simulations, the lifting magnet heights corresponding to each zero value and levitation height for the robot were obtained. The analysis of the experimental setup was solved using the COMSOL direct solver method to obtain more accurate results. The result of the analysis is calculated by using the Maxwell stress tensor and global matrix evaluation method, which effects the robot arm, and the results are the same. The force obtained in the Z direction were taken with a 3.31% error by surface fitting is shown in Figure 4.

![Figure 4](image)

According to the parabolic surface graph obtained from the analysis made, when the "Lift Magnet Distance" indicated by Y axis and the "Levitation Height" indicated by X axis increase, the net force generated on the microrobot is reduced. Max: 51.89 $\mu$N and min: 8.11$\mu$N force values were calculated.

Along with the drag force obtained, the net force, lift force on the z-axis and microrobot mass act on the microrobot at the same time. Related forces;

$$F_T = F_{\text{net},z} - F_{D,z} + F_{B,z} - F_{r,z}$$

(15)

<table>
<thead>
<tr>
<th>Forces</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$F_{D,z}$</td>
<td>0.781</td>
<td>$\mu$N</td>
</tr>
<tr>
<td>$F_{B,z}$</td>
<td>12.788</td>
<td>$\mu$N</td>
</tr>
<tr>
<td>$F_{r,z}$</td>
<td>28.741</td>
<td>$\mu$N</td>
</tr>
</tbody>
</table>

and $F_T$ (total force) are shown as equation (15). In addition, the related force values are given in Table 3 and the required magnetic force is calculated as 16.7345 $\mu$N. The corresponding force value given in Figure 6 is shown as marked on the surface graph. The corresponding force value given in Figure 6 is shown as marked on the surface graph. As a result, the robot is separated from the stabilization point at a levitation height of 329.1 $\mu$m according to the analysis. In addition, there is a flat profile with a linear slope at the levitation height: 0.1-0.3 mm. The area outside the region concerned may be called the region of instability; Within this region, the microrobot arm can be stably operated.

**Experimental Results**

Implementation of experimental setup: It contains a microrobot arm positioned in a DI water container with pyrolytic graphite on its surface. The ring magnet (lifter-magnet) on which the magnetic force required for levitation is obtained is on the vessel. To achieve stable and micro-precision levitation, it is necessary to position the lifter magnet on the DI water tank parallel and rigid. In order to perform levitation and precise position control at the micro level, A PI Micro Stage (M-126.PD2 / 20x20x20 mm) with 3-axis linear micro-movement sensitivity was placed on the Z axis. A manual micro-stage was used to position the DI water container parallel to the floor and to move the 3 axes when...
necessary. A nano-sensitive laser distance sensor (optoNCDT-ILD2300-50) is preferred for instant measurement of levitation height within the system. The microrobot is made to levitate by the movement of the fiber magnet in the order of microns along the Z axis. It exhibits a levitation characteristic depending on the magnets and properties used within the system. The reason for using a ring-shaped lifter magnet is that it has a hollow structure required for laser measurement. Thanks to the gap in the middle of the ring structure (10 mm diameter), the laser is aligned with the microrobot arm in the vertical position. The PI Stage, which we designed through the system interface, was moved by 50 μm on the Z axis, followed by 10 μm steps as the first levitation occurred. When the microrobot is in the levitated state, the behavior of the fiber magnet in the motion range of about 6 mm is observed. The measurement made according to the distance between the different levitation heights and the fibroid magnet microrobot is given in Figure 6.

Figure 6: The experiment was observed by recording the position data with the laser distance sensor in each movement step. The microrobot has been shown to operate at a maximum stabilization level of 330μm in the current system. Subsequently, the resultant force acting on the microrobot was acting in the upward direction, indicating that the robot departed from the stable region and moved upwards under the influence of the magnetic force.

In addition, the change in the 6 mm between the lifter magnet and the graphite also affects the levitation height of the microrobot, as shown in Figure 7.

Figure 7: Prior to the critical region where the lifter magnet effect increased, the microrobot showed a levitation elevation with linear characteristics similar to the simulation results.

Considering the objects and motion field to be manipulated by the microrobot in lab-on-a-chip applications, the 333 μm levitation height obtained from the experimental results is sufficient. In
Figure 7, it is a characteristic of our existing system that we have designed and designed. The diamagnetically levitated method we have developed may vary according to the system requirements to be applied. The proposed manipulation method allows for the microrobot design and driving magnet properties to be modified to achieve specific levitation intervals for different applications.

**Conclusion**

With diamagnetic levitation, the microrobot has been removed from the surface to achieve high precision positioning. The method we have developed will provide new solutions for precise micro-nano size objects and microfluidic applications requiring high precision positioning.

In addition to horizontal and vertical axis positioning accuracy, applicability has been demonstrated by means of end elements. Precise positioning of the levitation height of the microrobot has also been proven by experimental findings. In this way, nano-precision levitation and position control are ensured so that the microrobot can control movement in the micro-fluidic channel, nano-level and 3 axes.

**Acknowledgement**

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**References**


A CAMERA-BASED MEASUREMENT SYSTEM FOR OPTIMIZATION OF DIFFERENTIAL-ALGEBRAIC ECOTOXICOLOGICAL MODELS

Pawel Drąg,1 Krystyn Styczeń,2 Konrad Matyja3

Abstract: We present a general framework for measurements and optimization of differential-algebraic models. Moreover, we propose an application of the considered methodology in ecotoxicology. The differential-algebraic models can be used to describe different ecotoxicological relations. One of them is the influence of the environmental pollution on the Daphnia's movement characteristics. Changes in these characteristics can be used as a tool for assessment of neurotoxicity. The camera-based measurement and optimization system enable us to obtain the differential-algebraic ecotoxicological relations in a fully automated way.

UDC Classification: 519.6; DOI: http://dx.doi.org/10.12955/cbup.v5.1074

Keywords: differential-algebraic models, ecotoxicological models, measurement system, nonlinear optimization

Introduction

The aim of this study is to present and discuss a new method for measurement, which uses a camera-based observation system. The general difficulty in the presented methodology is connected with an appropriate interpretation of the obtained measured values and an optimization of parameters of a model. The considered task has an important practical application in the modeling of ecotoxicological phenomena. Moreover, the presented approach summarizes and extends the recently obtained results.

A fast development of new industrial technologies can generate a significant amount of pollution. Especially xenobiotic substances from technological processes, which can be introduced into the environment, can be dangerous for living organisms. Therefore, the toxicity of these substances has to be assessed to predict the possible impact on ecosystems.

A general idea of a toxicity assessment consists of determining the relationship between a dose (or concentration) and the toxic effects, which can be divided into two main groups:

- discrete effects
  - mortality, i.e. the number of immobilized organisms,
- continuous effects
  - changes in enzyme activity,
  - the rate of growth.

In practice, national and international institutions and organizations, like US Environmental Protection Agency (US EPA), Organization for Economic Co-operation and Development (OECD), International Organization for Standardization (ISO), often normalize toxicity tests. Documents provided by them contain a detailed description of conditions, as well as the methodology of required experiments.

Unfortunately, the toxicity assessment methods typically possess some disadvantages.

1. Changes of toxic effects during the period of exposure are often ignored (Hatano & Shoji, 2010).
2. Measurements are carried out with arbitrarily selected exposure time (Matyja et al. 2016).
3. Some effects, like mortality, provide a very little information about properties of the toxins.
4. Other effects require long-term measurements for their analysis.

Therefore, there is a request for a possible simple toxicity test, which would eliminate most of the mentioned disadvantages.

In this article, we considered an idea of a pattern motion analysis as a new toxicity test, that would possess the desired properties. Some chemical substances can affect the behavior of an observed organism. The nervous system, as well as the movement abilities, can be impaired. An impact of chemical pollutants can be observed and analyzed clearly and in depth on the example of Daphnia

1 Wrocław University of Science and Technology, Wrocław, Poland. E-mail: pawel.drag@pwr.edu.pl
2 Wrocław University of Science and Technology, Wrocław, Poland. E-mail: krystyn.styczen@pwr.edu.pl
3 Faculty of Chemistry, Wrocław University of Science and Technology, Poland. Email: konrad.matyja@pwr.edu.pl
magna and crab Barytelphusa Guerini (Guilhermino et al., 1996; Fingerman et al., 1996). In particular, insecticides parathion and paraoxon can inhibit acetylcholinesterase of Daphnia magna (Guilhermino et al., 1996). Some substances, e.g., glucose and caffeine, may increase the mobility in general. Conversely, other substances can decrease the mobility. Moreover, the analysis of mobility can be applied not only to a single organism but also to groups, herds, and shoals. Some compelling studies regarding this matter have been conducted (Mach & Schweitzer, 2007; Ordemann et al., 2003).

In the presented study, an application of motion pattern analysis of a single Daphnia magna has been considered. The observed motion changes can be used to illustrate the influence of some chemicals on Daphnia. Moreover, they can be used to assess their toxicity. The camera vision systems play a key role in many processes. In the discussed issue, using camera observations is required by a high frequency of changes, as well as by the size of the object observed, which is not larger than several millimeters. Long-term observations can be very tiring for the human eye, and this may lead to inaccurate results of the measurements.

The continuously operating vision systems are employed in many branches of environmental engineering. They can be used for direct observations of the essential parameters, as well as in the indirect observations, where the appropriate indicators are taken into account. Therefore, the main application of the proposed camera vision system is to find the relation between the indicators of pollution indicators and the observed behavior of the object.

The relations between the elements of the studied system can be modeled in many ways (Ahlkrona et al., 2016). One of the most commonly used ways is to describe the relations by ordinary differential equations (ODEs) (Balsa-Canto et al., 2005). In some cases, when not only differential but also algebraic relations can be defined, the differential-algebraic equations (DAEs) are employed. The algebraic relations, above all, express physical conservation laws of physical quantities such as mass, energy or momentum. Moreover, the algebraic equations can represent the geometrical constraints (Brenan et al., 1996; Diehl et al., 2002).

Therefore, the aim of this project was to design a camera-based vision system, which can observe the organism and model its motion, as well as to identify parameters of the unknown model (Betts, 2010; Biegler, 2010). The position changes of Daphnia magna have been described using new systems of differential-algebraic equation (DAEs). Subsequently, the nonlinear optimization algorithm was applied to identify the unknown model parameters.

Three milestones had to be achieved to realize the presented task. The required and available materials needed to be specified. Then, features of the motion patterns had to be combined into the new differential-algebraic model. Finally, the nonlinear optimization approach was proposed to evaluate the unknown model parameters.

Materials

Daphnia magna is small crustacean living in the freshwater environment. Its maximal length is 5 mm. It is widely used for ecotoxicology purposes (El-Doma, 2013). Daphnis motion is very characteristic. They move by a series of “jumps,” therefore is similar to flea movement (Daphnis are often called "water fleas"). The body of Daphnia is shown in Figure 1.

Figure 1: Daphnia magna.

Source: Author
The Measurement System

The main ideas of a fully automated vision system include data storage units, as well as image-processing algorithms for solving such problems as localization and path following of the objects observed. In recent years, the considered vision systems have been introduced in ecology, ecotoxicology, and environmental and agriculture engineering. For improvement of the efficiency and flexibility of such systems, the data could be obtained from different vision-based sensors, and the data-structure should be suitable for advanced image processing algorithms as well. Therefore, the required information can be obtained using the implemented reliable numerical procedures.

As it was indicated above, automated vision systems require both vision sensors, as well as image processing algorithm to obtain useful information about the systems, their quality, and other features. The environment can be characterized by lots of parameters, which are dependent on the available sensors and data acquisition possibilities.

The main part of the designed measurement system is the high-speed camera Optronis CL600x2 (Figure 2). The particular features of the camera, important from the application in measurement system point of view, have been presented in Table 2.

![Figure 2: The high-speed camera Optronis CL600x2.](source)

<table>
<thead>
<tr>
<th>Table 1: The high-speed camera Optronis CL600x2 specification.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resolution (max.)</td>
</tr>
<tr>
<td>Frame rate for max. res.</td>
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<tr>
<td>Image Sensor</td>
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<tr>
<td>Exposure time</td>
</tr>
<tr>
<td>Pixel Size</td>
</tr>
<tr>
<td>Operation temperature</td>
</tr>
<tr>
<td>Humidity</td>
</tr>
<tr>
<td>Dimensions</td>
</tr>
</tbody>
</table>

Source: Author

The image processing algorithm

The most prominent part of Daphnia are its eyes. For the identification of the eye position on an image, a threshold approach is usually sufficient. Therefore, a light background is necessary to avoid any inaccuracies.

The position of Daphnia can be equated with a position of their eyes. Therefore, only two coordinates are needed to define a position of an observed organism.

The position of Daphnia at time \( t = t_i \) can be defined as

\[
S_i = (x_i, y_i),
\]

(1)

where \( S_i \) denotes a state at time \( t_i \), which can be determined by values of \( x \) and \( y \)-axis: \( x_i \) and \( y_i \), respectively. The state at time \( t = t_{i+1} \) can be defined similarly as

\[
S_{i+1} = (x_{i+1}, y_{i+1})
\]

(2)
and in general
\[ M_{i \rightarrow i+1} = (\Delta x_{i \rightarrow i+1}, \Delta y_{i \rightarrow i+1}), \]  
(3)
where \( M_{i \rightarrow i+1} \) denotes a movement from the state at time \( t_i \) to the state at time \( t_{i+1} \). Therefore
\[ S_{i+1} + M_{i \rightarrow i+1} = (x_i, y_i) + (\Delta x_{i \rightarrow i+1}, \Delta y_{i \rightarrow i+1}) = (x_{i+1}, y_{i+1}) = S_{i+1}. \]  
(4)
The sequence of the observed movements can take a form of the series
\[ \{M_{i \rightarrow i+1}\}_{i=0}^{N-1} = \{M_{0 \rightarrow 1}, M_{1 \rightarrow 2}, \ldots, M_{N-1 \rightarrow N}\}, \]  
(5)
where \( N \), the number of steps, does not need to be known a priori.

### The new differential-algebraic model

The presented considerations lead us to the new form of the Daphnia’s motion model. Each observed step
\[ S_{i+1} - S_i = M_{i \rightarrow i+1} \]  
(6)
has been taken at a known time. Therefore, the position change can be defined as
\[ \frac{S_{i+1} - S_i}{t_{i+1} - t_i} = M_{i \rightarrow i+1}, \]  
(7)
If the interval \( t_{i+1} - t_i \) is constant, then
\[ \frac{S_{i+1} - S_i}{\Delta t} = M_{i \rightarrow i+1}. \]  
(8)
Moreover, the differential motion model can be obtained
\[ \dot{\mathbf{x}} = M_{\dot{x}} = \begin{bmatrix} M_{x} \\ M_{y} \end{bmatrix} \begin{bmatrix} \dot{x} \\ \dot{y} \end{bmatrix}, \]  
(9)
with the initial conditions
\[ \begin{bmatrix} x(t_0) \\ y(t_0) \end{bmatrix} = \begin{bmatrix} x_0 \\ y_0 \end{bmatrix}, \]  
(10)
which are known from the measurements. The values \( M_{x} \) and \( M_{y} \) are unknown and needed to be estimated. Moreover, the geometrical constraints have to be incorporated into the model. These are the extreme values of the state coordinates
\[ x_{\min} < x(t) < x_{\max} \]  
(11)
and
\[ y_{\min} < y(t) < y_{\max} \]  
(12)
In this way, the new model of the Daphnia’s motion with the differential-algebraic constraints has been obtained.

### The nonlinear optimization approach

The data obtained from measurements \( \{(x_{\text{meas}}(t_i), y_{\text{meas}}(t_i))\}_{i=1}^{N} \) enable us to design the following nonlinear optimization task
\[ \sum_{i=1}^{N} (x_{\text{meas}}(t_i) - x(t_i))^2 + (y_{\text{meas}}(t_i) - y(t_i))^2 \rightarrow \min \]  
(13)
with the differential-algebraic continuous-pointwise constraints
\[ \begin{align*}
\dot{x}(t_i) &= M_{x} \\
\dot{y}(t_i) &= M_{y} \\
x(t_0) &= x_0 \\
y(t_0) &= y_0
\end{align*} \]  
(14)
\[ x_{\text{min}} < x(t) < x_{\text{max}} \]
\[ y_{\text{min}} < y(t) < y_{\text{max}} \]

for \( t \in [t_0, t_N] \).

In the proposed methodology, the successive quadratic optimization algorithm has been suggested (Nocedal & Wright, 2006). Moreover, the optimization can be carried out simultaneously with the measurements. The results of the optimization from the previous iteration can be treated as a new starting point for the optimization with the extended set of measurements. This approach is appropriate for a huge set of measured data.

**Conclusions**

The main contribution of the presented work is the camera-based observation system of Daphnia's mobility. The general system consists of the measurement, as well as the algorithm for model parameters estimation.

The process of data acquisition and data analysis can be fully automated through the use of cameras and Matlab software. This kind of automation is a considerable advantage, which may result in shortening time of analysis of a large samples number.

Moreover, the new model of Daphnia's mobility consisting of the piecewise-continuous differential-algebraic constraints has been introduced. The presented methodology can found its application in ecology and environmental engineering, where the Daphnia are employed as the indicators of environmental pollution.

**Acknowledgments**

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**References**


EVALUATION OF A GROUP OF PYRROLE DERIVATIVES AS TUBERCULOSTATIC AGENTS

Maya Georgieva,¹ Diana Tzankova,² Stanislava Vladimirova,³ Atanas Bijev⁴

Abstract: This research aims to contribute to the global search for more effective tuberculostatics that has been triggered by recent outbreaks of tuberculosis. A group of pyrrole-containing derivatives are designed and theoretically elucidated. The identification of the pharmacophore group using the PharmaGist webserver is attempted. Also, the corresponding drug-like properties of the tested compounds are evaluated, together with their possible toxicity risks. The pharmacokinetic behavior of the structures is predicted, based on the Lipinski’s Rule of Five. The effects of some structural parameters are tested. In addition, in vitro evaluations of the anti-tubercular activity against Mycobacterium tuberculosis H₃₇Rv are performed, with compound GA-9 registering the highest activity.

UDC Classification: 615.3; DOI: http://dx.doi.org/10.12955/cbup.v5.1075
Keywords: pyrrole-derivatives, pharmacophore, drug-likeness, tuberculostatic

Introduction

According to recent statistics published by the World Health Organization (WHO), tuberculosis (TB) is one of the top 10 causes of death worldwide. In 2015, 10.4 million people were infected with TB, with 1.8 million deaths, including 0.4 million among them with the human immunodeficiency virus (HIV). Over 95% of TB deaths occur in low- and middle-income countries, where, according to WHO (2017):

Six countries account for 60% of the total deaths, with India leading the count, followed by Indonesia, China, Nigeria, Pakistan and South Africa. In 2015, an estimated 1 million children were infected with TB and 170 000 children died of TB (excluding children with HIV). TB is a leading killer of HIV-positive people: in 2015, 35% of HIV deaths were due to TB. Globally in 2015, an estimated 480 000 people developed multidrug-resistant TB (MDR-TB) (APA: WHO Tuberculosis, 2017).

Considering these statistics, “ending the TB epidemic by 2030 is among the health targets of the newly adopted by WHO Sustainable Development Goals” (WHO Tuberculosis, 2017).

Also, according to Euro WHO (n.d.):

Bulgaria is among the 18 high priority countries for tuberculosis (TB) control in the WHO European Region. Challenges for the National Tuberculosis Programme (NTP) include the lack of efficient TB infection control and the low level of engagement of TB care providers, especially primary health care providers, in early detection and follow-up of TB patients (APA: Euro WHO, 2017).

Thus, in the search for a promising platform of structures for evaluating anti-tubercular agents, a significant number of investigations have focused on a variety of heterocyclic derivatives, including structures containing a pyrrole heterocycle, such as the known anti-tubercular agent BM 212 (Deidda, 1998) and its analogs (Poce, 2013).

In the same context, a series of substituted pyroles were synthesized at the Faculty of Pharmacy, Medical University –Sofia, Bulgaria and laboratory of organic synthesis at University of Chemical Technology and Metallurgy (UCTM) - Bulgaria and evaluated as anti-tubercular agents, with up to 100% inhibitory activity against Mycobacterium tuberculosis or a half maximal inhibitory concentration (IC₅₀) less than 6 μg ml⁻¹ (Bijev, 2010; Georgieva, 2010; Georgieva, 2011). In addition, reliable structure-activity relationships have been derived (Lessigiarska, 2012) that attempt to contribute to the global fight against the spread of tuberculosis.

¹ Medical University, Faculty of Pharmacy, Sofia, Bulgaria, georgm@mail.bg
² Medical University, Faculty of Pharmacy, Sofia, Bulgaria, diana_ducova@abv.bg
³ University of Chemical Technology and Metallurgy, Sofia, Bulgaria, vladimirova.s@mail.bg
⁴ University of Chemical Technology and Metallurgy, Sofia, Bulgaria, atanas.bijev@gmail.com
Design and Synthesis of the Evaluated Structures
A variety of chemical templates has been explored by us (Bijev, 2006), including hydrazones (Bijev, 2008a) and derivatives of pyrrole (Bijev, 2008b). The performed analysis motivated us to combine the active principles of these moieties, and thus we synthesized consecutively several series of such pyrrole derivatives as potential anti-TB (anti-tubercular) agents (Bijev, 2006; Bijev, 2008a; Bijev, 2008b; Bijev, 2010; Georgieva, 2010; Vladimirova, 2015).

This research aims to contribute towards the global search for more effective tuberculostatics. The design of the molecules included in this study is addressed to diversify the available pyrrole derivatives already identified as perspective inhibitors of *M. tuberculosis*.

Data and Methodology
This study examined structural changes in three focus areas identified as A, B, and C of targeted compounds (Figure 1).

This approach was based on observations of Vladimirova & Bijev, (2015, p. 5): “The most radical change was made in moiety A, whereat the N-acyl-chain in the previously developed pyroles in our laboratory was replaced by R₂-R₃-substituted phenyl”, which was “motivated by the presence of the same moiety in series of bioactive products.”

In an attempt to evaluate the independent effect of this new moiety A, the ester group (R = OC₂H₅) in moiety B was maintained in three of the products. Aiming for an analogy with the piperazine- or thiomorpholine-heterocycle in BM 212 and their analogs, a change in moiety B with R = CH₃ or a morpholino-substituent was expected. In group fragment C, X = H alternates with X = Cl aimed to identify some similarity to substituted active tuberculostatics previously developed by the authors (Georgieva, 2010; Biava, 2004; Biava, 2008).

The products targeted in this study as described elsewhere by Vladimirova (2015, p. 3): “were synthesized via adopted Paal-Knorr cyclization by condensation of three 1,4-dicarbonyl compounds with a set of substituted anilines.”

Identification of the Pharmacophores
According to Schneidman-Duhovny, Dror, Inbar, Nussinov, and Wolfson (2008, p. 1), “Predicting molecular interactions is a major goal in rational drug design.” They also stated that: “The spatial arrangement of features, identified as pharmacophore group and responsible for the interaction of the designed molecule with a desired target receptor, is an important model for achieving” this purpose (Schneidman-Duhovny, Dror, Inbar, Nussinov, and Wolfson (2008, p. 1)).

This study aimed to identify the pharmacophore group using the PharmaGist Webserver (Schneidman-Duhovny, Dror, Inbar, Nussinov, and Wolfson, 2008). The evaluated compounds were separated into two groups, according to their structural similarity to the published pyrrole agent with underlined antituberculosis activity, BM 212 (Biava, 2004; Figure 2).
A ligand based method was employed, and the candidate pharmacophores were outlined, computed by multiple flexible alignments of the input ligands. The method explicitly considers the flexibility of the input ligands within the alignment process (Schneidman-Duhovny, Dror, Inbar, Nussinov, and Wolfson, 2008).

**Drug-likeness Prediction**

There are many approaches that assess a compound’s ‘drug-like’ properties, partially based on topological descriptors, fingerprints of MDL structure keys or other properties. The biological activity is also identified as a function of the complex influence of a variety of molecular descriptors. The underlayment of a certain structural parameter and the expected pharmacological effect is at times possible. The hydrophobicity of the compounds expressed as LogP outlined the key parameter for determination of compounds Drug-likeness.

The study aimed to predict the drug-like properties of the newly synthesized pyrrole derivatives using the following two approaches: Lipinski’s Rule of Five limitations (Lipinski, 1997; Lipinski, 2001) and OSIRIS Property Explorer evaluation score (Sander, Thomas Actelion Pharmaceuticals Ltd., 2017). The OSIRIS Property Explorer prediction tool used in this publication is an integral part of Actelio’s in-house substance registration system (Sander, Thomas Actelion Pharmaceuticals Ltd., 2017). The prediction process relied on a precomputed set of structural fragments that provided preliminary information on a number of drug-relevant properties, such as drug-likeness and toxicity alerts (Sander, Thomas Actelion Pharmaceuticals Ltd., 2017).

**Prediction of the Pharmacokinetic Behavior**

The pharmacokinetic of the evaluated structures was important for initial information in their identification as possible active agents. The behavior of the targeted structures was easily predicted, based on the results from the performed elucidation of Lipinski’s Rule of Five parameters pointing the following boundaries: hydrophobic parameter Log P < 5, molecular weight MW < 500, the number of hydrogen bond acceptors n(O, N) < 10, and the number of hydrogen bond donors n(OH, NH) < 5 (Lipinski, 1997; Lipinski, 2001). The desired parameters were calculated with the help of online cheminformatics services offered by Molinspiration Cheminformatics.

**Evaluation of Drug-likeness**

The synthesized new derivatives of pyrrole were assessed for drug-likeness using two parameters: Fragment Based Drug-likeness and Drug Score.
The Fragment Based Drug-likeness was calculated by the following equation for summing score values of those fragments that were present in the molecule under investigation, as follows:

\[ d = \frac{\sum v_i}{\sqrt{n}} \]  

(1)

A positive value meant that the analyzed molecule contained predominantly fragments that are frequently in commercial drugs (Sander, 2017).

The Drug Score was the combined value of the drug-likeness, cLogP, logS, molecular weight, and toxicity risks, used to evaluate the compound’s overall potential to qualify as a drug. It was calculated by multiplying contributions of the individual properties with Equation 1:

\[ ds = \prod \left( \frac{1}{2} + \frac{1}{2} S_i \right) \cdot \prod t_i \]  

(2)

where \( ds \) is the drug score and \( S \), the contributions calculated directly from of cLogP, logS, mol weight and drug-likeness \( (p_i) \) using Equation 3, which describes a spline curve:

\[ S_i = \frac{1}{1 + e^{a p_i + b}} \]  

(3)

where, respectively, \( a \) and \( b \) were the values of cLogP \( (1, -5) \), logS \( (1, 5) \), mol weight \( (0.012, -6.000) \), and drug-likeness \( (1, 0) \). The \( t_i \) was the contribution obtained for the four toxicity risk types. The \( t \) values were 1.0, 0.8 and 0.6 for ‘no risk’, ‘medium risk’, and ‘high risk’, respectively (Sander, 2017).

**Screening for Tuberculostatic Activity**

The anti-tubercular activities of the target compounds were determined by in vitro procedure at the SRI International, a contractor for National Institute of Allergy and Infectious Diseases (NIAID), USA (SRI International, 2010).

The evaluation was performed according to the SRI International Screening Program. This involved a single point concentration procedure where all compounds were initially screened against *M. tuberculosis* strain H\textsubscript{37}Rv (Collins, 1997). This assay was the primary screen. Where compounds were active at 10 µg mL\textsuperscript{-1} level, they were further tested in a minimal inhibitory concentration (MIC) assay at eight concentrations in a dose range between 10.000 and 0.078 µg mL\textsuperscript{-1} (Georgieva, 2010).

The procedure was performed as follows: 20 µl of the 3.2 mg mL\textsuperscript{-1} test compound was added to a 96-well microtiter plate. Two-fold dilutions were made by adding 20 µl of diluent. Each dilution was further diluted 1:10 in sterile water (10 µl of dilution to 90 µl of sterile water). An amount of 6.25 µl of each dilution was transferred to duplicate 96-well test plates. Then, 93.75 µl of the cell suspension \((\sim 10^8\) bacteria) in 7H9 medium was added to the test plates. Positive (included rifampicin and isoniazid), negative (included cell culture with solvent and water, and cell culture only), sterility (included media only; and media with solvent and water) and Resazurin (7-Hydroxy-3H-phenoxazin-3-one 10-oxide; included one plate containing the diluted compound with Resazurin only) controls were tested. The 96-well test plates were incubated at ambient 37°C incubator for six days. After the 6-day incubation, 5 µl of a 0.05% sterile Resazurin solution was added to each well of the 96-well plate. The plates were placed in an ambient 37°C incubator for two days. After the 2-day incubation, a visual evaluation and a fluorimetric reading were performed. The results were presented as ‘% Growth Inhibition’ (Georgieva, 2010).

The tuberculostatic activity of the tested series of pyrrole derivatives against *M. tuberculosis*, strain H\textsubscript{37}Rv, evaluated by SRI International as ‘% Growth Inhibition’ was transformed into a more common general format in an attempt to identify possible trends. Thus, with the help of simplifying considerations, the current results were recalculated from ‘% Growth Inhibition’ to ‘% inhibitory activity’ related to that of BM 212 (accepted to be a standard within 100%). The following approximations were applied:

Recalculated % inhibitory activity = % Growth Inhibition + 7.13

where the value of 7.13 was the absolute poorest registered (with negative sign) activity (Georgieva, 2010).

**Results and Discussion**

The best pairwise solution for the evaluated molecules and BM 212 was its pairing with MV-3 (Figure 3).
The identified pharmacophores for the most active agent identified from the microbiological testing and then used as reference agent BM 212 are shown in Figure 4.

The identified pharmacophores may be further used for generating new leads and optimizing existing ones or both in designing drugs.

The results of the performed calculations for prediction of the pharmacokinetic behavior are presented in Table 1.
<table>
<thead>
<tr>
<th>ID</th>
<th>% Growth Inhibition</th>
<th>% Inhibitory activity</th>
<th>miLogP</th>
<th>Mw</th>
<th>nON</th>
<th>nOHNH</th>
<th>% ABS</th>
</tr>
</thead>
<tbody>
<tr>
<td>MV-3</td>
<td>-1.88</td>
<td>5.25</td>
<td>2.69</td>
<td>406.48</td>
<td>6</td>
<td>0</td>
<td>90.73</td>
</tr>
<tr>
<td>MV-4</td>
<td>-0.04</td>
<td>7.08</td>
<td>3.51</td>
<td>380.88</td>
<td>4</td>
<td>0</td>
<td>97.11</td>
</tr>
<tr>
<td>MV-5</td>
<td>-6.65</td>
<td>0.48</td>
<td>4.32</td>
<td>415.32</td>
<td>4</td>
<td>0</td>
<td>97.11</td>
</tr>
<tr>
<td>MV-13</td>
<td>-0.87</td>
<td>6.26</td>
<td>5.72</td>
<td>374.27</td>
<td>3</td>
<td>0</td>
<td>98.22</td>
</tr>
<tr>
<td>GA-1</td>
<td>-3.76</td>
<td>3.37</td>
<td>6.40</td>
<td>408.71</td>
<td>3</td>
<td>0</td>
<td>98.22</td>
</tr>
<tr>
<td>GA-2</td>
<td>-2.26</td>
<td>4.87</td>
<td>5.58</td>
<td>374.27</td>
<td>3</td>
<td>0</td>
<td>98.22</td>
</tr>
<tr>
<td>GA-3</td>
<td>0.67</td>
<td>6.46</td>
<td>4.76</td>
<td>399.87</td>
<td>5</td>
<td>0</td>
<td>91.85</td>
</tr>
</tbody>
</table>
The compounds MV-13, GA-1, GA-2, GA-5, and GA-8 violated the rule with the miLogP parameter. As the structures are considered antimicrobials, the observed violations do not affect their value as pharmacokinetics.

Another confirmation was the result from the performed prediction with the absolute value (%ABS), calculated by the expression: %ABS = 109 – 0.345TPSA introduced elsewhere (Zhao, 2002). The results showed the target compounds had commensurable and high %ABS, which indicates valuable pharmacokinetics and thus indicated they follow the regulations of Lipinski’s Rule of Five, decreasing any pharmacokinetic concerns.

The corresponding values of the computational analysis for Drug-likeness and Drug Score are presented in Table 2.

**Table 2: Drug-likeness and drug score values for the evaluated compounds**

<table>
<thead>
<tr>
<th>ID</th>
<th>Mutagenic</th>
<th>Tumorigenic</th>
<th>Irritant</th>
<th>Reproductive effective</th>
<th>Drug-likeness</th>
<th>Drug-score</th>
</tr>
</thead>
<tbody>
<tr>
<td>MV-3</td>
<td>✓</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.52</td>
<td>0.34</td>
</tr>
<tr>
<td>MV-4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3.44</td>
<td>0.43</td>
</tr>
<tr>
<td>MV-5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3.67</td>
<td>0.35</td>
</tr>
<tr>
<td>MV-13</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>4.60</td>
<td>0.49</td>
</tr>
<tr>
<td>GA-1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-2.14</td>
<td>0.15</td>
</tr>
<tr>
<td>GA-2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-2.96</td>
<td>0.17</td>
</tr>
<tr>
<td>GA-3</td>
<td>✓</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-5.12</td>
<td>0.15</td>
</tr>
<tr>
<td>GA-5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1.63</td>
<td>0.27</td>
</tr>
<tr>
<td>GA-8</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.79</td>
<td>0.29</td>
</tr>
<tr>
<td>GA-9</td>
<td>✓</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-1.46</td>
<td>0.19</td>
</tr>
<tr>
<td>BM 212</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>4.60</td>
<td>0.49</td>
</tr>
</tbody>
</table>

Source: Author
The evaluation established that compound MV-13 shows the highest drug like properties with Fragment Based Drug-likeness score of 4.60 and total Drug Score of 0.49, equal to the new anti-tuberculat agent BM 212.

The primary screening results of the evaluated compounds are presented in Figure 5.

![Figure 5: Primary screening results for the evaluated compounds](image)

Source: Author

From the test group, compound GA-9 showed the highest inhibitory activity. This result confirms the expectation of the drug-like effect of the underlined structure, based on the drug-like similarity with the new anti-tuberculat agent BM 212.

**Conclusion**

The results indicate that the identified pharmacophores have additional use in generating new leads or optimizing existing ones or both in drug design. The newly synthesized products strongly aligned with Lipinski’s Rule of Five limitations, which is a premise for sound pharmacokinetics. In addition, the target compounds had commensurable and high absolute values. On the one hand, a comparison of results showed five compounds failed to meet Lipinski’s Rule of Five parameters, with these compounds unsuitable for further structural optimizations. On the other hand, the compound MV-13 had the highest drug-like properties, with a Fragment Based Drug-likeness score of 4.60 and total Drug score of 0.49, equal to the new anti-tuberculat agent BM 212. As well, compound GA-9 was underlined as having the highest tuberculostatic activity amongst the evaluated molecules.

**References**


SRI International Screening Program on line: http://www.niaid.nih.gov/LabsAnd Resources/resources/dmid/pretheraagents/Pages/preclinexamples.aspx (accessed on 26 January 2010).


CURRENT APPROACHES TO INCREASED PROTECTION AGAINST TROJAN HORSES IN CLOUD SERVER SOLUTIONS

Peter Veselý,1 Michal Greguš,2 Eleonóra Beňová3

Abstract: IT companies are presenting to their customers cloud computing as a technology that will give them a competitive advantage if they implement it faster than their competitors. It is true that cloud computing can improve the businesses capability to access, share, and protect their company's data, particularly when they have a limited capacity to manage on-site modern technology resources. Using cloud services or simply only thinking of moving data to the cloud creates a wide set of concerns, starting with basic security concerns, and going as far as to the availability of cloud services, that is the company would not be able to get to the data when it needs it. Small and medium companies do not have enough resources to fight cyberattacks, but they can implement policies that will minimize the risk of the loss of their valuable data. The aim of this paper is to describe the current threats companies are facing when they use cloud services and to give them advice how to minimize the risk of these threats. We will specify a set of rules especially for small and medium companies and organizations that should help them to be able to choose more secure cloud services for their particular needs.

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Keywords: cloud, security, Trojan horses, 0-day, hack

Introduction

Every day we use the connection to a cloud server. A large proportion of people do not even know, that they are connected to cloud server solutions. And not considering this, they use any functions of standard computers or smartphones (Davidekova, 2016). Companies are increasingly switching to cloud server solutions and implement various services to their corporate infrastructure. The threat of a cyber-attack does not surface until they become a victim (Kumar, 2017). The use of cloud server solutions brings many benefits but also a large number of new security risks. The whole world is currently in a great cyber war and it is only a matter of time before we become a target (Wenli, 2015). However, the primary targets shift towards cloud infrastructure and services based on cloud server solutions, where there are many users, a lot of data traffic, and personal data (Somani et al., 2017). There is currently a number of documented Trojan Horses, which are likely formed by state governments for the purpose of entering foreign computer systems to damage them, or more likely, in order to be used for a massive data collection. Cyber-attacks have evolved from simple ones to sophisticated and devastating Advanced Persistent Threats (Redondo-Hernandez et al., 2015), such as the Stuxnet attack was (Farwell and Rohozinski, 2011). These threats have the capabilities to stop business operations and even cause physical damage (Bajramovic and Gupta, 2017). Effective IS/IT security must ensure an adequate level of confidentiality, integrity, availability, authenticity and nonrepudiation (Karovic et al., 2015).

Stuxnet

The super virus Stuxnet is considered the first virus developed by intelligence services to track other countries or to damage the technologies of other countries. It is estimated, that more than 100,000 computers were infected by Stuxnet. The main goal, however, was initially only one target, the Natanz enrichment facilities in Iran. This is generally considered to be the first strike in the global cyber war. According to the reports, diaries and subsequent analysis of a number of authors like Fiaidhi and Gelogo (2012), Byres (2016), or Kenney (2015) including ESET, a leader in antivirus solutions, it is clear that the development of Stuxnet could be contributed to US intelligence agencies, the NSA and an Israeli military unit known as UNIT 8200. The virus itself was a relatively sophisticated solution that contested alone the core of the Windows operating system using a 0-day exploit. At the same time, it was a cross-platform solution, which after analysis of the virus infecting other systems, especially the Siemens PLC systems, where a firmware upload in particular centrifuges, which then changed parameters to lead to their physical destruction. A comprehensive solution indicates, that the virus itself must constitute more people versed in multiple systems. The biggest threat is currently

1 Faculty of Management, Comenius University in Bratislava, peter.vesely@fm.uniba.sk
2 Faculty of Management, Comenius University in Bratislava, michal.gregusml@fm.uniba.sk
3 Faculty of Management, Comenius University in Bratislava, eleonora.benova@fm.uniba.sk
using a 0-day exploit Windows operating systems. The use of these errors means that the virus conceals itself perfectly and had existed several years before it was discovered.

Figure 1: Possible ways to infect system with Stuxnet

Source: Byres (2016)

The technology is relatively simple, based on the recognition that the target group uses Windows in several versions and these versions are called 0-day bugs, errors which have not yet been discovered, not even by the manufacturer of the operating system. In the world, there are several companies that specialize in finding just those errors and sell them to governments. For example, a company VUPEN according to Forbes magazine in November 2011, received the amount of 250 000 USD for the supply of information on software vulnerabilities from the US government (Bohdalova and Kurdyova, 2013). Stuxnet itself according to the version contains an analysis of approximately 15,000 lines of code that is written quite sophistically and includes a section for introducing a different code to the PLC equipment.

Duqu and Flame

The new super virus Duqu and Flame are successors to Trojan horses produced by state organizations. Trojan Duqu is able by means of false digital signature certificate update the system by running the document to take control of the Windows kernel. Duqu is able to thereby change the computer to a botnet zombie. To function it is sufficient to have only about 3000 lines of code, unlike Stuxnet which depends on libraries having a size of approximately 20 megabytes. Already there is a visible shift from a pure Trojan horse technology, that is Duqu and Flame is a mixture of worms and Trojan virus and relies on the use of libraries of the Windows operating system itself. The Trojan Horse Flame collects information not only on the computer’s local network but due to undocumented bugs in Bluetooth, also collects data from mobile devices (BYOD abuse). Then it sends the information on to more than eighty servers. When analyzing these sites with Symantec, there has been issued a statement, which the efforts and plans to create Duqu and Flame requires government approval. It also proves the track of the eighty servers registered to cover German and Austrian companies around the world. Based on Flame there were created several generations of Ransomware viruses that also exist today and commit great damage in cybersecurity. Creating a Windows protection against the types of attacks such as the Duqu and Flame took a few weeks for Microsoft programmers. In doing so, they had to change part of the core system, in particular authentication and encryption of the core system, so that the 0-day exploits did not continue to abuse it.

FinFisher

The FinFisher software was sold legally by company Gamma International Ltd. worldwide to governments. For example, according to available information, Slovakia has purchased 49 licenses, which is more than Hungary. According to published information, there are several versions of FinFisher according to the degree of difficulty in the implementation of the target system. Malware/Trojan horse then actively analyses all available documents and databases, and extensive data is sent to the attacker. FinFisher is also known to actively exploit a security loophole in the
iTunes system for spreading itself. It took three years, until Apple has resolved the issue of its services - operated by its private cloud iTunes. In addition, a frequently used masking technique is used to attack Mozilla Firefox. Gamma had created an espionage program that was entitled Firefox.exe and even provided a version number and trademark claims that appear to be a legitimate Firefox software. Currently it is very difficult for detection since the algorithm is constantly changing as well as techniques for masking the Trojan Horse FinFisher.

**Future Trojan Horses and Other Cracking Tools**

It would be naive to think that after the success of Stuxnet, Duqu and Flame, the creators decided not to continue further in their development. At present, intensive work in the legal sphere of cross platform security and privacy is needed, since various solutions that seek to decrease vulnerability, e.g. Microsoft.NET, are being implemented for all operating systems. For policy makers that means the possibility of a smooth entry into the system. However, the authors of the operating system try to improve the security of the operating system core. For example, Ubuntu has agreed with Microsoft to implement running Bash on Ubuntu on Windows.

It is assumed that at the moment different versions of Trojan Horses are being tested and that the new version of Stuxnet, Flame and Duqu are already in circulation and are detectable.

**Infection Storm with Locky**

A new kind of infection ran like a chain reaction across the globe. Abused to distributing the 4th most popular operating system in the world - Linux Mint, combined with the most widespread misuse of the web applications from WordPress. The attackers have changed the distribution from the 20.2.2016 to their own for several distribution servers. As a result, over 20 million distributions of Linux Mint began to spread the ransomware Locky. It is estimated that over 2 days Locky infected over 250 million computers. Its sophisticated code first deletes all kinds of backups on disk, including shadow copies of Windows and then scans all drives attached external drives as well as any local network connection. Then it crypts in a quite sophisticated way (Davidkova and Farkas, 2014) individual files, and demanded 0.5 per Bitcoin ransom per file.

**Using Cloud Server Solutions**

Currently, cloud solutions is based on several projects such as OwnCloud, or OpenStack Zential. There are other solutions, but number of these solutions lead to large multinational companies. In addition, the functioning of the cloud server solutions rely upon e-Government solutions in world.

**Cloud Server Protection**

One of the possibilities of protection is the consistent prevention of security incidents, the consistent application of antivirus agents, keeping and updating the list of installed programs. However, in the cases described above, such prevention is meaningless. An attacker familiar with the company's internal affairs enforces and infects the standard security measures. In addition, standard antivirus solutions recognize only the threats that already have been analyzed, despite the fact that they dare to try to do a heuristic analysis.
The second option is a consistent cataloging of each file in the system with consistent hardware and software tracking. In practice, there are few systems for monitoring complex information systems, but they are mostly based on Windows technology. This means in practice that most of the hybrid networks can be controlled and protected. But not the whole hybrid network. Comprehensive cataloging of hardware and software on the corporate network should be able to check up and control the security of complex IS/IT, including BYOD. In fact, each file would be analyzed, compared to the file catalog of existing systems, and if a system kernel file would differ, the file would be refused to be copied down or it would be evaluated in detail as a threat. Currently, for example, Linux editions have a completely described file system, including the CRC checksum for system checking. The only exploitable weakness would be that the state starts publishing its own editions of operating systems that will have cataloged files in the part of the system, so the comparison will go well, but it will actually pose a security risk. The third option is to use other operating systems that are different from Windows. For example, there exist many variations of the system Linux as is documented by Karovic (2013), a vivid example is Scientific Linux that is used by scientists at CERN laboratories. Or the existence of Linux Ubuntu Kylin, which is approved by the Chinese government, and the standard version of Ubuntu is for example recommended by the UK Government as a safe one. The problem of the cloud solution however, is that there are currently several cloud server solutions based on only a few operating systems. So, the attacker only needs the knowledge of the given operating system, and basically the attacker does not have to deal with the other operating systems to get into a specific cloud server solution.

Conclusions
Currently as is documented especially by Lifars (2017), the development of super viruses and Trojan Horses is progressing faster than we are willing to admit. Individual countries are investing hundreds of millions in development, and over 150 states are developing solutions to protect against intruders from the internet. The war in cyberspace has already begun, and the protection against is becoming increasingly difficult and costly. Paradoxically the most efficient solutions now - cloud server solutions - are currently in the position as the most vulnerable ones because they are the often the primary aim of attackers and use only a narrow set of solutions for their operation.

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RATIONAL DESIGN, SYNTHESIS AND CHARACTERIZATION OF HYBRID MOLECULES WITH PYRAZOLINE, PYRIMIDINE AND THIAZOLIDINE NUCLEI AS POTENTIAL ANTIBACTERIAL AGENTS

Liliana Rocio Guerrero-Villalobos,1 Fabián Orozco-López2

Abstract: In this paper, a set of computational tools were used to design and evaluate molecular structures resulting from the combination of the biologically interesting pyrazoline, aminopyrimidine and thiazolidine nuclei (molecular modification) to obtain new bioactive compounds. Key physicochemical properties were calculated (absorption, distribution, metabolism, excretion and toxicity), to determine the bioavailability of the designed compounds and to perform a preselection of 12 derivatives which were then optimized and studied by molecular docking with the receptor PBP3 (4bpj) from Escherichia coli. By these studies, 8 compounds were selected by their binding energies (from -5.36kJ/mol to – 7.05kJ/mol) and significant interactions with the amino acids of the receptor in its active site. In general, the synthesis of the selected compounds was carried out from the α,β-unsaturated carbonyl compounds as precursors. The dihydropyrazole derivatives were obtained from the reaction of chalcones with one equivalent of hydrazine derivatives by one-step cyclocondensations. The pyrimidine series were synthesized starting by the reaction of chalcones and guanidine, giving rise to the corresponding aminopyrimidines, which were then reacted with aromatic and heteroaromatic aldehydes to obtain the acyclic azomethine compounds. The thiazolidine-4-ones were obtained from the aminopyrimidines synthesized above, using three-component cyclocondensation reactions with 2-mercaptoacetic acid and benzaldehyde, in anhydrous toluene or benzene as solvents and using conditions of reflux with Dean-Stark. Finally, assays were carried out aiming to the formation of β-lactam rings, using the Staudinger-type cycloaddition reaction of 2-chloroacetyl chloride with cyclic imines. All the obtained compounds were fully characterized by IR spectroscopy, as well as mono- and bidimensional NMR techniques. The most promising compounds will be evaluated by in vitro assays as potential antibacterial agents.

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Keywords: Antibacterials, molecular modification, virtual screening, pyrazolines, aminopyrimidines, thiazolidines.

Introduction

The indiscriminate use of antibiotics due to the growing proliferation of bacterial diseases has generated resistant and highly infectious strains that are often fatal in immunocompromised patients (Cuellar, 2013). This has motivated the scientific community to face new challenges in the development of latest introduced compounds with the widest possible spectrum, low toxicity, greater bioactivity and high selectivity.

In addition, the synthetic methods that could be more versatile, economical and practical, implying both health benefits and the generation of new knowledge in the development of pharmacophores of interest (World Health Organization, 2016). This scenario has made it possible to boost the search and discovery of new antimicrobial agents, which is reflected in the long lists of new antibiotic compounds that were not available due to the high amount of research and development in the different areas of both chemistry and medicine, seeking to address the problem (Vardanyan & Hruby, 2016). Along with this, advances in the understanding of bacterial physiology have established a structure-activity relationship (SAR) (Reguero, Barreto, & Jimenez, 1989), which has been used to modify the chemical structures of antibiotics with the aim of improving their antimicrobial activity, and thus to fight bacteria that have acquired resistance to previous antimicrobials (Amábile-Cuevas, 2003).

In this field, it is important to mention that the process of developing new medicines can take years to reach its final stage and represent an excellent economic investment to ensure its mechanism of action and guarantee its safety and efficacy in vivo (Marovac, 2001). Consequently, the current trend in obtaining new medicines seeks to rationalize the development of new therapeutic agents based on the relationship between the chemical structure of the medicine and its biological activity, as well as the rational design of new drugs using current tools of computational chemistry which daily grow in their ability to detect unobvious similarities and differences between pharmacotherapeutic agents (Escalona, Carrasco, & Padrón, 2008).

From this standpoint, the synthesis of heterocyclic compounds is proposed as an alternative to address this problem by means of versatile approaches such as Diversity-Oriented Synthesis - DOS (Spring,

1 National University of Colombia, Bogotá, Colombia, lrguerrero@unal.edu.co
2 National University of Colombia, Bogotá, Colombia, forozcol@unal.edu.co
molecular modification or hybrid pharmacophore (Moreno-Díaz, et al., 2008) and bioisosterism (Navarrete-Vázquez, et al., 2006), in order to circumvent the defence mechanisms and thus enhance pharmacological and pharmacodynamic effect of drugs; a process that throughout several studies have shown new and/or better biological activity.

In this respect, this work seeks to apply the methodology of rational *in silico* drug design with the aim of obtaining molecular prototypes with pyrazole, aminopyrimidine, thiazolidonic and β-lactam nuclei with potential antimicrobial activity; all of them tackled by the derivatization of chalcones as building blocks. In this study, ADMET parameters and virtual screening were considered in order to establish bioavailability and the proper structure-activity relationships, selecting this way the best prototypes to be synthesized by means of computational tools (Cheng et al., 2012), thus contributing to an increase in the chances of success and a decrease in costs (time, infrastructure, experimentation, among others), compared to traditional methods used in the discovery of drugs.

**Methods**

a. Structures preparation and virtual screening

Several aspects were taken into account. At the outset, the identification and design of the prototypes to be studied was carried out through the molecular modification approach (hybrid pharmacophore), with the fusion of some nuclei of the different chemical structures of the antibiotics (pyrazolines, aminopyrimidines, thiazolidones and β-lactams). To establish the best oral bioavailability profile according to the model developed by Lipinski (Lipinski, 2001), 60 new hybrid structures were designed and were then evaluated through *in silico* studies for the prediction of some relevant ADMET properties. In this study, molecular prototypes (pharmacophoric nuclei) were designed and diversified by the substitutions patterns at the Ar and Ar₁ positions, which sought to enhance biological activity and/or improve their bioavailability (Table 1).

<table>
<thead>
<tr>
<th>Table 1: Chemical structure of prototypes 1-6(a-j).</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Chemical structures" /></td>
</tr>
<tr>
<td><strong>Substituents in Ar and Ar₁</strong></td>
</tr>
<tr>
<td><img src="image" alt="Substituent images" /></td>
</tr>
<tr>
<td>Source: Author</td>
</tr>
</tbody>
</table>

In order to determine the bioavailability and toxicity profile of the prototypes, *in silico* tools were used that allowed the analysis and subsequent pre-selection of candidate compounds to be studied further. The first source of filtration was the prediction and evaluation of oral absorption from the physicochemical properties (Lipinski’s rules) since the more distant they are from the parameters of the rule, the more more complicated to overcome the subsequent stages in a possible development of drugs. Table 2 shows the values of the best prototypes, in which only 5 violates one of Lipinski’s rules (lipophilicity), showing an excellent bioavailability profile. *Ampicillin* was chosen as blank and was therefore subjected to the same process of evaluation of the bioavailability profile used in the other compounds, to compare the values and to analyse the selection criteria of the compounds in each phase. In that sense, it is observed that most of the scores are considerably higher except 5j.
acceptable in terms of efficacy (activity) and safety (Toxicity) for the molecular docking study, since it was necessary to confirm that the potential new drug will be subjected to estimation of in silico toxicity from their molecular structure using the free online software admetSAR, which is a database that relates structure-activity (Cheng et al., 2012). In general, for toxicity predictions, the entire series of compounds with -NO2 substituents showed toxicity as possible carcinogenic agents and exhibited significant levels of toxicity in environmental, biological models. Compared with Ampicillin, scores for Rat Acute Toxicity LD50 of most of the prototypes resulted similarly, but almost at the limit of the toxicity value, according to the scale of (Hodge & Sterner, 1949) (From moderately toxic to slightly toxic). The prototype 5i presented the best profile, with the lowest toxicity of the series (Table 3).

To predict the toxicity of the prototypes that presented the best bioavailability profiles, the compounds were subjected to estimation of in vitro toxicity from their molecular structure using the free online software admetSAR, which is a database that relates structure-activity (Cheng et al., 2012). In general, for toxicity predictions, the entire series of compounds with -NO2 substituents showed toxicity as possible carcinogenic agents and exhibited significant levels of toxicity in environmental, biological models. Compared with Ampicillin, scores for Rat Acute Toxicity LD50 of most of the prototypes resulted similarly, but almost at the limit of the toxicity value, according to the scale of (Hodge & Sterner, 1949) (From moderately toxic to slightly toxic). The prototype 5i presented the best profile, with the lowest toxicity of the series (Table 3).

With complete ADMET data obtained, it was possible to select the group of molecules to continue to the molecular docking study, since it was necessary to confirm that the potential new drug will be acceptable in terms of efficacy (activity) and safety (Toxicity) for in vitro and in vivo assays in animals and subsequently, in humans.

Table 2: Predicted ADME properties of the best prototypes.

<table>
<thead>
<tr>
<th>Compound</th>
<th>MlogP</th>
<th>S+logP</th>
<th>RuleOf5</th>
<th>RuleOf5_Code</th>
<th>MWt</th>
<th>M_NO</th>
<th>T_PSA</th>
<th>HBDH</th>
</tr>
</thead>
<tbody>
<tr>
<td>1i</td>
<td>3.822</td>
<td>4.201</td>
<td>0</td>
<td>&lt;None&gt;</td>
<td>282.341</td>
<td>3</td>
<td>46.53</td>
<td>1</td>
</tr>
<tr>
<td>2g</td>
<td>4.669</td>
<td>5.037</td>
<td>1</td>
<td>LP</td>
<td>358.443</td>
<td>4</td>
<td>45.06</td>
<td>1</td>
</tr>
<tr>
<td>2j</td>
<td>4.881</td>
<td>5.464</td>
<td>1</td>
<td>LP</td>
<td>372.47</td>
<td>4</td>
<td>45.06</td>
<td>1</td>
</tr>
<tr>
<td>3d</td>
<td>4.092</td>
<td>4.007</td>
<td>0</td>
<td>&lt;None&gt;</td>
<td>281.746</td>
<td>3</td>
<td>51.8</td>
<td>2</td>
</tr>
<tr>
<td>3h</td>
<td>3.824</td>
<td>4.05</td>
<td>0</td>
<td>&lt;None&gt;</td>
<td>261.328</td>
<td>3</td>
<td>51.8</td>
<td>2</td>
</tr>
<tr>
<td>4a</td>
<td>4.093</td>
<td>4.343</td>
<td>0</td>
<td>&lt;None&gt;</td>
<td>453.566</td>
<td>5</td>
<td>55.32</td>
<td>0</td>
</tr>
<tr>
<td>4i</td>
<td>3.773</td>
<td>4.387</td>
<td>0</td>
<td>&lt;None&gt;</td>
<td>485.565</td>
<td>7</td>
<td>95.78</td>
<td>2</td>
</tr>
<tr>
<td>4j</td>
<td>4.03</td>
<td>4.264</td>
<td>0</td>
<td>&lt;None&gt;</td>
<td>483.592</td>
<td>6</td>
<td>75.55</td>
<td>1</td>
</tr>
<tr>
<td>5i</td>
<td>4.642</td>
<td>4.754</td>
<td>1</td>
<td>LP</td>
<td>446.571</td>
<td>5</td>
<td>53.01</td>
<td>1</td>
</tr>
<tr>
<td>5j</td>
<td>3.678</td>
<td>2.831</td>
<td>0</td>
<td>&lt;None&gt;</td>
<td>310.42</td>
<td>3</td>
<td>23.55</td>
<td>0</td>
</tr>
<tr>
<td>6a</td>
<td>6.027</td>
<td>4.805</td>
<td>1</td>
<td>LP</td>
<td>409.318</td>
<td>3</td>
<td>23.55</td>
<td>0</td>
</tr>
<tr>
<td>6c</td>
<td>5.424</td>
<td>5.033</td>
<td>1</td>
<td>LP</td>
<td>418.926</td>
<td>4</td>
<td>32.78</td>
<td>0</td>
</tr>
<tr>
<td>Ampicillin</td>
<td>0.656</td>
<td>-1.302</td>
<td>0</td>
<td>&lt;None&gt;</td>
<td>349.411</td>
<td>7</td>
<td>112.73</td>
<td>4</td>
</tr>
</tbody>
</table>

Source: Author

Table 3: Results of toxicity prediction for the selected prototypes.

<table>
<thead>
<tr>
<th>Compound</th>
<th>Rat Acute Toxicity LD50, mg/kg</th>
<th>Fish Toxicity pLC50, mg/L</th>
<th>Tetrahymena Pyriformis Toxicity pIGC50, ug/L</th>
<th>AMES Toxicity</th>
<th>Carcinogens</th>
</tr>
</thead>
<tbody>
<tr>
<td>1i</td>
<td>529.14</td>
<td>0.7881</td>
<td>1.4756</td>
<td>Non AMES toxic</td>
<td>Non-carcinogens</td>
</tr>
<tr>
<td>2g</td>
<td>800.40</td>
<td>0.9462</td>
<td>0.8867</td>
<td>Non AMES toxic</td>
<td>Non-carcinogens</td>
</tr>
<tr>
<td>2j</td>
<td>843.98</td>
<td>0.9254</td>
<td>0.9021</td>
<td>Non AMES toxic</td>
<td>Non-carcinogens</td>
</tr>
<tr>
<td>3d</td>
<td>611.98</td>
<td>0.9897</td>
<td>1.0663</td>
<td>Non AMES toxic</td>
<td>Non-carcinogens</td>
</tr>
<tr>
<td>3h</td>
<td>555.09</td>
<td>2.1895</td>
<td>0.4607</td>
<td>Non AMES toxic</td>
<td>Non-carcinogens</td>
</tr>
<tr>
<td>4a</td>
<td>975.35</td>
<td>1.3660</td>
<td>0.5324</td>
<td>Non AMES toxic</td>
<td>Non-carcinogens</td>
</tr>
<tr>
<td>4i</td>
<td>1079.17</td>
<td>1.4308</td>
<td>0.5852</td>
<td>Non AMES toxic</td>
<td>Non-carcinogens</td>
</tr>
<tr>
<td>4j</td>
<td>1096.11</td>
<td>1.4392</td>
<td>0.5863</td>
<td>Non AMES toxic</td>
<td>Non-carcinogens</td>
</tr>
<tr>
<td>5i</td>
<td>1107.54</td>
<td>1.1490</td>
<td>0.5910</td>
<td>Non AMES toxic</td>
<td>Non-carcinogens</td>
</tr>
<tr>
<td>5j</td>
<td>760.65</td>
<td>1.7126</td>
<td>0.2589</td>
<td>Non AMES toxic</td>
<td>Non-carcinogens</td>
</tr>
<tr>
<td>6a</td>
<td>977.08</td>
<td>0.9791</td>
<td>0.9481</td>
<td>Non AMES toxic</td>
<td>Non-carcinogens</td>
</tr>
<tr>
<td>6c</td>
<td>1000.56</td>
<td>0.8618</td>
<td>0.8056</td>
<td>Non AMES toxic</td>
<td>Non-carcinogens</td>
</tr>
<tr>
<td>Ampicillin</td>
<td>545.78</td>
<td>1.7369</td>
<td>0.2178</td>
<td>Non AMES toxic</td>
<td>Non-carcinogens</td>
</tr>
</tbody>
</table>

Source: Author
The group comprised of 12 compounds that presented the best bioavailability profiles were subjected to geometric optimization with the help of the HyperChem v.8.0.10 computational tool, in order to find the lowest energy (most stable) molecular conformation for each candidate, which will allow the study of the atomic and molecular properties of the prototypes. With this study, it was possible to establish that 10 of the molecules are below the energy value observed for the reference compound. Only prototypes 6a and 6c have values close to Ampicillin, indicating that these molecules at the conformational level are the least stable and possibly the most reactive.

Table 4: Single point energy and gradient of optimized structures of selected prototypes

<table>
<thead>
<tr>
<th>Compound</th>
<th>Energy (kcal/mol)</th>
<th>Energy Gradient (kcal/mol)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1i</td>
<td>16.659472</td>
<td>0.009584</td>
</tr>
<tr>
<td>2g</td>
<td>12.243122</td>
<td>0.009579</td>
</tr>
<tr>
<td>2j</td>
<td>12.008585</td>
<td>0.009787</td>
</tr>
<tr>
<td>3d</td>
<td>27.334485</td>
<td>0.009215</td>
</tr>
<tr>
<td>3h</td>
<td>21.33536</td>
<td>0.009500</td>
</tr>
<tr>
<td>4i</td>
<td>30.989200</td>
<td>0.009848</td>
</tr>
<tr>
<td>4i</td>
<td>31.256056</td>
<td>0.009958</td>
</tr>
<tr>
<td>4j</td>
<td>33.507793</td>
<td>0.009481</td>
</tr>
<tr>
<td>5i</td>
<td>28.509365</td>
<td>0.008822</td>
</tr>
<tr>
<td>5j</td>
<td>25.530389</td>
<td>0.009847</td>
</tr>
<tr>
<td>6a</td>
<td>88.456739</td>
<td>0.009296</td>
</tr>
<tr>
<td>6c</td>
<td>89.821765</td>
<td>0.009569</td>
</tr>
<tr>
<td>Ampicillin</td>
<td>88.301683</td>
<td>0.09338</td>
</tr>
</tbody>
</table>

Source: Author

With the objective of determining the viability of the interaction of the selected molecules with the catalytic domain of the enzyme transpeptidase PBP3 (4bjp) of E. coli (Berman, et al., 2000), and to find the most likely ligand-receptor binding conformation, the group of compounds were subjected to computer-aided molecular coupling analysis. The study of molecular docking was performed using the computational tool Auto Dock 4.2.6, by a rigid-body approach and study was conducted at the active site identified for the enzyme PBP3 and considering eight key amino acid residues: Ser307, Lys310, Ser359, Asn361, Lys494, Thr495, Gly496 and Thr497, responsible for the binding of ß-lactams to the active site of PBPs (Sauvage, et al., 2014).

The different Docking results (Table 5), show which of the selected molecules display binding energy values similar to the reference drug Ampicillin (-6.16 kJ / mol), and which of them have a better interaction with the amino acids of the catalytic site of the enzyme. In the set of results comprising hydrogen bonds, bonding energies and docking conformations of each of the molecules with the active site, it is evident that the prototypes 1i and 4i had interactions with several amino acids in the pocket and which of the atoms of the molecule participate in those bindings. It is also shown that 5i and 5j have no apparent interaction in the study.

Table 5. Binding energies and interactions with active site residues.

<table>
<thead>
<tr>
<th>Prototype</th>
<th>Structures and Hydrogen bonds (Residue-interaction)</th>
<th>Binding energy (kJ/mol)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1i</td>
<td>SER 307:H THR 497:HN TYR 347:HH THR 495:O SER 359:H</td>
<td>-5.78</td>
</tr>
<tr>
<td>4j</td>
<td>SER 307:O THR 497:HH</td>
<td>-6.52</td>
</tr>
</tbody>
</table>
Table 5. Binding energies and interactions with active site residues.

<table>
<thead>
<tr>
<th>Prototype</th>
<th>Structures and Hydrogen bonds (Residue-interaction)</th>
<th>Binding energy (kJ/mol)</th>
<th>Prototype</th>
<th>Structures and Hydrogen bonds (Residue-interaction)</th>
<th>Binding energy (kJ/mol)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2g</td>
<td>ALA 544:HN 2g:19:O ALA 544:HN 2g:20:O SER 307:H 2g:2:N THR 497:H 2g:19:O</td>
<td>-7.64</td>
<td>5i</td>
<td>LYS 499:HN 5i:44:O</td>
<td>-5.58</td>
</tr>
<tr>
<td>3h</td>
<td>ASN 361:O 3h:34:H TYR 419:HH 3h:34:O PHE 417:O 3h:35:H</td>
<td>-5.36</td>
<td>6c</td>
<td>THR 497:H 6c:19:O</td>
<td>-7.05</td>
</tr>
</tbody>
</table>
Table 5. Binding energies and interactions with active site residues.

<table>
<thead>
<tr>
<th>Prototype</th>
<th>Structures and Hydrogen bonds (Residue-interaction)</th>
<th>Binding energy (kJ/mol)</th>
<th>Prototype</th>
<th>Structures and Hydrogen bonds (Residue-interaction)</th>
<th>Binding energy (kJ/mol)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4i</td>
<td><img src="image" alt="Chemical Structure" /></td>
<td>-6.31</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>GLY 480:HN 4i:7:O</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ALA 544:HN 4i:17:O</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>GLN 357:O 4i:40:H</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>TYR 514:HH 4i:27:O</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>THR 497:HN 4i:27:O</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Author

After the enzyme-ligand molecular coupling study, each prototype was visualized and analysed using the PyMOL computational tool (Figure 1), which determined that 10 compounds have interaction with at least one of the residues of the amino acids that are part of the active site of E. coli PBP3. Among the compounds that showed interaction with the catalytic site of the enzyme, one is a chalcone (4i), two belong to molecules with pyrazoline nuclei (2g, 2j), two to aminopyrimidine derivatives (3d, 3h), three to thiazolidone compounds (4a, 4i, 4j) and two to derivatives with β-lactam nuclei (6a, 6c). The last two prototypes are still under consideration to pass to the synthesis stage.

Figure 1: Molecular Docking Display of 4i with the active site of the PBP3 receptor (4BJP) of E. coli.

Source: Author

**Chemistry**

In general, the synthesis of the selected compounds was carried out in the preparation of α, β-unsaturated carbonyl compounds as precursors (chalcons), using the Claisen-Schmidt type cyclocondensation reaction between aromatic aldehydes and the corresponding substituted acetophenones, according to the procedure reported in the literature (Durst & Gokel, 1985). Dihydropyrazole derivatives were obtained from the reaction of chalcones with one equivalent of hydrazine or hydrazine derivatives, by cyclocondensation reactions monitored by TLC. The aminopyrimidine series synthesis was performed by the reaction of chalcones with guanidine to obtain thereby the substituted aminopyrimidine derivatives, which in turn were reacted with aromatic and heteroaromatic aldehydes to obtain the acyclic azomethines. Such as the pyrazolines synthesized,
aminopyrimidine series exhibited high fluorescence properties in solution, making them interesting because of their potential application in molecular materials science.

**Figure 2: General scheme of synthesis of the selected hybrid compounds.**

In general, thiazolidine-4-ones were obtained from the aminopyrimidines synthesized above, using three-component cyclocondensation reactions with 2-mercaptoacetic acid and benzaldehyde, in anhydrous toluene or benzene as solvents and using conditions of reflux with Dean-Stark trap. Finally, assays were carried out for the formation of β-lactam rings, which were conducted using the cycloaddition reaction of 2-chloroacetyl chloride with a cyclic imine, in our particular case pyrazolines. This reaction is known as a Staudinger cycloaddition; however, although many the reaction conditions were used, the desired product could not be obtained, and the pyrazole compound was obtained instead, leading to the conclusion that there is a possible competition between the oxidation reaction (aromatization) and the cycloadition (formation β-lactam ring). That is to say that the thermodynamic driving force of the aromatic and more stable pyrazole formation ends up overcoming the formation of the fused β-lactam ring.

All the obtained compounds were fully characterized and confirmed by IR spectroscopy, 1H-NMR, 13C-NMR and two-dimensional techniques.

**Table 6: Experimental data of the synthesized compounds**

<table>
<thead>
<tr>
<th>Compound</th>
<th>Ar</th>
<th>Ar1</th>
<th>Yield %</th>
<th>Tf. (°C)</th>
<th>t. Rx (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1i</td>
<td>-pMe</td>
<td>-mOH, -pOEt</td>
<td>92</td>
<td>96-98</td>
<td>180</td>
</tr>
<tr>
<td>2g</td>
<td>C6H5-H</td>
<td>C6H5-mOH, -pOEt</td>
<td>62</td>
<td>196-197</td>
<td>180</td>
</tr>
<tr>
<td>2j</td>
<td>C6H5-pMe</td>
<td>C6H5-mOH, -pOEt</td>
<td>58</td>
<td>93-95</td>
<td>240</td>
</tr>
<tr>
<td>3d</td>
<td>-H</td>
<td>-oCl</td>
<td>85</td>
<td>62-63</td>
<td>8</td>
</tr>
<tr>
<td>3h</td>
<td>-H</td>
<td>-pMe</td>
<td>72</td>
<td>98-99</td>
<td>12</td>
</tr>
<tr>
<td>4a</td>
<td>-pMe</td>
<td>-pOMe</td>
<td>18</td>
<td>80-82</td>
<td>8</td>
</tr>
<tr>
<td>4i</td>
<td>-pOH</td>
<td>-pOH, -pOEt</td>
<td>23</td>
<td>110-113</td>
<td>25</td>
</tr>
<tr>
<td>4j</td>
<td>-pMe</td>
<td>-pOEt</td>
<td>22</td>
<td>102-104</td>
<td>15</td>
</tr>
</tbody>
</table>

Source: Author
Conclusions

Following a methodology based on the rational design of in silico drugs, it was possible to propose and study a series of prototypes that have in their structure thiazolidone, aminopyrimidine, pyrazoline and β-lactam rings. Out of 60 molecules proposed, it was possible to determine that ten exhibited interactions directly with some of the key amino acids that make up the active site of E. coli’s PBP3 enzyme (4BJP). The ten selected prototypes were considered for synthesis phase, from which eight were obtained and are considered promising hits to be evaluated in subsequent in vitro tests to corroborate the acceptable profile of bioavailability and potential antibacterial activities observed in the computational studies. The series of aminopyrimidine and pyrazoline derivatives presented a characteristic luminescence that could be used for other purposes, such as bioindicators and chemosensors, as well as in molecular materials science.

Acknowledgements

To the National University of Colombia for the funding and support to carry out this work.

References


Amábile-Cuevas, C. (2003). In many ways, the fight against antibiotic resistance is already lost; preventing bacterial disease requires thoughtful new approaches. American Scientist , 91, 138-149.


PREVALENCE AND BIOFILM FORMING ABILITY OF LISTERIA MONOCYTOGENES ISOLATED FROM MEAT

Anna Zadernowska,1 Wioleta Chajęcka-Wierzchowska,2 Arkadiusz Zakrzewski3

Abstract: *Listeria monocytogenes* is a Gram-positive intracellular bacterium, which causes foodborne listeriosis. This organism can be introduced through many routes to food-processing environments and may become established on food-processing equipment. Examination of 130 meat samples was conducted and the *Listeria monocytogenes* prevalence was determined by using an ISO culture method and PCR method. The isolated strains’ ability to form a biofilm was determined with the microplate (MP) method. Out of 130 meat samples examined, 22 (17%) contained *L. monocytogenes*. The majority (n=13; 59%) of the strains were characterized by a no biofilm producer. Four of the of *Listeria monocytogenes* strains (18,2%) showed strong and five of them (22,7%) moderate ability to form biofilm.

**UDC Classification:** 614; **DOI:** http://dx.doi.org/10.12955/cbup.v5.1078

**Keywords:** *Listeria monocytogenes*, meat, biofilm

Introduction

*Listeria monocytogenes* is a Gram-positive, psychotrophic foodborne pathogen. The aim of this study was to investigate the incidence of *Listeria monocytogenes* in raw meat. Moreover, the aim of the study was to determine the isolated strains’ ability to form biofilm.

Literature review

*Listeria monocytogenes* is able to grow at different temperature (including refrigeration temperature) ranging from 2 to 52 °C, and in food having low pH value (4,4) or high salt concentration (14%). The minimum water activity (a_w) for the growth of *L. monocytogenes* in food is 0.92. The bacteria grow better (short generation and lag time) at the alkaline pH and high a_w. *Listeria monocytogenes* grows well in the presence or absence of oxygen. High concentrations of carbon dioxide are necessary to inhibit growth. At least 13 different serotypes of *L. monocytogenes* are known. Most cases are caused by serotypes 1/2a, 1/2b and 4b. The majority of reported foodborne outbreaks have been caused by serotype 4b (Ryser and Marth, 2007; Kramarenko et al., 2013). The minimum infective dose of *L. monocytogenes* is unknown, but is believed to vary in accordance with the immunity of the infected individual and the strain type (Bailey et al., 1989). Listeriosis arises from food contamination with *Listeria monocytogenes* causing encephalitis, septicaemia and miscarriage. The first epidemiologically confirmed foodborne outbreak of listeriosis occurred in 1981 in Canada and was linked to the consumption of Coleslaw salad. Other outbreaks of human listeriosis have been associated with milk, soft cheese, pate, jellied pork, tongue, rillettes and other foods of animal or vegetable origin (Capita et al. 2001). Some *L. monocytogenes* strains attack to environmental surfaces and form biofilms, perhaps by using peritrichous flagella encoded by flaA gene. Microorganisms growing in biofilms are protected against cleaning and disinfection and are difficult to eradicate. *L. monocytogenes* can attach and grow on abiotic surfaces including all types of foods processing surface such as glass, stainless steel, polypropylene, and rubber after contact times as short as 20 minutes. The biofilm formation renders the organisms more resistant to harsh environmental conditions, such as food processing, antibiotics, and detergents (Fux et al. 2005; Mafu et al., 1990).

Materials and Methods

Isolation of *Listeria* strains

A total of 130 samples were obtained from several local markets in Olsztyn, north-west Poland. Samples consisted of poultry meat: duck, chicken, turkey (n=40), beef meat (n=45), and pork meat (n=45). All the samples were kept at 4°C during transport and during storage before analysis. The analysis was done within 4 hours of purchase.

1 Industrial and Food Microbiology Department, University of Warmia and Mazury in Olsztyn, anna.zadernowska@uwm.edu.pl
2 Industrial and Food Microbiology Department, University of Warmia and Mazury in Olsztyn, wioleta.chajecka@uwm.edu.pl
3 Industrial and Food Microbiology Department, University of Warmia and Mazury in Olsztyn, arkadiusz.zakrzewski@@uwm.edu.pl
Culture method of *Listeria monocytogenes* isolation was based on the International Standard ISO 11290-1:1996. For primary enrichment, 25 g of each of the collected food samples was transferred to 225 ml of Half-Fraser broth (Merck, Poland), homogenized using a stomacher, next incubated overnight at 37°C. After 24 h incubation of the primary enrichment broth, 1 ml of the culture obtained was transferred to 10 ml of secondary enrichment broth, the Fraser broth (Merck, Poland). Inoculated Fraser broth was incubated for 48 h at 37°C. After incubation, a portion of the culture was taken with a loop for inoculating of the surface of Oxford and Ottawiani and Agosti agars (Merck, Poland). After incubation for 48 h at 37°C the plates were examined for the presence of colonies presumed to be *Listeria* spp. Colonies suspected to be *Listeria* spp. were selected for further confirmatory tests indicated in ISO 11290-1:1996. Finally, the colonies identified as *L. monocytogenes* were confirmed by PCR. Prior to analysis, isolates were stored in a Microbank at -80°C (Biocorp, Poland).

**PCR identification of *Listeria monocytogenes***

Identification using a Multiplex PCR was performed with primers and conditions described previously (Szymczak et al., 2011), specific for the *Listeria sp.* and *Listeria monocytogenes* based on the amplification of fragments of 16S rRNA gene sequence (938 bp) and *iap* (287 bp) (Table 1). In all PCR reactions used, amplified products were analyzed by electrophoresis through a 1.5% high resolution agarose gel (Promega) in 1 x TBE buffer pH 8.3. The sizes of the amplification products were estimated by comparison with a 100-bp molecular size ladder (Thermo Scientific, Fermentas). Gels were stained with ethidium bromide (Sigma-Aldrich) and visualized using the system for the documentation of fluorescently stained gels G-BOX F3 (Syngene) and analyzed using the program Gene Tools (Syngene). Each profile was visually compared with those obtained from the reference strains: *Listeria monocytogenes* NCIMB 13726.

**Table 1: Primers used for the amplification of the *Listeria* spp. and *Listeria monocytogenes***

<table>
<thead>
<tr>
<th>Primer</th>
<th>Sequence (5'-3')</th>
<th>Destination/target gene</th>
<th>Product size</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>U1</td>
<td>CAG CMG CCG CGG TAA TWC</td>
<td><em>Listeria</em> spp</td>
<td>938 bp</td>
<td>Szymczak et al. 2011</td>
</tr>
<tr>
<td>L1</td>
<td>CTC CAT AAA GGT GAC CCT</td>
<td><em>L. monocytogenes</em></td>
<td>287 bp</td>
<td></td>
</tr>
<tr>
<td>Iap1</td>
<td>CGA ATC TAA CGG CTG GCA CA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iap2</td>
<td>GCC CAA ATA GTG TCA CCG CT</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Source: Authors*

**Detection of biofilm formation by the microplate (MP) method**

The method for assessment of biofilm formation by the MP method was based on the techniques proposed previously by Stepanovic et al. (2004) with some modifications described previously (Chajecka-Wierzchowska, Zadernowska & Łaniewska-Trokenheim, 2016). Wells of a sterile 96-well flat-bottomed sterile polystyrene microtiter plates were filled with 200μl of fresh sterile broth BHI (Merck, Poland). An overnight cultures (20μl) of each strain with a cell density of 1x10⁹ cells/ml were added in triplicate, onto the 96-well plates. Negative control wells contained broth only. The plates were covered and incubated aerobically at 36°C for 24 hours. The bacterial suspension was aspirated and each well was washed three times with 250 μL of PBS buffer (Sigma). After that, the biofilm was fixed with 200 μL of ethanol (99%) for 15 minutes, and later removed. The plates were dried at room temperature, stained with 200 μL of crystal violet solution used for Gram staining (Merck, Germany) for 5 minutes, washed in running water until the unbound crystal violet was removed and dried at room temperature. The dye bound to the adherent cells was re-solubilized with 160 μL of 33% (v/v) glacial acetic acid (Sigma) per well. Absorbance was read using an Infinite M1000 PRO plate reader (Tecan) at 570 nm. The optical density (ODs) of each strain was obtained by the arithmetic mean of the absorbance of three wells and this value was compared with the cut-off OD (ODc) which was defined as three standard deviations above the mean OD of the negative control. The following classification was used for the determination of biofilm formation: no biofilm production (ODc≤ODc), weak biofilm production (ODc<ODc≤2xODc), moderate biofilm production (2xODc<ODc≤4xODc) and strong biofilm production (4xODc<ODc).
Results and discussion

A total of 130 meat samples, including poultry, beef and pork meat were analysed for *Listeria monocytogenes*. Results are summarized in Table 2. The prevalence of *L. monocytogenes* in raw meats marketed in Olsztyn (Poland) was 17%. The percent occurrence of *Listeria monocytogenes* in the tested meat in descending order was poultry (20%), beef (9.8%) and pork (4.5%). Capita et al. (2001) isolated *Listeria monocytogenes* from 15% of poultry carcasses. A study conducted by Vitas (2004) in Navarra (Spain) revealed the presence of *Listeria monocytogenes* in 34.9% in minced pork and beef and 36.1% in poultry meat. No documented outbreaks of listeriosis have yet been directly attributed to the consumption of poultry meat. Nevertheless, the high prevalence of *L. monocytogenes* in poultry meat presents a potential risk, which may lead to outbreaks of listeriosis (Capita et al. 2001).

<table>
<thead>
<tr>
<th>Samples tested</th>
<th>Number of samples</th>
<th>Number (%) of strains</th>
<th>Biofilm formation category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poultry meat</td>
<td>40</td>
<td>8 (20)</td>
<td>S 2 M 2 NBP 4</td>
</tr>
<tr>
<td>Beef meat</td>
<td>45</td>
<td>4 (9.8)</td>
<td>0 2 2</td>
</tr>
<tr>
<td>Pork meat</td>
<td>45</td>
<td>10 (4.5)</td>
<td>2 1 7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>130</strong></td>
<td><strong>22 (17)</strong></td>
<td><strong>4 5 13</strong></td>
</tr>
</tbody>
</table>

The pathogens’ ability to form biofilms has a twofold meaning. From a medical point of view, the ability to form it is a feature which proves the strain’s virulence. Components of a biofilm matrix protect bacteria against an immune attack and against penetration of chemotherapeutics. However, in terms of their industrial significance, strains which can form biofilms of manufacturing surfaces can pose a big problem; they are more difficult to remove from those surfaces, they can be less sensitive to disinfectants and they often cause secondary (cross) infections in the food industry (Shi & Zhu X 2009, Zadernowska, Chajęcka-Wierzchowska & Laniewska-Trokenheim 2017). Strains of *L. monocytogenes* are recurrently found on surfaces in the food industry, notably in refrigerated premises, even though these are routinely cleaned and disinfected (Carpentier et al. 2004). The majority of the *Listeria monocytogenes* strains were characterized by a no biofilm producer (n=13), or moderate ability to form a biofilm (n=5), only four of the investigate strains showed a strong ability to produce biofilm (Table 2). In a study conducted by Barbosa et al. (2013) revealed that most food isolates were classified as weak or moderate biofilm formers, although the majority were weak. In a study conducted by Kalmkoff et al. (2001), significant differences were found in the ability of various *L. monocytogenes* strains to attach to a test surface. In monoculture, the majority of strains did not form biofilms which coincides with our results.

Conclusions

Our results and data presented by other authors demonstrate the ubiquitous occurrence of *L. monocytogenes* in raw chicken, beef and pork meat. Since *L. monocytogenes* may be present in meat the consumption of raw or undercooked meat can be an important factor in the transmission and epidemiology of *Listeria monocytogenes* infection. It is also necessary to raise consumer awareness regarding secondary infections, which can occur during the transport of meat from a shop or during its processing. Regular monitoring of *Listeria monocytogenes* prevalence in food are necessary for disease surveillance and tracing the epidemic outbreaks.

References


STAPHYLOCOCCUS AUREUS FROM READY-TO-EAT FOOD AS A SOURCE OF MULTIPLE ANTIBIOTIC RESISTANCE GENES

Wioleta Chajęcka-Wierzchowska,1 Anna Zadernowska,2 Łucja Łaniewska-Trokenheim3

Abstract: The emergence of antibiotic-resistant strains of S. aureus such as methicillin-resistant S. aureus (MRSA) is a worldwide problem. Ready-to-eat (RTE) food which does not need thermal processing before consumption could be a vehicle for the spread of antibiotic-resistant microorganisms. The present study evaluated the molecular genetic characteristics (RAPD) and pheno- and genotypical antimicrobial resistance profile of S. aureus isolated from 75 RTE food samples (sushi, hamburgers, salads). All of the isolates (n=32) were resistant to at least one class of antibiotic tested of which 75% strains were classified as multidrug resistant. Most of the isolates were resistant to cefoxitin (87.5%) followed by clindamycin (78,1%), tigecycline and quinupristin/dalfopristin (53,1%). All methicillin resistant staphylococci harbored mecA gene. Among tetracycline resistance isolates all of them harbored at least one gene: tet(M), tet(L) and/or tet(K) and 78,9% of them were positive for the Tn916/Tn1545-like integrase family gene. Our results indicated that retail RTE food could be considered an important route for transmission of antibiotic resistant staphylococci harboring multiple antibiotic resistance genes.

UDC Classification: 614. DOI: http://dx.doi.org/10.12955/cbup.v5.1079

Keywords: antibiotic resistance, Staphylococcus aureus, antibiotic resistance genes, MRSA

Introduction

Staphylococcus aureus is one of the leading etiologic agents of hospital infections (Le Loir et al., 2003). It is known to cause a number of pathological conditions in humans and animals like bacteremia, urinary system infections, systemic diseases, osteomyelitis (Lina et al., 1999; Hageman et al., 2006). Toxins produced by S. aureus are one of the most frequent causes of bacterial food poisonings (Hennekinne et al., 2012). Foodstuff contamination may result from poor hygiene during production processes or the retail and storage of food. The pathogenic nature of S. aureus is related to the high genotypic and phenotypic heterogeneity of its strains. This results mainly from the abilities of staphylococci to exchange genetic material through mobile genetic elements.

Growing antibiotic resistance in S. aureus strains is a worldwide problem. The most worrying are strains resistant to methicillin (Methicillin-resistant Staphylococcus aureus - MRSA). The presence of antibiotic resistant strains among food derived microorganisms suggests that it may play a much more important role in transferring the antibiotic resistance encoding genes than previously thought (Chajęcka-Wierzchowska et al., 2016). Antibiotics are used for prophylactic purposes in swine, cattle, rabbit and poultry production as well as in vegetable and fruit cultivation and beekeeping (Ding and He, 2010) and, thus, the meat of farm animals, fruit, vegetables and water may be a source of resistant strains. Food and feed safety is essential, and the presence of MRSA in the food chain may contribute to the increasing dissemination of MRSA worldwide (Oniciuc et al., 2017). The multi-drug resistant S. aureus strains may have an increased ability to spread. This does not only provide therapeutic challenges for clinicians but may be very detrimental to human health. The study was designed to determine the occurrence of S. aureus and MRSA strains in ready-to-eat food products as sushi, salads, and hamburgers in Poland. Moreover, the presence of genes which encode resistance to methicillin and tetracycline’s was investigated.

Materials and methods

2.1. Isolation and biochemical identification of the strains

Staphylococci were isolated from samples obtained from sushi, hamburgers and salads purchases in fast-food bars and restaurants. Totally, 75 ready-to-eat samples were collected. These consisted of 25 sushi samples, 25 hamburgers and 25 salads. Samples were immediately transported to the laboratory under refrigerated conditions. All microbiological analyses were performed within the same day. Food samples (10 g) were homogenized in 90 ml buffered peptone water (Merck, Germany), incubated overnight at 37°C and streaked on selective plates containing Mannitol Salt Phenol-red Agar (Merck,

1 Chair of Industrial and Food Microbiology, University of Warmia and Mazury in Olsztyn, wioleta.chajeceka@uwm.edu.pl
2 Chair of Industrial and Food Microbiology, University of Warmia and Mazury in Olsztyn, anna.zadernowska@uwm.edu.pl
3 Chair of Industrial and Food Microbiology, University of Warmia and Mazury in Olsztyn, lucja.laniewska- trokenheim@uwm.edu.pl

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Germany). Mannitol (+) colonies were differentiated into coagulase-positive and coagulase-negative with a test detecting the production of a clumping factor (CF) and production of coagulase on the RPF medium (Biomerieux) with rabbit blood plasma and fibrinogen. Isolates were Gram-stained using standard techniques. Gram positive, coagulase positive bacteria were presumptively identified as staphylococci and were selected for further biochemical identification. Prior to analysis, isolates were stored in Microbank at -80°C (Biocorp, Poland).

2.2. Bacterial strains and DNA extraction

For DNA extraction bacterial strains were cultivated on Brain Heart Infusion Broth with agar (BHI, Merck, Germany) at 37°C. Colony were suspended in TE buffer and lysed by Lизostaphin enzyme (0.6mg/ml). Total Genomic DNA of isolated and reference strains was extracted using the Genomic Mini DNA Purification Kit (A&A Biotechnology) according to the manufacturer’s instructions.

2.3. Molecular identification of isolates to the genus level

RAPD-PCR reactions were performed with primer M13 according to protocol published by Andrighetto et al., (1996). For the identification of isolates to the genus level, part of the 16S rRNA Staphylococcus gene was amplified according to Morot-Bizot et al. (2004). Amplification was carried out in a Kyratec Super Cycler Trinity Triple Zone (Nippon Genetics Europe) PCR reaction mixture were analyzed by electrophoresis through a 2% high resolution agarose gel (Promega) in 1 x TBE buffer pH 8.3. The sizes of the amplification products were estimated by comparison with a 100-bp molecular size ladder (Thermo Scientific, Fermentas). Gels were stained with ethidium bromide. Images of the gels were visualized using the system for the documentation and analysis of fluorescently stained gels G-BOX F3 (Syngene) and analyzed using the program Gene Tools (Syngene). Each profile was visually compared with those obtained from the S. aureus ATCC® 25923 reference strain.

2.4. Antimicrobial susceptibility test

Antimicrobial susceptibility testing was performed on Mueller-Hinton agar (Biomérieux) using the disk diffusion method. Isolates were tested for their susceptibility to erythromycin (E, 15μg), clindamycin (DA, 2μg), gentamicin (CN, 120μg), cefoxitin (FOX, 30 μg), norfloxacin (NOR, 10μg), ciprofloxacin (CIP, 2.5μg), tetracycline (TE, 30μg), rifampicin (RD, 5μg), nitrofurantoin (F, 300μg), linezolid (LZD, 30μg), chloramphenicol (C, 30μg), trimethoprim (W, 5μg), and tigecycline (TGC, 1μg), trimethoprim/sulfamethoxazole (SXT, 25μg), quinupristin/dalfopristin (QDA,15μg) using antimicrobial disks (Oxoid). Plates were incubated at 37 °C for 20–24 h and results were interpreted according to the Clinical and Laboratory Standard Institute document M100-S20.

2.5. PCR detection of antimicrobial resistance genes

All the strains phenotypically resistant to at least one antibiotic were examined for the presence of the resistance genes. Polymerase chain reaction for detection of genes mecA (533 bp) were carried out (Table 1). Amplification cycles for this two genes were done according to Barski et al. (1996). The

<table>
<thead>
<tr>
<th>Primer</th>
<th>Primer sequence (5’→ 3’)</th>
<th>Amplicon size (bp)</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staphylococcus spp.</td>
<td>TIACCAATTTCTGACCTCTTCTGTGTA</td>
<td>370</td>
<td>Morot-Bizot, 2005</td>
</tr>
<tr>
<td>S. aureus</td>
<td>CGTAAATGAGATTTCCAGTGAAGATAATACACAA</td>
<td>107</td>
<td>Barski, 1996</td>
</tr>
<tr>
<td>mecA</td>
<td>AAAATCCTGATGGAAAGAGCTGCCG</td>
<td>533</td>
<td>Rizzotti, 2005</td>
</tr>
<tr>
<td>tet(L)</td>
<td>TGGTTGGAATGATGACCCCAT</td>
<td>229</td>
<td>Gevers, 2003</td>
</tr>
<tr>
<td>tet(M)</td>
<td>GTGGCAAAAGGTCACACACAC</td>
<td>406</td>
<td>Macovei and Zurek, 2006</td>
</tr>
<tr>
<td>tet(K)</td>
<td>TTATGTCCTGATGCTAGAAA</td>
<td>348</td>
<td>Barski, 1996</td>
</tr>
<tr>
<td>int (1α/1β)</td>
<td>GCCGTATTGTATCATCAT</td>
<td>1046</td>
<td>Source: Authors</td>
</tr>
</tbody>
</table>
tetracycline efflux gene tet(K) amplification was performed according to Gevers et al. (2003). PCR detection of resistance to tetracyclines - tet(M), tet(L) was determined using the specific primers and the conditions reported by Rizzotti et al. (2005). For all the tet(M)-positive isolates the presence of conjugative transposons of the Tn916-Tn1545 family was determined by using primers targeting the integrase gene int according to Macovei and Zurek (2006).

The amplicons were evaluated by 1.5% agarose gel electrophoresis followed by staining with ethidium bromide (0.5mg/mL). Images of the gels were visualized using the system for the documentation and analysis of fluorescently stained gels G-BOX F3 (Syngene) and analyzed using the program Gene Tools (Syngene).

Results and discussion

The present study evaluated the molecular genetic characteristics (RAPD) and pheno- and genotypical antimicrobial resistance profile of 32 S. aureus strains isolated from 75 RTE food samples (sushi, hamburgers, salads) (Figure 1).

All staphylococcal isolates were examined for their susceptibility to 15 antibiotics. The data obtained from the disc diffusion testing are summarized in Table 2. The overall percentages of antimicrobial resistant isolates were: 87.5% to cefoxitin, 78.1% to clindamycin, 53.1% to tigecycline and quinupristin/dalfopristin, 46.9% to tetracycline, 31.2% to rifampicin and gentamycin; 12.5% to trimetoprim/sulfametoxasol and nitrofurantoin; 9.4% to erythromycin and trimethoprim and 6.3% to ciprofloxacin and linezolid. All of the investigated strains (n=32) were resistant to at least one class of antibiotic of which 24 strains were classified as multidrug resistant – MDR (resistant to three or more classes of antibiotics). Most MDR strains (n=11) revealed simultaneous resistance to 4 classes of antibiotics, followed by 5 strains to 6 classes; 4 strains to 5 classes; 3 strains to 3 classes. One of the examined strains revealed simultaneous resistance to antibiotics of 7 various classes (Table 2). All MDR strains (n=24;100%) were resistant to cefoxitin (FOX) and the majority of them (n=20; 83.3%) were resistant to clindamycin (DA), 16 MDR strains (66.7%) were resistant to quinupristin/dalfopristin, 14 of them (58.3%) to tigecycline and 13 MRD strains (54.1%) were resistant to tetracycline (Table 2).
Most of the studies on antibiotic resistance contrast to results published by other authors (Hammad et al., 2012; Lee et al., 2004) and reported on S. aureus (Chajęcka et al., 2008). A study of 200 samples of RTE food (including cheeses, cured meats, sausages, smoked meats, and raw fish) in our previous research (Hammad et al., 2012) examined 858 samples of RTE food (including cheeses, cured meats, sausages, smoked meats, and raw fish) in our previous research, tested for the presence of MRSA and MR-CoNS. In the study of 200 samples of RTE food (including cheeses, cured meats, sausages, smoked meats, and raw fish), 6% of isolated strains were positive for mecA (35 MRSA and 17 MR-CoNS strains) (Chajęcka-Wierczowska et al., 2014). Unlike in other studies, all MRSA strains carry mecA gene, in contrast to results published by other authors (Hammad et al., 2012; Lee et al., 2004).

Most of the studies on antibiotic resistance in S. aureus have concentrated on strains isolated from clinical samples. Recently, some researchers have suggested that environment and food could play a significant role in the transmission of resistance to humans (Wang et al., 2012; Chajęcka-

<table>
<thead>
<tr>
<th>Strain number</th>
<th>Source</th>
<th>Antibiotic resistance genes</th>
<th>Integrate</th>
<th>Antibiotic resistance phenotype</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>S. aureus sushi</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>S. aureus sushi</td>
<td>mec(A) tet(L)</td>
<td>tetr(M)</td>
<td>int FOX, TE, E</td>
</tr>
<tr>
<td>3</td>
<td>S. aureus sushi</td>
<td>mec(A) tet(L)</td>
<td>tetr(M)</td>
<td>int FOX, TGC, TE</td>
</tr>
<tr>
<td>4</td>
<td>S. aureus sushi</td>
<td>mec(A)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>S. aureus sushi</td>
<td>mec(A) tet(L)</td>
<td>tetr(M)</td>
<td>-</td>
</tr>
<tr>
<td>6</td>
<td>S. aureus sushi</td>
<td>mec(A)</td>
<td>tetr(M)</td>
<td>int DA, FOX, TE, CN, QD</td>
</tr>
<tr>
<td>7</td>
<td>S. aureus sushi</td>
<td>mec(A)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>8</td>
<td>S. aureus sushi</td>
<td>mec(A)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>9</td>
<td>S. aureus sushi</td>
<td>mec(A) tet(L)</td>
<td>tetr(M)</td>
<td>int DA, FOX, TGC, TE, RD, CN, QD</td>
</tr>
<tr>
<td>10</td>
<td>S. aureus sushi</td>
<td>mec(A) tet(L)</td>
<td>tetr(M)</td>
<td>-</td>
</tr>
<tr>
<td>11</td>
<td>S. aureus sushi</td>
<td>mec(A) tetr(K)</td>
<td>-</td>
<td>int DA, FOX, TGC, TE, RD, CN, QD</td>
</tr>
<tr>
<td>12</td>
<td>S. aureus sushi</td>
<td>mec(A) tetr(K)</td>
<td>-</td>
<td>int DA, FOX, TGC, TE, RD, CN, QD</td>
</tr>
<tr>
<td>13</td>
<td>S. aureus sushi</td>
<td>mec(A)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>14</td>
<td>S. aureus sushi</td>
<td>mec(A) tetr(K)</td>
<td>-</td>
<td>int DA, FOX, TGC, TE, RD, CN, QD</td>
</tr>
<tr>
<td>15</td>
<td>S. aureus sushi</td>
<td>mec(A) tetr(K)</td>
<td>-</td>
<td>int DA, FOX, TGC, TE, RD, CN, QD</td>
</tr>
<tr>
<td>16</td>
<td>S. aureus sushi</td>
<td>mec(A) tetr(K)</td>
<td>-</td>
<td>int DA, FOX, TGC, TE, RD, CN, QD</td>
</tr>
<tr>
<td>17</td>
<td>S. aureus sushi</td>
<td>mec(A) tetr(K)</td>
<td>-</td>
<td>int DA, FOX, TGC, TE, RD, CN, QD</td>
</tr>
<tr>
<td>18</td>
<td>S. aureus sushi</td>
<td>mec(A) tetr(K)</td>
<td>-</td>
<td>int DA, FOX, TGC, TE, RD, CN, QD</td>
</tr>
<tr>
<td>19</td>
<td>S. aureus sushi</td>
<td>mec(A) tetr(K)</td>
<td>-</td>
<td>int DA, FOX, TGC, TE, RD, CN, QD</td>
</tr>
<tr>
<td>20</td>
<td>S. aureus salad</td>
<td>mec(A) tet(L)</td>
<td>tetr(M)</td>
<td>-</td>
</tr>
<tr>
<td>21</td>
<td>S. aureus salad</td>
<td>mec(A) tet(L)</td>
<td>tetr(M)</td>
<td>-</td>
</tr>
<tr>
<td>22</td>
<td>S. aureus salad</td>
<td>mec(A) tetr(M)</td>
<td>-</td>
<td>int DA, FOX, TGC, TE, QD</td>
</tr>
<tr>
<td>23</td>
<td>S. aureus salad</td>
<td>mec(A) tetr(M)</td>
<td>-</td>
<td>int DA, FOX, TGC, TE, QD</td>
</tr>
<tr>
<td>24</td>
<td>S. aureus salad</td>
<td>mec(A)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>25</td>
<td>S. aureus salad</td>
<td>mec(A)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>26</td>
<td>S. aureus salad</td>
<td>mec(A)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>27</td>
<td>S. aureus salad</td>
<td>mec(A) tetr(L)</td>
<td>tetr(M)</td>
<td>-</td>
</tr>
<tr>
<td>28</td>
<td>S. aureus hamburger</td>
<td>mec(A)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>29</td>
<td>S. aureus hamburger</td>
<td>mec(A)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>30</td>
<td>S. aureus hamburger</td>
<td>mec(A)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>31</td>
<td>S. aureus hamburger</td>
<td>mec(A)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>32</td>
<td>S. aureus hamburger</td>
<td>mec(A) tetr(L)</td>
<td>tetr(M)</td>
<td>-</td>
</tr>
</tbody>
</table>

Abbreviations: E - erythromycin, DA - clindamycin, CN - gentamicin, FOX - cefoxitin, TE - tetracycline, TGC - tigecycline, RD - rifampicin, F - nitrofurantoin, LZD - linezolid, W - trimethoprim, QD - quinupristin/dalfopristin, SXT - trimethoprim/sulfamethoxasol

Source: Authors

Genotyping analysis indicated that all of the isolates phenotypic resistant to tetracycline harbored at least one tetracycline resistance determinant on which tet(M) was most frequent. The tet(L) genes did also appear but were less common. Gene tet(K) was always associated with tet(M) and tet(L). All of the isolates positive for tet(M) genes were positive for the Tn916/Tn1545-like integrase family gene. All of the cefoxitin resistant strains harbored mecA gene. Most MRSA strains were resistant to at least three of the antibiotics tested, and 25 of 28 MRSA strains were classified as MDR.

In other recently reported studies, lower isolation frequencies for MRSA in foods were found. In an Italian survey of 160 S. aureus strains analyzed six strains (3.75%) harbored the mecA gene. In Japan, Hammad et al. (2012) examined 200 samples of retail ready-to-eat raw fish (sashimi) of which they recovered 10 MRSA/MR-CoNS isolated from 10 different samples (5%, 10/200). In our previous study we have examined 858 samples of RTE food (including cheeses, cured meats, sausages, smoked fishes) on which 6% of isolated strains were positive for mecA (35 MRSA and 17 MR-CoNS strains) (Chajęcka-Wierczowska et al., 2014). Like as in these studies all MRSA strains carry mecA gene, in contrast to results published by other authors (Hammad et al., 2012; Lee et al., 2004).
Wierczowska et al., 2014, 2015). Furthermore, Gram-positive bacteria acquire and transfer resistance to antibiotics much more often and more easily than Gram-negative bacteria. The results obtained indicate the need for food monitoring for the presence of antibiotic-resistant \textit{S. aureus} and the possibility of transferring and transmitting antibiotic resistance genes. \textit{S. aureus} strains present in ready-to-eat food can pose a hazard for consumer health serving as a reservoir of resistance genes.

**Conclusions**

Our data indicate that \textit{S. aureus} is widely present in retail sushi, but also hamburgers and salads. Many isolated strains are antibiotic resistant and carry transferable genes which represent a potential source of resistance transmission to bacteria in humans. The most disturbing fact is that most \textit{S. aureus} strains were resistant to methicillin and had \textit{mecA} gene. Our results indicated that retail RTE food could be considered as important route for transmission of antibiotic resistant staphylococci harboring multiple antibiotic resistance genes.

**References**


NLP MODULE FOR BULGARIAN TEXT PROCESSING
Stoyan Cherecharov,1 Hristo Krushkov,2 Mariana Krushkova3

Abstract: The wide use of web-based information systems and a lack of highly skilled developers are the primary motivation to search for methods and approaches to optimize the building of such systems. This paper describes a model for creating web-based information systems by using a core of reusable, independent, and installable base modules. Such a system is easily adapted to a client’s needs and is extendable by adding specific modules that interact with the remainder of the system by following certain rules. The approach allows flexible and rapid development of applications for small to extremely large web-based systems, simply by adding modules with adequate functionality. The growing demand of Bulgarian customers for such systems is the reason for building a base module for automatic processing of Bulgarian text. This paper presents a module that performs automatic morphological analysis and synthesis, verifies syntactic agreement, automatically places stress, and processes complex verb forms, among other functions. The described functionality can be integrated with other modules using a suitable interface.

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Keywords: natural language processing, computational linguistics, software modules, web-based systems

Introduction
In recent years, there has been an increased interest for wide use of web-based systems (Prokofyeva & Boltunova, 2017; Yang et al., 2016). The high customer requirements and the lack of highly skilled and experienced developers are primary motivations for seeking methods and approaches to optimize the building of such systems. Using similar functionality allows a system to be built with reusable, independent, and installable modules. The systems can be built rapidly without compromising their quality. For this purpose, developers use the principles of the Aspect-Oriented and Modular programming. The installation can be performed using the standard package depended upon by managers of technology.

For example, one can use the log mechanism to track exceptions. An analysis of different web-based systems reveals the exceptions are managed by code snippets. This aspect of the functionality is spread across the application with different parts involved in more than one role and elements strongly coupled. That is, the various components have more than one primary role, and hence, the functionality does not conform to principles of strong cohesion, loose coupling, and single responsibility. One way to remedy this nonconformity is to extract and encapsulate each functionality into a separate module with a single role. This approach would mean the modules having a single assignment would be independent of the system for recording exceptions (a log system).

Another example is the authorization system that controls access to system resources by different roles or users. Such functionality can be encapsulated in a separate module where the system resources are independent of the controlled access. The method of a dynamic and parallel slicing algorithm that is context-sensitive for distributed Aspect-Oriented Programming (AOP; Singh et al., 2017) can be used. However, there are certain code pitfalls in AOP and analyses that need to be avoided (Santos et al., 2016). Certain technology with agnostic programming techniques for modular programming (Toulson & Wilmshurst, 2017) can be used during the separation of the functionality into modules.

There have been increased problems with the use of the Bulgarian language, from the students in recent years. Errors are evident in the speeches of the politicians and journalists in the mass media. Some universities overcome this problem by organizing Bulgarian language courses during the first year of the education. The abilities of the Information Technology (IT) in this type of education are still not used extensively. According to Blagoeva et al. (2011), the support for Bulgarian language text analysis is fragmentary, while for English it is sound, and for Dutch, French, German, Italian, and Spanish moderate. The state of speech and text resources is the same for cited European languages, although languages with moderate support include Czech, Hungarian, Polish, and Swedish.

There are also some fragmentary publications related to the automatic processing of the Bulgarian language. Different problems emerge with different approaches. The formal models comprise two main types: rule-based and statistical. Rule-based models are traditional and are a result of research by

1 Plovdiv University Paisii Hilendarski, Faculty of Mathematics and Informatics, cherecharov@iahockey.com
2 Plovdiv University Paisii Hilendarski, Faculty of Mathematics and Informatics, hdk@uni-plovdiv.bg
3 Plovdiv University Paisii Hilendarski, Faculty of Mathematics and Informatics, mik@uni-plovdiv.bg
linguists. The creation of tagged text corpora allows for statistical methods to apply over large amounts of data. The development of IT enables statistical models to improve and extend the rule-based models with new rules derived empirically. Rule-based Part Of Speech (POS) tagging as a part of a machine translation system is presented in Jackov (2015).

Regression models are used for fine-grained sentiment analysis in Bulgarian movie reviews (Kapukaranov & Nakov, 2015). Statistical methods provide sound practical achievements, while rule-based ones give students appropriate linguistic knowledge, and are thus, better for educational purpose.

Applying the methods of Active Learning, in which the student is the center of the educational process, is an important step in the direction of increasing its quality. The gamification is one form of such education.

Different techniques from the game industry, such as earning points, badges and medals, levels, a list of the leaders, avatars, and virtual currency are used, to increase the motivation of the students. A scientific report, dedicated to this topic, reveals that these techniques are used mostly in the informatics and IT education (Dicheva et al., 2015). Educational computer games that support utilization of Bulgarian morphology are described in Krushkov et al. (2015).

The conclusion of the research indicates the positive effect the gamification has on the students, by increasing their motivation, activity, commitment, and success. The usage of only traditional methods in the education of the high school and university students is monotonous and demotivating, especially for the ‘Z-generation’ (Internet generation). This generation (born after 1994) accepts the virtual world as the normal environment and cannot imagine their education without information technology (IT). The number of the students, graduates, and prospective students is decreasing. In such an environment, the courses of teachers and schools that are attractive to students are those using innovative educational methods based on IT. Hence, the main aim of this study is to create a natural language processing (NLP) module for Bulgarian text processing that is an integral part of every web-based system.

**Data and Methodology**

Analyses showed that the base modules necessary for rapid web-system development are: authentication module, log module, authorization module using access control list, navigation module using the authorization, session module, and a content management module.

The system we have built was open to extensions. Different modules with specific functionality can be added following certain rules. This approach allows flexible, rapid application and development of small to extremely large web-based systems, by only adding modules with adequate functionality. It allows programming with event and control loops, which further augments the usage of the modular programming (Ricci, 2016).

The modules can be distributed and separated in the web space. The communication between these is based on RESTful Web application programming interface (API) over Hypertext Transfer Protocol (HTTP) or the secure hypertext version (HTTPS). The modules can be built using different programming languages and technologies.

To expand the scope of the systems, built with the modules, we started to add highly abstract modules with general purpose using different mathematical and linguistic formalisms. Such a module that helps to solve numerous problems is the Workflow Engine Module based on Petri Nets theory. It augments the rest of the modules and creates another abstraction layer. Different types of concurrent processes can be modeled with the Petri Nets Theory and implemented without writing programming code.

Another module is based on the formal model of the Bulgarian language grammar. It allows Natural Language Processing. It gives extra abilities for searching and proofreading of Bulgarian text in the web-based applications. It is extremely useful for building educational systems.

The Bulgarian language belongs to the group of inflected languages. The NLP module is based on the formal model described in (Krushkov, 1997). In this model, the Bulgarian words are divided into disjoint classes of equivalence. Every class has a unique machine number for identification and a list of rules for generation of the paradigm. A part of speech is a set of classes. Every set can be divided into subsets depending on criteria pertaining to this particular part of speech.

For example, the set of nouns includes the classes with machine numbers 1–75. There are four subsets depending on the gender as follows: with machine numbers 1-40: masculine, 41-53: feminine, 54-73:
neuter, 74–75: only plural. Two words are in the same class if their paradigms are generated in the same way. The paradigm is described as a list of word forms with specific grammatical features for each of them. Every word-form also has a number. Two-word forms with equal numbers have the same grammatical features. For example, in the paradigm of the adjectives, word-form num. 1 has grammatical features (masculine, singular); word-form num. 2 has grammatical features (plural); etc. For all parts of speech word-form num. 1 is the base (citation) form. The model is appropriate for all inflected languages. It is extended for proper nouns (Krushkov, 2001).

A morphological processor is a tool performing automatic morphological analysis and synthesis. An approach for automatic morphological generation and analysis is investigated, based on the presented classification. For every word, a pattern is built up. The pattern and the inflectional type number determine the paradigm of that word. The pattern shows which letters are constant in all word forms in the paradigm of the word and which are changing. The changing letters are marked with ‘*’ in the pattern. For example, the pattern of the word ‘в*ен’ (faithful) is ‘*ен’. All other words from the same inflectional type (84) ‘*ен’ (narrow), ‘*ен’ (mad), ‘*ен’ (right), with the following patterns: ‘*ен’, ‘*ен’, ‘*ен’, have two changing letters (last two vowels) in the pattern. The rules for the word-form generation are of two types:

1) Replacing the ‘*’ with a letter (including the empty one, ‘’); and
2) Appending the endings.

The paradigm of the word ‘*ен’ according to the rules for type 84 is shown in Table 1.

<table>
<thead>
<tr>
<th>Number/word form</th>
<th>Grammatical features</th>
<th>Rules for type 84</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. в*ен</td>
<td>masc., sing.</td>
<td>*/'ен'</td>
</tr>
<tr>
<td>2. верни</td>
<td>pl. / extended form</td>
<td>*/'ен'</td>
</tr>
<tr>
<td>3. в*рн</td>
<td>fem., sing.</td>
<td>*/'ен'</td>
</tr>
<tr>
<td>4. в*рно</td>
<td>neut., sing.</td>
<td>*/'ен'</td>
</tr>
<tr>
<td>5. верния</td>
<td>masc., sing., full def.art.</td>
<td>*/'ен'</td>
</tr>
<tr>
<td>6. верн*ят</td>
<td>masc., sing., short def.art.</td>
<td>*/'ен'</td>
</tr>
<tr>
<td>7. верни*те</td>
<td>pl., def.art.</td>
<td>*/'ен'</td>
</tr>
<tr>
<td>8. в*рната</td>
<td>fem., def.art.</td>
<td>*/'ен'</td>
</tr>
<tr>
<td>9. в*рното</td>
<td>neut., def.art.</td>
<td>*/'ен'</td>
</tr>
</tbody>
</table>

masc. = masculine; fem. = feminine; neut. = neuter; sing. = singular; def. art. = definite article

Source: Authors

For other adjective types (types numbered from 76 to 89) a column with respective rules is prepared. The rules for a member of some inflectional type are the same for all other members of this type.

The purpose of the automatic morphological analysis is to perform automatically morphological classification of an arbitrary word-form. This includes identifying the base form of the word, its grammatical features and to which inflectional type (part of speech) it belongs. A machine dictionary consists of (word-pattern, inflectional type number) entries. When an arbitrary word-form has to be classified, the analyzer looks up a matching word-pattern in the dictionary. If such a pattern has been found, using the second part of the entry pair (inflectional type number) the rules are extracted from the generation table. Based on these rules a paradigm from this pattern is generated. If the analyzed word coincides with a word-form from the generated paradigm, it obtains the grammatical features of that word-form. In such way, the word is morphologically completely determined. For every word, an inflectional type number (t) and a word-form number (g) can be extracted.

For checking the agreement between two words, the following sequence was obtained: t1, g1, t2, g2, where t1 and t2 were the inflectional type numbers of the words; g1, g2 were the word-form numbers of the words. For example, the analysis of ‘в*рната жена’ (the faithful woman) produces the sequence 84, 8, 41, 1, which means that:

- The former word is an adjective (t1=84), feminine, singular, definite article (g1=8);
- The latter word is a noun, feminine (t2=41), singular (g2=1).
The agreement of words is right if there exists a row in the table of agreement $tb_{fw}$, $te_{fw}$, $g_{fw}$, $b_{sw}$, $te_{sw}$, $g_{sw}$, where $tb_{fw} \leq t_1 \leq te_{fw}$ and $g_1 = g_{fw}$ and $tb_{sw} \leq t_2 \leq te_{sw}$ and $g_2 = g_{sw}$ gives true.

In our example, the 5-th row of Table 2 agrees with the sequence 84, 8, 41, and 1:

$$76 \leq 84 \leq 89 \text{ and } 8 = 8 \text{ and } 41 \leq 41 \leq 53 \text{ and } 1 = 1$$

If such a row does not exist hypotheses for the right agreement are building up:

1. if $tb_{sw} \leq t_1 \leq te_{sw}$ and $g_1 = g_{sw}$ and $tb_{sw} \leq t_2 \leq te_{sw}$ and $g_2 \neq g_{sw}$, then $g_2$ is wrong. It has to obtain the value of $g_{sw}$; and
2. if $tb_{sw} \leq t_1 \leq te_{sw}$ and $g_1 \neq g_{sw}$ and $tb_{sw} \leq t_2 \leq te_{sw}$ and $g_2 = g_{sw}$, then $g_1$ is wrong. It has to obtain the value of $g_{sw}$.

For example, the analysis of 'врён вената' (present Google translation of 'faithful woman') produces the sequence 84, 1, 41, and 1, which means that the former word is an adjective ($t_1=84$), masculine, singular ($g_1=1$), and the latter is a noun, feminine ($t_2 = 41$), singular ($g_2 = 1$). These two words are not in agreement.

There is no row in the table of agreement giving true for the sequence 84, 1, 41, and 1. However, there are two rows which can produce hypotheses:

- the 4-th row ($76 \leq 84 \leq 89 \text{ and } 1 \neq 3 \text{ and } 41 \leq 41 \leq 53 \text{ and } 1=1$) gives the sequence of right agreement $84 \ 3 \ 41 \ 1$ (варна жена – ‘faithful woman’)
- the 5-th row $76 \leq 84 \leq 89 \text{ and } 1 \neq 8 \text{ and } 41 \leq 41 \leq 53 \text{ and } 1=1$ gives the sequence of right agreement $84 \ 8 \ 41 \ 1$ (варната жена – ‘the faithful woman’)

<table>
<thead>
<tr>
<th>First word</th>
<th>Second word</th>
<th>$tb_{fw}$</th>
<th>$tb_{sw}$</th>
<th>$te_{fw}$</th>
<th>$te_{sw}$</th>
<th>$g_{fw}$</th>
<th>$g_{sw}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>masc., sing.</td>
<td>masc., sing.</td>
<td>76</td>
<td>89</td>
<td>1</td>
<td>1</td>
<td>40</td>
<td>1</td>
</tr>
<tr>
<td>masc., sing. short def. art.</td>
<td>masc., sing.</td>
<td>76</td>
<td>89</td>
<td>5</td>
<td>1</td>
<td>40</td>
<td>1</td>
</tr>
<tr>
<td>masc., sing. full def. art.</td>
<td>masc., sing.</td>
<td>76</td>
<td>89</td>
<td>6</td>
<td>1</td>
<td>40</td>
<td>1</td>
</tr>
<tr>
<td>fem., sing.</td>
<td>fem., sing.</td>
<td>76</td>
<td>89</td>
<td>3</td>
<td>41</td>
<td>53</td>
<td>1</td>
</tr>
<tr>
<td>fem., sing. def. art.</td>
<td>fem., sing.</td>
<td>76</td>
<td>89</td>
<td>8</td>
<td>41</td>
<td>53</td>
<td>1</td>
</tr>
<tr>
<td>neut., sing.</td>
<td>neut., sing.</td>
<td>76</td>
<td>89</td>
<td>4</td>
<td>54</td>
<td>73</td>
<td>1</td>
</tr>
<tr>
<td>neut., sing. def. art.</td>
<td>neut., sing.</td>
<td>76</td>
<td>89</td>
<td>9</td>
<td>54</td>
<td>73</td>
<td>1</td>
</tr>
<tr>
<td>plural</td>
<td>plural</td>
<td>76</td>
<td>89</td>
<td>2</td>
<td>1</td>
<td>75</td>
<td>4</td>
</tr>
<tr>
<td>plural def. art.</td>
<td>plural</td>
<td>76</td>
<td>89</td>
<td>7</td>
<td>1</td>
<td>75</td>
<td>4</td>
</tr>
</tbody>
</table>

masc. = masculine; fem. = feminine; neut. = neuter; sing. = singular; def. art. = definite article.

Source: Authors

The practical research leads to the conclusion that, it is better to build another table. This is a table of the syntactic disagreement. In the table, there are some variants of incorrect agreement of adjacent words. This is due to the inability for each two adjacent words to determine if the agreement is correct or incorrect without syntactic analysis. The second table is built for the adjacent words, which certainly cannot reach an agreement (e.g., preposition and verb).

A phonetic classification is performed to determine the stress position of all words of the paradigm. To every dictionary word, a vector is attached. The length of the vector coincides with the length of the paradigm. The element $v[i]$ of the vector shows the relative position (in vowels) of the stress of the $i$-th word of the paradigm according to the stress position of the base form. That is why the first element of every vector is 0: $v[1] = 0$. If the stress remains constant for all the words in the paradigm, the vector consists of zeros $c = (0, 0, 0, ..., 0)$. For example, the vector assigned to the word 'врён вената' (the enemy – full def. art.), 'врён вени' (the enemies).

A formal model of complex verb forms, as well as an algorithm for automatic analysis and synthesis of these forms, is also investigated.

**Conclusion**

The NLP module performs automatic morphological analysis and synthesis, verification of syntactic agreement, automatically placing the stress, automatic processing of complex verb forms. These
functionalities allow searching in Bulgarian texts for all word forms of a given word. It is possible to search for words, which belong to a specific part of the speech or have specific grammatical features, as well as to replace the word forms of a given word with the word forms of another word if they belong to the same part of the speech. If the replacement words are nouns, where it is appropriate in the adjacent words, the gender of the adjectives is changed. The main dictionary comprises 82 thousand base forms, which can produce over than 1 500 thousand word forms. Dictionary lookup allows one to retrieve words with specific grammatical and morpho-syntactic features. It is possible to extract words from the same morphological class, with the same type of stress mobility and more. The module can work together with the Content Management Module, Authorization Module and the Workflow Engine Module creating and managing complex workflow processes for proofreading, text analyzes, editing and more. Creating an article in the Content Management system could trigger proofreading and text analyzes in the NLP module. Depending on the results of the analyzes work items can be instantiated in the Workflow Engine Module for different roles and actors. The work items represent tasks to be completed by the roles and actors in the workflow process. The Petri Nets theory is used to create a model of the process. So, the NLP module adds a unique functionality to the system. The module will be used for building a web-based system for teaching the Bulgarian language. The main functionalities will help teachers to construct computer-aided e-lessons according to their wishes selecting appropriate lexical and grammatical material. Much of the options of the system could be done automatically: extracting sentences and vocabulary of selected text material, analyzing the number of the new words, generating tests and exercises similar to those described for English (Malinova & Rahneva, 2016).

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References


EFFECT OF CHILLING STRESS ON THE PHOTOSYNTHETIC PERFORMANCE OF YOUNG PLANTS FROM TWO MAIZE (ZA MAYS) HYBRIDS

Rositsa Cholakova-Bimbalova,1 Andon Vassilev2

Abstract: In the climate conditions of Bulgaria, early stages of maize plants development often go under suboptimal temperatures. Chilling stress is known to cause different physiological disturbances in young maize plants during the transition period from heterotrophic to autotrophic nutrition. However, the effect of chilling may differ among maize hybrids. Photosynthetic performance could be a good indicator for the hybrid tolerance to chilling. The aim of our study was to evaluate the tolerance of young maize plants from two hybrids – the new Bulgarian hybrid - Kneza 307 and the hybrid P9528 using as criteria the changes in their photosynthetic performance.

Plants at the third leaf stage were exposed for seven days to chilling stress. At the end of the experimental period, growth, leaf lipid peroxidation, and several photosynthetic parameters were measured. We found that chilling stress reduced the fresh mass accumulation, increased lipid peroxidation, diminished net photosynthetic rate and chlorophyll content, and enhanced non-photochemical quenching of chlorophyll fluorescence. Although the responses of both hybrids were similar, some specificity were observed and discussed.

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Keywords: Zea mays, chilling, photosynthesis, pigments, chlorophyll fluorescence

Introduction

Maize (Zea mays) is a tropical crop which has a relatively high temperature optimum for growth and development: 30–35 ºC (Miedema, 1982). Temperatures below 12-15ºC may damage the young plants, causing chilling stress (Hola et al., 2007; Leipner, 2009). Maize plants are the most sensitive to chilling during the transitional phase from heterotrophic to autotrophic nutrition (Stamp, 1984), which usually lasts several weeks after sowing. In the climate conditions of Bulgaria, maize plants during their early stages of development are often subjected to suboptimal temperatures. Chilling provokes different physiological disorders in maize plants. It disturbs the balance between formation and quenching of the reactive oxygen species (Foyer et al., 2002), damages membrane integrity (Aroca et al., 2003) and modulates enzyme activities (Farooq et al., 2008; Takac, 2004). These negative effects are further multiplied on the scale of cardinal physiological processes, such as mineral nutrition, water relations, photosynthesis, dark respiration, etc. and lead to plant growth inhibition (Leipner, 2009; Zaidi et al., 2010).

Photosynthesis is one of the processes most susceptible to low-temperature inhibition in maize (Zea mays) (Nie et al., 1992). Chilling stress negatively affects both formation and functional activity of the photosynthetic apparatus of the plants (Leipner, 2009; Sowinski et al., 2005). It has been shown that it decreases stomata conductance (Aroca et al., 2001; Melkonian et al., 2004), disturbs chloroplast development (Moseki, 2004; Nie et al., 1995), diminishes photosynthetic pigment content (Haldimann, 1998, 1999) and lowers PSII photochemistry and CO2 assimilation (Al-Shoaiib, 2008; Bilska and Sowinski, 2010). It also retards photosynthetic carbon export from the leaves (Bilska and Sowinski, 2010).

The performance of maize plants during both chilling stress and recovery strongly depends on hybrid tolerance (Bano et al., 2015; Sowinski et al., 2005). Many reports demonstrated significant differences in chilling tolerance among maize hybrids (Aroca et al., 2001, 2003; Haldimann 1998, 1999; Hola et al., 2007). Photosynthetic performance during the chilling period and after recovery could be a good indicator for the hybrid tolerance to chilling. In fact, many authors studied maize hybrids’ tolerance to chilling temperature using photosynthetic parameters as criteria (Haldimann, 1998; Kosova et al., 2005; Sowinski et al., 2005).

The tolerance of Bulgarian maize hybrids to chilling stress is not well characterized. Therefore, we decided to perform a study aiming to evaluate the tolerance of young maize plants from two hybrids, using as criteria the changes in their photosynthetic performance.

1Agricultural University of Plovdiv, Plovdiv, Bulgaria, rositsa.cho@abv.bg
2Agricultural University of Plovdiv, Plovdiv, Bulgaria, vassilev@au-plovdiv.bg
Material and methods

The experiments were carried out in a climatic room of the Department of Plant Physiology and Biochemistry at the Agricultural University of Plovdiv, Bulgaria. Maize plants from two hybrids: Kneza 307 (Kn.307) and P9528, were grown as a hydroponic culture on ½ strength modified Hoagland nutrient solution at controlled environment: photoperiod – 12 hours, PPFD (photosynthetic photon flux density) 200 μmol m⁻² s⁻¹, temperature – 25±1°C/ 20±1°C (day/night) and relative air humidity – 60±5%. The solution was aerated 15 minutes per hour.

At the appearance of the 3rd leaf of maize plants, the following experimental design was arranged. Plants from both hybrids were cultivated for the next seven days at different temperature regimes, namely: no chilling regime 25±1°C/20±1°C (day/night) and chilling regime 10±1°C – constantly. Each treatment consisted of 3 replications (pots) with four plants per pot. The experiment was performed twice.

Both growth and photosynthetic performance of the maize plants were analyzed at the end of the experiments. Leaf gas exchange (A – net photosynthetic rate, E – transpiration rate, gₛ – stomatal conductance as well as cᵢ – internal CO₂ concentration) was measured by an open photosynthetic system LCpro⁺ (ADC, England) on the upper fully developed leaf, at PPFD of 450 μmol m⁻² s⁻¹, after one hour adaptation.

Chlorophyll fluorescence measurements were performed with a pulse modulation fluorometer (MINI-PAM, Heinz Walz, Germany) in the same leaves after dark and light adaptation. The measurements were done on both top-leaf zone and middle-low part zone of the leaf lamina in no chilled and chilled plants. The maize plants were kept in the dark for 30 min before the start of the measurement. By switching on the measuring beam (0.02 – 0.20 μmol m⁻² s⁻¹), the minimal level of fluorescence (F₀) was recorded. Immediately after that, a saturating light pulse of 5500 μmol m⁻² s⁻¹ with 0.8 s duration was sent out to record the maximal level of fluorescence in the dark-adapted state (Fm), from which the maximal quantum yield of PSII (Fv/Fm) was calculated (with Fv = Fm – F₀). After 30 min light adaptation at 450 μmol m⁻² s⁻¹ the steady-state level of photosynthesis was achieved, and a saturating pulse with the same characteristics was applied. Fluorescence yields before triggering the saturation pulse (F); maximal (Fm') fluorescence, reached during the saturation pulse; as well as an apparent electron transport rate ETR as (Genty et al., 1989).

1) \[ ETR = Y \times PAR \times 0.5 \times 0.84 \], where \( Y = (Fm' - F)/Fm' \).

Both photochemical quenching qP and non-photochemical quenching qN, can be calculated according to Schreiber (2004).

2) \[ qP = (Fm' - F)/(Fm' - F₀) \],

3) \[ qN = (Fm - Fm')/(Fm - F₀) \],

Photosynthetic pigments (chlorophyll a, chlorophyll b and total carotenoids) were extracted in 80% acetone, measured spectrophotometrically and calculated according to the formulae of Lichtenthaler (1987).

For the measurement of lipid peroxidation in leaves, the thiobarbituric acid (TBA) test, which determines malonyldialdehyde (MDA) as an end product of lipid peroxidation (Heath and Parker, 1968), was used. The amount of MDA–TBA complex (red pigment) was calculated from the extinction coefficient 155 mM⁻¹ cm⁻¹. Plant fresh weight was determined at the end of the experiments.

Statistical analysis was performed using one-way ANOVA (for P<0.05). Based on ANOVA results, a Duncan test for mean comparison was conducted, for a 95% confidence level, to test for significant differences among treatments. In the figure and the tables, different letters (a, b, c and d) express significant differences at the P < 0.05.

Results and discussion

The applied seven-day-long chilling significantly retarded the plant growth of both maize hybrids (Figure 1). The fresh weight of the chilled plants from Kn.307 and P9528 were lower as compared with the plants grown at the 25/20°C regime by 67% and 68%, respectively. In addition to the inhibited growth, the chilled plants were distinguished by some leaf yellowing, in particular between
the middle and the lower part of the lamina of the 3rd leaf. These symptoms were more expressed in the leaves of the hybrids Kn.307.

The data concerning MDA content, which is a marker for oxidative degradation of membrane lipids, is also presented in Figure 1. The results show that the MDA content significantly increased in the chilled plants - 39% in hybrid Kn.307 and 24% in hybrid P9528. The higher lipid degradation in the leaves of these plants provides evidence they suffered from chilling-provoked oxidative stress. The upper leaf MDA content in the chilled plants from the hybrid Kn.307, the more expressed damage symptoms as well as, the more strongly depressed growth as compared with that of P9528, show this hybrid is more susceptible to such conditions.

Figure 1: Influence of chilling on plant fresh weight (FW; g plant⁻¹) and malondialdehyde content (MDA; nmol g⁻¹FW) in the leaves of young maize hybrids Kn.307 and P9528.

![Diagram showing FW and MDA content](image)

Different letters above the columns (a, b and c) mean significant differences at P<0.05.

Source: Authors

The data presented in Table 1 shows the effect of chilling on leaf gas exchange of maize plants. The net photosynthetic rate (A) of both maize hybrids, grown at no chilling regime, was similar, while a larger difference was observed between the respective values of the chilled plants. The chilling-induced decrease of A was 67% in Kn.307 and much less - 44% in P9528. Our results well correspond well with Al-Shoaibi’s (2008) observation for strongly retarded carboxylation efficiency of chilling-exposed maize plants.

The chilling significantly diminished transpiration rate (E), which is more strongly affected in plants of Kn.307 (67%) than in those of P9528 (39%). The changes in stomata conductance (gₛ) of the chilled plants showed a similar trend. It was more retarded in Kn.307 than in P9528, by 80% and 50%, respectively.

Our results confirm the negative impact of low temperatures on leaf gas exchange (Al-Shoaibi, 2008; Aroca et al., 2001) as well as the existence of different sensitivity among maize hybrids to chilling, observed in many studies (Aroca et al., 2001; Biłska and Sowinski, 2010). The significant decrease of both E and gₛ in the chilled plants was a result of a developed leaf water deficit. Based on our previous results, we may propose that this effect was at least partly due to a chilling-induced decrease of the root mass formation (Cholakova and Vassilev, 2015).

Usually, the lower stomata conductance leads to decrease of CO₂ intake in leaves and subsequently to stomata limitation of CO₂ assimilation. In our experimental conditions, the internal leaf CO₂ concentration (cᵢ) of the chilled plants from both hybrids increased, which indicates that mesophyll limitations prevail over stomatal ones. The yellowing of the middle to lower part of the leaf lamina of the chilled plants motivated performing analyses on photosynthetic pigments content and photochemical efficiency.

The influence of chilling on photosynthetic pigments content is presented in Table 2. The data shows a significant decrease in chlorophyll (a+b) content in the chilled plants, being lower than in the no
chilled controls by 46% in the plants from Kn.307 and by 21% in those from P9528. The chilling stress affected to a smaller degree the total carotenoids content. It was diminished by 24% in the plants from Kn.307 and slightly (by 4%) and insignificantly in those from P9528.

The detected changes in both chlorophyll and carotenoids content resulted in a change in their ratio. The Car / Chl (a+b) ratio increased by 38% and 22% in Kn.307 and P952, respectively. The chlorotic symptoms and enhanced leaf lipid peroxidation in maize plants are consequences of chlorophyll photooxidative damage as was shown by Leipner et al. (2009). In addition to lower chlorophyll content, the increased Car / Chl (a+b) ratio could be related to the essential function of carotenoids in protecting the photosynthetic apparatus against photo-oxidative damage. Haldiman (1998) considered increased ratio carotenoids/chlorophyll in chilling-exposed maize plants as their adaptation strategy allowing them both to reduce light absorption as well as to increase the capacity for photoprotection.

The data obtained from the performed chlorophyll fluorescence analysis is presented in Table 3. The values of all parameters achieved in the top leaf zone of both no chilled and chilled plants were almost similar (data were not shown), while significant differences were detected in the respective values measured in middle-low part zones. The maximal quantum yield of PSII (Fv/Fm) of no chilled plants was the norm characteristic for healthy plants - 0.75-0.83 (Bolhar-Nordenkampf and Oquist, 1993), while the value of this parameter was significantly diminished in the chilled plants – by 15% in Kn.307 and 8% in P9528.

The reduction is due to both an increase of minimal fluorescence (F0) and decreases in the maximal one (Fm). While an increase of F0 usually points to photodamage, a reduction of Fm reflects heat dissipation as a mechanism for photoprotection (Schreiber, 2004). The lower Fv/Fm in the chlorotic leaf

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Table 1: Influence of chilling on leaf gas exchange of young maize plants from hybrids Kn.307 and P9528. A – net photosynthetic rate (µmol CO2 m⁻² s⁻¹); E – transpiration rate (mmol H2O m⁻² s⁻¹), gs – stomatal conductance (mol m⁻² s⁻¹) and ci – internal CO2 concentration (vpm).

<table>
<thead>
<tr>
<th>Hybrids</th>
<th>Temperature regime, °C</th>
<th>Leaf gas exchange parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Kn.307</td>
<td>25/20</td>
<td>16.69±0.11a</td>
</tr>
<tr>
<td></td>
<td>10/10</td>
<td>5.43±0.01c</td>
</tr>
<tr>
<td>P9528</td>
<td>25/20</td>
<td>18.09±0.10a</td>
</tr>
<tr>
<td></td>
<td>10/10</td>
<td>10.07±0.15b</td>
</tr>
</tbody>
</table>

Data presented are means ± SD. Different letters (a, b, c and d) following the mean values within a column indicate significant differences at P<0.05.

Source: Authors

Table 2: Influence of chilling on photosynthetic pigments content (mg g FW⁻¹) and ratio in leaves of young maize plants from hybrids Kn.307 and P9528.

<table>
<thead>
<tr>
<th>Hybrids</th>
<th>Temperature regime, °C</th>
<th>Photosynthetic pigments content and ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Chl a</td>
</tr>
<tr>
<td>Kn.307</td>
<td>25/20</td>
<td>3.12±0.29a</td>
</tr>
<tr>
<td></td>
<td>10/10</td>
<td>1.76±0.04c</td>
</tr>
<tr>
<td>P9528</td>
<td>25/20</td>
<td>2.35±0.19b</td>
</tr>
<tr>
<td></td>
<td>10/10</td>
<td>1.94±0.10c</td>
</tr>
</tbody>
</table>

Data presented are means ± SD. Different letters (a, b, c and d) following the mean values within a column indicate significant differences at P<0.05.

Source: Authors

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zones of chilled plants is a marker of photoinhibition (Bilska and Sowinski, 2010; Kosova et al., 2005). Another reason for this effect could be impaired chloroplast development as suggested by Nie et al. (1995). Considering the absence of significant changes in the Fv/Fm value in the top “healthy” leaf zones, we assume that the major limiting factor could be disturbed chloroplast development in the chlorotic ones. Nie et al. (1995) showed that several chloroplast polypeptides, including the very important for PSII functioning – D1, are poorly expressed in Zea mays leaves grown at chilling temperatures.

The apparent electron transport rate (ETR) is a calculated parameter representing linear electron transport rate of the overall in vivo photosynthetic process. In the chilled maize plants, it was retarded by 44% and 26% in Kn.307 and P9528, respectively. Using the so-called “quenching analysis” it is possible to distinguish the use of absorbed light for photochemical conversion and non-photochemical loss of excitation energy (Schreiber, 2004). Photochemical quenching (qP) indicates the proportion of open PSII reactive centers, while non-photochemical quenching (qN) – heat dissipation. The results presented in Table 3 show that the applied chilling treatment decreased very slightly (by 5-6%), but significantly, the qP values and sharply increased the qN values – by 97% in Kn.307 and 72% in P9528. The obtained fluorescence data demonstrate that the photochemical efficiency of the chilled maize plants was lowered. A small part of the reaction centers in PSII was closed. Due to the decrease in CO2 assimilation, the absorbed excitation energy overloaded the electron-transport processes. Therefore, the “excess” light was sufficiently de-excited by heat dissipation. Similarly to the other observed changes in the photosynthetic parameters, the chilling effect on chlorophyll fluorescence was higher in plants from in Kn.307 than in P9528.

<table>
<thead>
<tr>
<th>Hybrids</th>
<th>Temperature regime, °C</th>
<th>F0</th>
<th>Fm</th>
<th>Fv/Fm</th>
<th>ETR</th>
<th>qP</th>
<th>qN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kn.307</td>
<td>25/20</td>
<td>209±10b</td>
<td>932±15b</td>
<td>0.78±0.03a</td>
<td>42.2±3.2a</td>
<td>0.477±0.11a</td>
<td>0.293±0.15c</td>
</tr>
<tr>
<td></td>
<td>10/10</td>
<td>253±6a</td>
<td>736±21c</td>
<td>0.66±0.02c</td>
<td>23.8±5.1b</td>
<td>0.446±0.06b</td>
<td>0.577±0.10a</td>
</tr>
<tr>
<td>P9528</td>
<td>25/20</td>
<td>238±8b</td>
<td>1091±32a</td>
<td>0.78±0.03a</td>
<td>38.1±3.0a</td>
<td>0.420±0.20a</td>
<td>0.241±0.08d</td>
</tr>
<tr>
<td></td>
<td>25/20</td>
<td>251±2a</td>
<td>902±24b</td>
<td>0.72±0.01b</td>
<td>28.3±4.2b</td>
<td>0.397±0.14c</td>
<td>0.415±0.12b</td>
</tr>
</tbody>
</table>

Data presented are means ± SD. Different letters (a, b, c and d) following the mean values within a column indicate significant differences at P<0.05.

Source: Authors

**Conclusion**

The young maize plants from the hybrids Kn.307 and P9528 suffered from chilling stress when exposed for seven days at 10 °C. They responded to this treatment by different physiological alterations, including growth retardation, increased membrane lipids peroxidation, diminished leaf gas exchange, decreased photosynthetic pigments and lowered efficiency of PSII photochemistry. These alterations were more pronounced in the chilling-exposed plants of the hybrid Kn.307 than in those of P9528. Based on the obtained results we consider the hybrid P9528 as more tolerant to chilling at the early stage of plant development. Further studies will be performed to evaluate its tolerance in field conditions as well as to describe the physiological bases for this important trait.
References
THERMODYNAMIC PROPERTIES OF HYDROGEN PLASMA

Maratbek Gabdullin¹, Tlekkabul Ramazanov², Tomiris Ismagambetova³, Alexander Tikhonov⁴

Abstract: In this paper dense hydrogen plasma, which is of considerable interest in both theoretical and practical areas such as non-ideal plasma encountered in thermonuclear reactors, is considered. The structural and thermodynamic properties of dense non-ideal hydrogen plasma were investigated. Potentials taking into account the quantum-mechanical effects of diffraction and symmetry have been used as a model of interaction. The symmetry effect was considered for the different directions of spin of electrons. Pair correlation functions have been obtained in the solution for the integral equation of the Ornstein-Zernike in hyper-netted chain approximation on the basis of the interaction potentials. Thermodynamic properties for hydrogen plasma were calculated using the interaction potentials and pair correlation functions. The quantum symmetry effect weakens the interaction between the charged particles leading to a decrease in the absolute value of the non-ideal part of the thermodynamic characteristics of the dense plasma. The symmetry effect is more pronounced for higher values of density.

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Keywords: plasma, potential, structural, thermodynamic.

Introduction

One of the main problems of modern plasma physics is obtaining thermodynamic properties of a non-ideal plasma in a wide range of parameters. In this paper, the model of interparticle interactions, which takes into account quantum-mechanical effects of diffraction and symmetry, was used to study properties of dense non-ideal hydrogen plasma (Moldabekov, 2012).

The quantum-mechanical effect of symmetry takes into account the Pauli principle, which prohibits the simultaneous presence of two identical particles with a half-integer spin (in this case, electrons) in the same state, hence reducing the probability of finding particles at a distance from each other.

Interaction potentials

In the work conducted by Moldabekov (2012), interaction potentials used in this paper that take into account quantum-mechanical effects of diffraction and symmetry were obtained:

\[ u_{ab}(r) = \frac{e_a e_b}{r} \left[ 1 - th \left( \sqrt{2} \frac{\lambda_{ab}^2}{a_0^2 + br^2} \right) e^{-dr} \right] \left(1 - e^{-r/r_{ab}}\right) - \delta_{ab} \delta_{br} k_B T \ln \left(1 - \frac{1}{2} \exp \left(-\frac{r^2}{\lambda_{ee}^2}\right)\right). \] (1)

where \( e_a, e_b \) are electrical charges of particles a and b, \( m_{ab} = m_a m_b / (m_a + m_b) \), \( \lambda_{ab} = \hbar / \sqrt{2\pi m_{ab} k_B T} \) is the thermal de-Broglie wavelength, \( r_{ab} = \left( k_B T / (4\pi e^2 \sum_j n_j Z_j^2) \right)^{1/2} \) is the Debye radius, also dimensionless parameters such as coupling parameter \( \gamma = (Ze)^2 / ak_B T \) and density parameter \( r_s = a / \ell_B \) were used, \( a = (3/(4\pi n_s))^{1/3} \) is the average distance between electrons. The first term in the formula (1) takes into account the diffraction effect, the second term - the symmetry effect.

The following formula was used to account for different electron spin directions instead of the second term in (1):

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¹ al-Farabi Kazakh National University, gabdullin@physics.kz
² al-Farabi Kazakh National University, Tlekkabul.Ramazanov@kaznu.kz
³ al-Farabi Kazakh National University, mirial@mail.ru
⁴ Nazarbayev University, atikhonov@nu.edu.kz
\[ U_{ce,0}^{S(T)}(r) = -k_BT \ln \left( 1 \pm \exp \left( -\frac{r^2}{\lambda_{ce}^2} \right) \right), \] 

where \( S=1 \) corresponds to parallel spins, \( S=0 \) to antiparallel spins.

For interactions between ions, the effective potential from work by Ramazanov (2010) was used. Polarizability of atoms was taken into account in the effective potentials from work done by Ramazanov (2005).

**Structural properties**

Pair correlation functions \( g(r) \) were calculated on the basis of the integral equation of Ornstein-Zernike from work by Goodstein (2002):

\[ h(\vec{r}) = C(\vec{r}) + n \int C(\vec{r}_1 - \vec{r}_2) h(\vec{r}_1 - \vec{r}_2) d\vec{r}_2, \] 

which in HNC approximation can be written in the following form:

\[ C_{HCA}(r) = h(r) - \ln g(r) - \frac{\Phi(r)}{k_BT}, \] 

where \( h(\vec{r}) = g(\vec{r}) - 1 \) – full correlation function, \( C(\vec{r}) \) – direct correlation function, \( \Phi \) is the interaction potential. The equations (3) and (4) were calculated by numerical schemes.

**Thermodynamic Properties**

Thermodynamic properties such as internal energy and the equation of state were calculated using interaction potentials (1-2) and were obtained on their basis pair correlation functions in approximation (4):

\[ E = \frac{3}{2} N k_BT - \pi \sum_{\alpha=i,e} n_\alpha \sum_{\beta=i,e} n_\beta \int_0^{\infty} g^{ab}(r) \Phi^{ab}(r) r^2 dr, \] 

\[ P = n k_BT - \frac{2}{3} \pi \sum_{\alpha=i,e} n_\alpha \sum_{\beta=i,e} n_\beta \int_0^{\infty} \frac{\partial \Phi^{ab}(r)}{\partial r} g^{ab}(r) r^3 dr, \]

where \( N \) is the number of particles in the system (Ramazanov, 2014).

The interaction potentials for different models are presented in figure 1. Black, red, and green lines present the results based on the potential (1) with differences in the symmetry effect, the yellow line shows the results based on the Deutsch theory, and the blue line – on the Debye theory.

Pair correlation functions for different directions of spins are presented in Figure 2. The black lines represent results based on the potentials (1), the red lines represent the results for antiparallel spins, and the green lines represent the results for parallel spins. The results, denoted by a solid line, represent data for \( r_i=1 \). The results, indicated by the dashed line, represent data for \( r_i=2 \). The effect of symmetry takes into account the Pauli principle. The effect of the symmetry effect, as a quantum-mechanical effect, is more pronounced at short distances and for denser plasma.

Figures 3-4 show internal energy and the equation of state calculated in the present work in comparison with the results of other authors. It can be seen that for small values of the coupling parameter (up to \( \Gamma=1 \)) the results of the present work are in good agreement with other results. With increasing value of the coupling parameter, the results of this work start to deviate due to the weakening of the interaction between the particles due to a change in the composition of the plasma.
Figure 1: Different potentials for $\Gamma=0.3$, $r_s=2$. Black line – potential (1), red line – potential (1) with antiparallel spins, green line – potential (1) with parallel spins, yellow line – Deutsch theory, blue line – Debye theory.

Source: Authors

Figure 2: Pair correlation functions for $\Gamma=0.3$. Black lines – potential (1), red lines – potential (1) with antiparallel spins, green lines – potential (1) with parallel spins. Solid lines – $r_s=1$, dashed lines – $r_s=2$.

Source: Authors

Figure 3: Internal energy for hydrogen plasma at $r_s=1$. Black line – Debye theory, circles – Izteleuov (2001), black triangles – Pierleoni (1996) and Magro (1996), green line – present work.

Source: Authors
**Figure 4:** Equation of state for hydrogen plasma at $r_s=1$. Solid line – Debye theory, dashed line – Ichimaru (1987), circles – Izteleuov (2001), black triangles – Pierleoni (1996) and Magro (1996), green line – present work.

**Conclusion**

Thermodynamic properties of hydrogen plasma were calculated on the basis of the interaction potential taking into account the quantum-mechanical symmetry effect. Pair correlation functions were obtained through the solution of the integral equation of the Ornstein-Zernike in hyper-netted chain approximation. The quantum symmetry effect weakens the interaction between the charged particles, which leads to a decrease in the absolute value of the non-ideal part of the thermodynamic characteristics of the dense plasma. The symmetry effect is more pronounced for higher values of density. The results of this work are in a good agreement with the results of other authors.

**References**


TOOL TO SUPPORT THE DESIGN AND IMPLEMENTATION OF INNOVATIVE SOLUTIONS
Dominika Jagoda-Sobalak\textsuperscript{1}, Iwona Łapuńska\textsuperscript{2}

Abstract: This article indicates the need to create innovation in the economy. The innovative process is closely related to creative management, including methods of creative problem solving. The presented tool to support the use of creative problem-solving methods (in particular inventive creation methods) is aimed at design and implement innovative solutions. The described tool supports the selection process of methods and enables fast application of the method. The tool was designed based on literature research and a repeated case study. A case study consisted of 3 stages: creativity research, creative sessions using the inventive methods, and development of guidelines for the construction of the tool to support the design and implementation of innovative solutions. The study included manufacturing and service companies in southern Poland. The tool (in the form of a database of inventive methods) has been positively verified. The conducted verification was held according to the adopted scheme in the repeated case study. However, the methods used to generate innovation have been selected by using the application process of the tool supporting selection of inventive methods.

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Keywords: inventive creation, creative problem solving, design and implementation of innovation

Introduction

Reality is a world of turbulent changes. These changes continuously bring chances and threats to enterprises. The industry intensively evolves, and incessantly develops innovative technologies, and hence in consequence management and supervision methods. Yet, the routine analytical approach used to solve newly appearing problems does not show the expected results.

The result of the traditional approach to management is a low degree of innovation in Polish enterprises (Kowalski and Nasirowski, 2007; Franken, 2010; Patalas-Maličewska 2012; Baruk, 2002). This fact is confirmed by numerous reports including the Innovation Union Scoreboard, among others. Poland is characterized by a lower level of the Summary Innovation Index – SII than the average for all other countries of the European Union (Polish Agency for Enterprise Development report, 2015). At the same time, Poland is in one of the last places in the ranking of EU countries with regard to participation of enterprises conducting innovation activities, 25th place out of 27 (report of the Ministry of Economy, 2015).

The methods and techniques for the creative solving of problems may turn out to be the support that is needed. It is used to solve problems in a creative way, to create innovation or to support creativity in the organization while at the same time positively affecting the widely comprehended sphere of economics of work, and supporting efficiency, performance, and functionality in achieving results. The results of their application are visible not only for the person who uses them, but for the entire organization; they affect management, philosophy of thinking, and social relations in the company.

The systematic development of the creativity of employees in enterprises, by applying methods of creative problem solving, will positively affect innovative potential. New solutions – innovations can contribute to the increase of competitiveness of the enterprise.

However, there is difficulty in applying creative methods. Their limited description the literature, small number of experts, or their focus on only the psychological aspect of discussed methods (rather than also on results), hinders their use in enterprises. Therefore, a simple tool for the selection of methods of creative problem solving was proposed (in particular inventive creation methods), with regard to problems of the enterprise. The tool (in the form of a database of inventive methods) is supposed to provide information, which method should be applied in the given conditions (situation), and provide a comprehensible, synthetic description that enables its immediate application.

Research methodology

Empirical research were conducted, based on the literature analysis concerning the innovation level of Polish enterprises (in particular from the SMEs sector) and with methods of creative problem solving, in the enterprises of Opole and Silesian Voivodeships in the form of a repeated case study. Procedure

\textsuperscript{1} Opole University of Technology, d.jagoda@po.opole.pl
\textsuperscript{2} Opole University of Technology, i.lapunka@po.opole.pl
compliant with an indication o in Yin’s textbook (1984), early stage of knowledge development in the given area of research, identification of current phenomenon in real conditions, vague boundaries between phenomenon and circumstances of its occurrence). The procedure of conducting the case study proposed by Czakon (2013) was adopted, the diagram presents Figure 1.

<table>
<thead>
<tr>
<th>Figure 1: Case study procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formulating a research question</td>
</tr>
<tr>
<td>Case selection</td>
</tr>
<tr>
<td>Development of data collection tools</td>
</tr>
<tr>
<td>Carry out multiple case studies</td>
</tr>
<tr>
<td>Analysis of collected data</td>
</tr>
<tr>
<td>Formulate proposals</td>
</tr>
<tr>
<td>Confrontation with literature</td>
</tr>
<tr>
<td>Closure of research, generalization</td>
</tr>
</tbody>
</table>

Source: Authors

Studies were carried out in the enterprises of Opole and Silesian Voivodeship (Poland) in the years 2013-2016. The scientific basis included:

- quantitative methods (creativity test) – which provide information on the creativity level of employees,
- quality methods (in-depth interview) – used in the study of creativity of the organization
- methods of creative problem solving,
- techniques to support the development of creativity,
- methods of decision making based on many evaluation criteria.

These studies included the following stages (according to Figure 2):

1. Preliminary studies – creativity tests were conducted in enterprises, which enabled us to measure the creativity of employees in the given enterprise. Tests were drawn up based on specialist psychological tests. Tests enabled us to assign employees of the given enterprise to one of three groups: innovators, persons not fully using their creative abilities, and persons whose creativity is “dormant.” Moreover, barriers limiting the individual and collective creativity were identified in surveyed enterprises using an in-depth interview.

2. Basic empirical research – in analyzed enterprises, the employees participated in creative sessions in which inventive creative methods were used in order to design innovative solutions. An expert was responsible for the selection of methods and carrying out the creative session. Innovative organizational, procedural, product solutions were designed. Employees positively used the process of the creative sessions and the application of inventive creation methods to solve problems.

3. Development of a tool supporting the selection of inventive creative methods to the problem. Conclusions from conducted basic empirical research, preliminary studies, and literature analysis were used to build a tool supporting the selection of inventive creative methods to the problem (situation) of enterprises. One by one the base of inventive methods 1 was verified in enterprises. Verification was based on the assumption that in the creative session there would be the use of methods indicated by the selection tool, the expert will only carry out an open observation.
It should be noted that currently there are longitudinal studies being conducted, and tests assessing the creativity level in enterprises after certain time of applying inventive creation methods are repeated in order to study the changes of this level.

**Figure 2: Study scheme**

<table>
<thead>
<tr>
<th>Literary analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preliminary research</td>
</tr>
<tr>
<td>Creativity tests</td>
</tr>
<tr>
<td>Surveys, interviews</td>
</tr>
<tr>
<td><strong>Fundamental empirical research</strong></td>
</tr>
<tr>
<td>Collect empirical data in multiple case studies</td>
</tr>
<tr>
<td>Develop a tool to support the selection of inventive methods to the problem</td>
</tr>
<tr>
<td>Verification of a tool supporting the selection of inventive methods to the problem</td>
</tr>
<tr>
<td><strong>Creative session</strong></td>
</tr>
<tr>
<td><strong>Conclusions, recommendations</strong></td>
</tr>
</tbody>
</table>

Source: Authors

**Tool to support the design and implementation of innovative solutions**

Participation of the expert and, his knowledge and experience is important for proper and effective application of inventive creation methods. The expert’s task is to indicate the method which should be used, and to present its scenario. The group of experts is small, which largely impedes the use of inventive creation methods by a larger group of companies. Therefore, it was reasonable to create a tool supporting the selection of inventive creative methods to the problem. This will facilitate the use of creative problem solving methods by the largest group of recipients. The base of the inventive methods, which is extremely simple, was built in Access program, and this is supposed to also contribute to its popularization. The user of such a database, by answering a few questions about the detected problem and specifics of the given organization, will receive advice in the form of: which method to choose and description of the method for its immediate application.

The first design stage of the tool supporting selection of inventive creation methods was to determine the criteria for the selection of inventive creation methods to the problem. Due to the specificity of solved problems and the practical aspect of applied methods, attention was paid to inventive creation methods.

Criteria for selection of methods based on literature studies, preliminary and basic studies include:

- The number of participants in the creative session (individual or team). There are inventive creation methods, which require one to work in the group. There is also a group of methods, which can be applied to both individuals and to a group.
- Method area (comprehensive or fragmentary). This criterion is aimed to indicate, whether the method is supposed to be applied only to search for solutions or is supposed to be helpful in the entire problem-solving process (from defining the problem to seeking solutions).
- Duration (up to 1 h, up to 1 working days, above 1 day). This criterion is very important for entrepreneurs, because it enables to choose the method to time at its disposal.
- Method nature (based on forced or free associations, analytical methods; lists of test questions, not-systematized).
- Creativity and experience, this criterion is necessary to determine whether the organization’s appointed team for creative problem solving is creative. The previously carried out test is supposed to be used for this purpose. It is possible also to be based on previous experience associated with application of inventive creation methods.
- Problem type (technical/technological, organization and management).

The design base of inventive methods supporting the selection of inventive creation methods to the problem in a form of a database of the inventive creation methods is unusually easy to use and transparent, which makes it easier to apply. From the main menu, it is possible to carry out one of four orders: browse the database of inventive creation methods, add a new method, select a method to a determined situation, or close the database. The most important element of the main menu and specific objective of the designed tool that supports the selection of inventive creation methods to the problem is to find a method that will be selected to the following factors: solving entity, duration of creative session, method nature, creativity, and experience in applying inventive creation methods to a problem type. While selecting the method we can define all criteria or those selected. The result of the selection will be shown in table. As a result of the defined criteria, the proposed methods will be indicated along with their description (Jagoda-Sobalak, 2016).

Design stages of database included:

1. Creating tables – 6 tables were created for the selected criteria and for the inventive creative methods.
2. Providing clear values in the table fields (keys) – keys were entered in tables: Id_metody, Id_podmiot, Id_obszar, Id_charakter, Id_rodzj, Id_czas, Id_kret_dosw.
3. Determining the relation between tables – determined the correct connection of related data in a logical whole.
4. Creating the form – 5 associated and 6 supporting forms were created for communication with the user.
5. Creating queries – in order to enable searching (selecting) methods and displaying search results.
6. Creating reports – created reports display inventive creation methods (that meet the criteria) along with their characteristics and description.
Tool verification

The last research stage was based on inventive methods verification, which was held among others in the enterprise of the construction industry (finishing and decorative elements). Conducted verification was held according to the adopted scheme in the repeated case study. However, methods used to generate innovative solutions have been selected by using the application process of the tool supporting selection of inventive creation methods to the problem. Before proceeding with the problem solving, the employees of the enterprise filled out the questionnaire, determining their creativity level. The questionnaire showed that the surveyed group has a large creative potential, willingly seek unconventional solutions, and they are open and ready for changes and taking risks. The next research stage in the enterprise was to familiarize employees with the idea of creative organization and with inventive creative methods. Interviews have been conducted with employees, which enabled us to get to know the barriers limiting creativity in the organization. Employees pointed at the following barriers: lack of knowledge, lack of possibilities (place, time, way) of reporting new solutions, and lack of faith in their own abilities. In order to develop creative potential, the management board of the enterprise decided: to create a Research and Technology Development Department, the systematic organization of creative sessions, further supporting employees in personal development and knowledge acquisition by participation in programs of the European Union (Human Capital program), funding trainings, courses, and studies.

20 persons, representing all departments, took part in the creative session. Employees of the enterprise already earlier participated in such sessions. They usually used methods of: brainstorming, crumbling, or 5 why. The tool supporting the selection of inventive creation methods to the problem was used to select the method of creative problem solving (designing the innovative product). The following selection criteria were adopted:

1. Solving entity – team.
3. Duration – up to 1 day.
5. Creativity and/or experience – moderate.

The defectologist method was indicated to solve the problem, which was applied to generate product innovation. Employees of enterprises had the task to search for as many shortcomings of the products currently offered by the company, as a result the employees on the board one by one wrote out defects in the elevation stage. In the next stage, defects were divided into two groups: defects associated with material, nature, and properties of the product (on which the producer has no impact), and defects possible to remove.
The next step was seeking the solution in order to eliminate defects from the second group. A detailed method was used in order to eliminate defects, which was also indicated by the tool supporting selection of inventive creation methods to the problem. Employees using a detailed method pointed to the problem with assembly (necessary good specialists, assembly increases costs, often connections between tiles are visible, assembly requires the time and practice) as the main reason of resignation from the purchase of elevation stone. Therefore, the problem to be solved was defined as follows: “Design tiles of the elevation stone, which will simplify the assembly.” Again, a tool supporting selection of inventive creation methods to the problem was applied, changing the nature of the method based on associations in order to stimulate the creativity of employees. Then an analog transmission method was applied to solve the problem. Laying tiles were compared to puzzles, which then indicated the elements which facilitate assembling puzzles. Next an attempt of analogous transferring to the assembly of tiles was made.

The solution generated in the session, and developed in the laboratory of the enterprise is product - brick tile currently available for sale. It is a revolutionary product – tile combined with the groove. Due to the design it is extremely easy to assembly. The tile is in the color white, but it is possible to paint it any color needed. Its texture and special corners cause that the texture of wall does not differ in appearance from real bricks.

The developed tool supporting selection of inventive creation methods to the problem has been positively verified. The selected methods enabled the organization to generate the innovative solutions without the participation of the expert. The first indicated method – defectologist, enabled to reveal tiles deficiencies, which affect the customer’s decision, and which are possible to remove. The next method – details, enabled to indicate the major defect from the customer point of view (difficult assembly). The application of the indicated analogy by the database of inventive creation methods contributed to find the solution, which enables simple assembly, hence increasing the attraction of tiles on the market and it became an innovation of the national scale.

Conclusions
Research in a form of a repeated case study indicated that inventive creation methods support the growth of innovation. They enabled to generate innovative solutions: processes, products and organizational innovation. Positive opinions of the employees in relation to creative sessions with inventive creation methods confirmed the benefits from applying inventive creative methods. The conducted studies enabled to build the creative organization, identification, and development of the creativity level of employees, and eliminated barriers limiting their creativity. The applied inventive creation methods extorted on employees a creative way of thinking, and taking brave, unconventional decisions, contributed to integration of employees, created the climate that supports creation of new solutions, which in consequence significantly affected the creativity in individual enterprises.
The designed tool enables to popularize inventive creation methods, and their application without participation of the experts. The process of tool verification has proven the correctness of the criteria selection and assumptions.

References


CARBON STRUCTURES AS EFFECTIVE MODIFIERS OF THE MATERIALS’ BASIC PROPERTIES
Natalia Kamanina

Abstract: Because of the unique energetic, refractive and photoconductive characteristics of effective nano-objects, especially carbon nanotubes, the modification of optical properties of the organic and inorganic materials can be considered as the preferable one via the use of the nanostructuration process. Emphasis has been given to the incorporation of nanoobjects directly in the materials’ body and on their surface. Under the conditions of a surface treatment of the inorganic structures, an IR-laser at the wavelength of 10.6 micrometers was used to orientate carbon nanotubes deposited in the electric field of 100-600 V/cm\(^1\). Dramatic spectral and mechanical parameters changes have been found. Refractive features of the nanostructured organics have been studied via applying the second harmonic of the pulsed Nd-laser at different spatial frequencies and under the nanoparticles sensitization doping such as fullerenes, carbon nanotubes, shungites, quantum dots, and graphenes. A drastically obtained laser-induced refractive index has been established. A prediction has been proposed to extend the area of the application of the systems considered.

UDC Classification: 535; 538.9; 539; 544; DOI: http://dx.doi.org/10.12955/cbup.v5.1084

Keywords: Carbon nanotubes, organics, inorganics, interface, refraction, laser-matter interaction

Introduction

It is well known that after the discovery of fullerenes (1985) and carbon nanotubes (1991), many scientific and research groups have conducted scrupulous studies on them and found different areas of applications of these nanoobjects and related ones (Bhattacharya et al., 2004, Yamamoto et al., 2004, Xu & Xiong, 2004, Yu et al., 2011, Taranko et al., 2012, Ciszewski et al., 2013, Asokan, 2013, Xi et al., 2014, Neyts & Erik, 2015,Guo et al., 2016). The peculiarities of the growth, the mechanisms of the sensitization, and the changes of the basic physic-chemical parameters have been tested. Our own steps in this direction occupy a significant place too (Kamanina, 2002, Kamanina, 2005, Kamanina & Uskokovic 2008, Kamanina et al., 2012, Kamanina et al., 2016). The main reason to use fullerenes, shungites, and quantum dots is connected with their unique energy levels and high value of electron affinity energy. The basic features of carbon nanotubes, graphene, graphene oxides are their branched surface, high conductivity, strong hardness of their C—C bonds as well as complicated and unique mechanisms of charge carrier moving. These features of the mentioned perspective nanoobjects can provoke, the discovery of new physical and technology ways to optimize the photorefractive, photoconductive and dynamic parameters of organic conjugated polymers, monomers and liquid crystal (LC) systems via nanoobjects sensitization. For example, due to its ability to enhance the polarization of the composites the sensitization process (connected with the activation of the intermolecular charge transfer complex formation) permits to increase the speed of the LC elements (from 8-16 ms to 1-2 ms and less for the structured nematic LC) and to improve the photorefractive features, such as can be seen in the laser-induced refractive index Δn from the value of \(10^{-5}\) up to \(10^{-3}-10^{-2}\). It also increases the surface mechanical hardness, laser strength as well as the wetting angle of the inorganic materials.

In the current paper, some evidence will be shown of the increase of the transparency of some inorganic materials and their mechanical and wetting features will be discussed as well as the modification of the organics’ refractive properties by checking the increase of the laser-induced refractive index.

Experimental conditions, materials and results: inorganic system modification

It should be mentioned that to modify the properties of the inorganic materials via their surface treatment, the carbon nanotubes have been deposited on the material surface using an IR CO\(_2\)-laser with \(p\)-polarized irradiation at a wavelength of 10.6 \(\mu\)m and power of 30 W. Moreover, when single wall carbon nanotubes (SWCNTs) have been placed at the materials interface, an electric field up to 100-600 V/cm\(^1\) was applied in order to orient the nanotubes during the deposition process. The spectra of the nanotube-treated materials have been obtained using Perkin-Elmer Lambda 9 and

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1 St.-Petersburg Electrotechnical University, nvkamanina@mail.ru
Furrier FSM-1202 instruments. Surface mechanical hardness was revealed using the CM-55 instrument as well as via using of the microhardness device PMT-3M ("LOMO," Saint-Petersburg). The laser strength was checked with a pulsed nanosecond Nd-laser. The special accent was given to observe the relief at the material surface via checking the wetting angle. In this case the camera with parameters as Compact F1.6 1/3 CS Mount 6.0-60 mm Manual Focal Iris Zoom Lens for CCTV Camera (Black) was applied.

**Si materials spectra and hardness**

As an effective material in the application of solar energy and as the perspective photosensitive layer in the spatial light modulators operated in the reflective mode, the Si structure was treated. Using a laser deposition technique and as a method to orient the carbon nanotubes (Kamanina & Vasilyev, 2009, Kamanina & Vasilyev 2010), the essential increase of the transparency of the Si materials was obtained as well as the increase of the micro hardness was shown. The quantum chemical calculation based on the LAMMPS program (Plimpton, 1995, Tersoff, 1989) was made to support the different penetration of the CNTs depended on the different CNTs diameter and varied their speed. The data are shown in Figure 1 and 2 and in Table 1.

Figure 1: Transmittance spectra of the pure Si (lower curve) and Si covered with the vertically aligned CNTs (upper curve), a. Transmittance spectra of the pure Si (lower curve), Si covered with the vertically aligned CNTs (middle curve), and Si covered with the graphene (upper curve), b.

Analyzing the spectral dependence (see Figure 1a), one can see that the transparency of the Si materials has drastically increased in the IR range from 2 to 16 micrometres. It should be noted that the refractive index, for example of CNTs, is close to 1.01-1.1 (Yang et al., 2007), thus the Fresnel losses are decreased dramatically. Furthermore, the spectral range of the inorganic materials which surfaces’ can be treated with carbon nanoparticles, such as CNTs, can be extended to the IR spectral range due to the fact that the imaginary part of the dielectric constant of the CNTs (responsible for absorption) is close to zero in the near IR and the middle IR-ranges. Moreover, based on the data in Figure 1b, the advances of the graphene layer as a promising coating can be suggested. It permits to propose that the graphene treated systems can be effective elements in optoelectronic devices when the transparency of the devices should be dramatically increased. Furthermore, this can be proposed for the laser technique too, for example, when the thickness of the key layers of the optically addressed spatial light modulators should be decreased and the mobility for the charge should be increased. It should be noticed that the increase of the charge carrier mobility is an important parameter for the solar energy elements and the battery as well.

Analyzing the mechanical properties (see Table 1), one should take into account the fact that the coupling length between the Si-Si atom is large (0.23-0.235 nm), in comparison with the length of C-C bond in the carbon nanotubes (~ 0.139-0.143 nm), thus the hardness of silicon is much less than carbon nanotubes. This can be improved and optimized with the laser deposition of carbon nanotubes because of their unique physical and chemical properties and very high Young's modulus with the values placed in the range of some terra Pa (Namilae et al., 2004). Thus, a 7.7% increase of the micro hardness can be found. Moreover, the roughness of the pure Si sample (RMS, nm) was 0.206; 0.219; 0.200 in comparison to the optimized Si treated with CNTs: 0.160; 0.165; 0.169. In addition, the data for the Ge micro hardness improvement, for the comparison, has been presented (see Table 1).
Figure 2: Penetration depth change due to the CNTs diameter variation and the velocity of the CNTs deposition increase on the Si surface

![Penetration depth change figure](image)

Source: Author

Table 1: Micro-hardness of the pure and CNTs treated Si and Ge at the indenter force ~30g

<table>
<thead>
<tr>
<th>Materials</th>
<th>Micro-hardness, Pa</th>
<th>Materials</th>
<th>Micro-hardness, Pa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Si</td>
<td>$1.189 \times 10^9$</td>
<td>Ge</td>
<td>$0.897 \times 10^9$</td>
</tr>
<tr>
<td>Si+CNTs</td>
<td>$1.281 \times 10^9$</td>
<td>Ge+CNTs</td>
<td>$0.943 \times 10^9$</td>
</tr>
</tbody>
</table>

Source: Author

ITO coating spectra, laser strength and hardness

In this paragraph, the emphasis was given on the modification of the ITO-conducting layers because these structures have a very broad area of application in the solar energy, biomedicine, display, laser, and general telecommunication systems areas (Vasilev et al., 1987, Kamanina & Vasilenko, 1997). Some problem with increase of the transparency, mechanical and laser strength have been existed. For example, the transparency connected with the annealing temperature, the laser strength coincided with the mechanical hardness, etc. Thus, the nanostructuration process permits us to find new ways to resolve the problem mentioned above. The data shown in Figures 3 and 4 as well as in the Tables 3 and 4 support the spectral evidence, the mechanical, laser, resistance and wetting features as well.

Figure 3: Transmittance spectra of the ITO-layer covered with the vertically aligned CNTs under the application of different electric fields.

![Transmittance spectra figure](image)

Source: Author
One can see from the Figure 3 data that the structuration of the ITO surfaces with oriented CNTs provokes the shift of spectral parameters. Moreover, the data from Figure 4 shows that the effect has been coincided with the formation of the link between the carbon atom and the atomic layer of the ITO surface. It should be noted that the quantum chemical calculation was made based on the LAMMPS program (Plimpton, 1995, Tersoff, 1989). Moreover, it supports the dependence of the penetration depth on the diameter and the speed of the CNTs placed on the ITO surface via the oriented laser deposited technique. The ITO-relief obtained can be sufficiently used in the display technique due to the fact that the modified relief at the ITO surfaces can be considered as the conducting layer with the decreased resistivity, from one side. But, this relief can be used as the orienting one to align the LC-dipole with good advantage as well.

Analyising the data shown in Table 3 one can see that the strength of the ITO-conducting layer can be successfully increased via the CNTs treatment. It should be mentioned that traditionally the researchers have used the HfO$_2$-coatings deposited on the ITO surface to eliminate their roughness and increase the strength, but the CNTs modification can lead to better results.

### Table 2: Comparative micro-hardness of the pure and CNTs treated ITO-conducting layers

<table>
<thead>
<tr>
<th>Materials</th>
<th>Micro-hardness, Pa</th>
<th>Micro-hardness increase, times</th>
</tr>
</thead>
<tbody>
<tr>
<td>ITO</td>
<td>2.2×10$^9$</td>
<td>0</td>
</tr>
<tr>
<td>ITO+CNTs</td>
<td>3.5×10$^9$</td>
<td>~1.6</td>
</tr>
<tr>
<td>ITO+CNTs+SEW</td>
<td>4.7×10$^9$</td>
<td>~2</td>
</tr>
</tbody>
</table>

Source: Author

### Table 3: Comparative laser strength of the pure and CNTs treated ITO-conducting layers

<table>
<thead>
<tr>
<th>Materials</th>
<th>Energy density, J×cm$^2$</th>
<th>Energy density provoked the destruction of the layer, J×cm$^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>ITO</td>
<td>0.3-0.4</td>
<td>0.65</td>
</tr>
<tr>
<td>ITO+CNTs</td>
<td>0.6-0.7</td>
<td>~0.75</td>
</tr>
<tr>
<td>ITO+CNTs+SEW</td>
<td>0.9</td>
<td>~1.5</td>
</tr>
</tbody>
</table>

Source: Author
According to the change of the wetting angle of the pure and structured ITO-layers it should be noted that the wetting angle can be increased from 70-75 degrees up to 85-89 degrees.

Thus, using this consideration based on the Si and ITO materials study, the CNTs laser treatment can be proposed as an innovative way to modify the important physic-chemical characteristics of this type of the inorganic material.

III. Experimental conditions, materials and results: organic system modification

The laser-induced change of the refractive index has been studied at the wavelength of 532 nm under Raman-Nath diffraction conditions (Kamanina & Vasilenko, 1997, Kamanina & Vasilenko, 1995Kamanina et al. 2015). The Raman-Nath diffraction condition is realized in the case when the recorded grating period is larger than the thickness d of the treated sample. Beam energies incident on and transmitted through the sample in first-order diffraction can be measured. The experiments have been made at a nanosecond pulsed regime at the spatial frequency of 90–130 mm⁻¹ and at the laser energy density ranged from 0.01 to 0.6 J·cm⁻². The technical experimental scheme has been analogous to that it can be explained in detail (Kamanina & Vasilenko, 1997, Kamanina & Vasilenko 1995) and was recently shown in (Kamanina et al., 2015) in the modified variant.

3.1. Polymides, pyridines, LC structures laser-induced change of the refractive index

It should be mentioned that in order to analyze the refractive processes of the organic materials spatially, one it should take into account that when the electric field of the laser wave is less than the intra-atomic electric field correlated with the electron charge and with the Bohr radius, we should estimate the linear effect. But, when the electric field of the laser wave is larger than the intra-atomic electric field, we should draw attention on the nonlinear optical features. Using this aspect, the values of optical susceptibility play important roles in the nonlinear optical effect. Really, the most important optical characteristic in this case is the induced dipole, whose can be expressed through dipole polarizabilities α(n). These are in turn related to the proportional dependence to the nonlinear susceptibility χ(n) and to the local volume v of the materials (media). Thus, laser-matter interaction provokes the change in polarization of the media and predicts the change in such properties as dynamic, photorefractive and photoconductive ones.

To predict the change of the cubic nonlinearity χ(3), as the minimum media local volume polarizability (Kamanina, 2005, Kamanina & Uskokovic, 2008, Kamanina et al., 2012, Kamanina et al., 2008), the laser-induced change of the refractive index Δn can be calculated from the diffraction efficiency η (Kamanina et al., 2015, Kamanina et al., 2008, Akhmanov & Nikitin, 1997) via realization of the Raman-Nath diffraction conditions (Λ≥2d) using the equation (1):

\[
\eta = \frac{I_1}{I_0} = \left( \frac{2\lambda}{\pi \Delta n d} \right)^2 .
\]

Here Δn is the induced change of the refractive index, I₁ is the intensity in the first diffraction order, I₀ is the input laser intensity, d is the thickness of the medium, λ is the wavelength of the light incident on the medium, Λ is the spatial frequency.

The basic data of the laser-induced change of the refractive index of the materials studied are shown in Table 4.

According the studied nonlinear features of the polyimide, etc. materials with different nanosensitizers, it can be predicted that new composite materials can be considered in order to establish the dramatical nanoparticles influence on the photorefractive features of the organic conjugated matrixes and to apply the organic materials to the holographic recording, laser frequency conversion, switching, as well as for the testing of the dynamic properties of the modified composites and their possible application in general telecommunication systems and in biomedicine instead of the volumetric inorganic materials.

Conclusion To summarize the results, one can state that:

- Structuration of the inorganic material surfaces (based, for example, on the Si and ITO structures) has predicted the change in the spectral, mechanical and wetting features. The increase of the transparency, hardness, and wetting angle has been revealed.
• Structuration of the inorganic material surfaces based on ITO has shown and supported the essential decrease of the resistivity. It can incite the decrease of the applied voltage when these ITO coatings are considered as the transparent conducting layers in the spatial light modulators.

• Structuration of the inorganic material surfaces based on ITO via the CNTs oriented laser deposition technique can form possible quasi-graphene layers which can explain the change of the ITO resistivity due to the large charge from the core of the CNTs and their donor-acceptor properties.

• Sensitization of the organic materials by the studied nanoparticles has revealed the change of the laser-induced refractive index that is larger than the ones obtained for the pure matrixes.

• Sensitization of the organic materials by the studied nanoparticles has provoked the change of the laser-induced refractive index that is compared or larger than the ones obtained for the classical inorganics matrixes.

• The area of the applications of the materials which body and interface can be modified with effective nanoparticles can be extended essentially.

Table 4: Change in the refractive index $\Delta n_i$ of the studied sensitized organics

<table>
<thead>
<tr>
<th>Materials</th>
<th>Nano-object content, wt.%</th>
<th>Energy density, J$\times$cm$^{-2}$</th>
<th>$\Delta n_i$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pure polyimide</td>
<td>0</td>
<td>0.5-0.6</td>
<td>$10^{-4}$-$10^{-3}$</td>
</tr>
<tr>
<td>Polyimide + QDs CdSe(ZnS)</td>
<td>0.003</td>
<td>0.2-0.3</td>
<td>$2.0\times10^{-3}$</td>
</tr>
<tr>
<td>Polyimide + graphene oxide</td>
<td>0.05</td>
<td>0.2</td>
<td>$2.7\times10^{-3}$</td>
</tr>
<tr>
<td>Polyimide + graphene oxide</td>
<td>0.1</td>
<td>0.2</td>
<td>$3.4\times10^{-3}$</td>
</tr>
<tr>
<td>Polyimide + C$_{60}$</td>
<td>0.2</td>
<td>0.5-0.6</td>
<td>$4.2\times10^{-3}$</td>
</tr>
<tr>
<td>Polyimide + C$_{70}$</td>
<td>0.2</td>
<td>0.6</td>
<td>$4.68\times10^{-3}$</td>
</tr>
<tr>
<td>Polyimide + shungite</td>
<td>0.1</td>
<td>0.5</td>
<td>$3.46\times10^{-3}$</td>
</tr>
<tr>
<td>Polyimide + shungite</td>
<td>0.2</td>
<td>0.1</td>
<td>$5.3\times10^{-3}$</td>
</tr>
<tr>
<td>Polyimide + CNTs</td>
<td>0.1</td>
<td>0.5-0.6</td>
<td>$5.7\times10^{-3}$</td>
</tr>
<tr>
<td>2-cyclooctylamino-5-nitropyridine (COANP)+C$_{60}$</td>
<td>5</td>
<td>0.9</td>
<td>$6.21\times10^{-3}$</td>
</tr>
<tr>
<td>COANP + C$_{60}$</td>
<td>5</td>
<td>0.9</td>
<td>$6.89\times10^{-3}$</td>
</tr>
<tr>
<td>LC + polyimide + C$_{70}$</td>
<td>0.2</td>
<td>0.1</td>
<td>$1.2\times10^{-3}$</td>
</tr>
<tr>
<td>LC + COANP + C$_{70}$</td>
<td>5</td>
<td>$17.5\times10^{-3}$</td>
<td>$1.4\times10^{-3}$</td>
</tr>
<tr>
<td>LC + COANP + C$_{70}$</td>
<td>1</td>
<td>$30\times10^{-3}$</td>
<td>$1.45\times10^{-3}$</td>
</tr>
</tbody>
</table>

Source: Author

Acknowledgments

The obtained results have been supported by RFBR grant #13-03-00044 (2013-2015), project “Nanocoating-GOI” (2012-2015) and international FP7 Program, Marie Curie Action, Project “BIOMOLEC” (2011-2015). Author wishes to thank their colleagues Dmitry Kvashnin (Emanuel Institute of biochemical physics RAS, Institute of Science and Technology “MISIS”) and Pavel Sorokin (Technological Institute for Superhard and Novel Carbon Materials) for quantum chemical calculations. The author appreciates their colleagues from the department for “Photophysics of media with nanoobject”, Vavilov State Optical Institute and abroad too for the helpful discussions. The author is grateful to her colleagues of the Central Bohemia University for the suggestion of better wording in some paragraphs of this manuscript.

References


CEREAL CRISPBREAD IMPROVEMENT WITH DIETARY FIBRE FROM APPLE BY-PRODUCTS

Daiga Konrade,¹ Dace Klava,² Ilze Gramatina³

Abstract: In the production of apple juice, the by-products such as the peel, bark and seeds remain biologically active substances and a good source of dietary fibre. The aim of our study is to incorporate apple by-product flour (ABF) into cereal crispbreads and to determine the total dietary fibre (TDF) content, the colour and the structural changes after addition of ABF to cereal based extrudates. Hot air drying was applied for the preparation of ABF from apple pomace. For the development of new products, a laboratory single-screw extruder GÖTTFERT 1 L series (Germany) was used. An extrusion screw (compression ratio 2:1) at a speed of 60-80 rpm and a rectangular die (aperture: 20 mm wide, 1.0 mm high, 100 mm long) were also used. The basic ingredients for extruded crispbreads were wheat flour, rice flour, wheat bran, rye flour, oat flour with addition of ABF in different proportions (5%, 10%, 15%). The content of total dietary fibre (TDF) was determined according to the AOAC – AACC method No.985.29 by FOSS Analytical Fibertec E 1023 system. Density, textural properties and colour were also determined. The obtained results showed an increase of TDF from 9.39 to 15.89 g 100g⁻¹ in wheat crispbreads with AB and from 15.8 to 19.89 g 100g⁻¹ in rye crispbreads with ABF, hardness of products with ABF was from 17.2-21.7 N and density from 0.24-0.35 g cm⁻³, moisture of final product was 3.89-4.24±0.01%. The main purpose of the current research was to determine the effect of ABF addition to cereal crispbread content, of the TDF and the textural properties.

UDC Classification: 664.6.7; DOI: http://dx.doi.org/10.12955/cbup.v5.1085

Keywords: apple by- products, crispbreads, extrusion, dietary fibre

Introduction

Apple processing in the food industry results in a significant number of by-products such as the peel, mark, bark, and seeds which are still rich in bioactive compounds promoting health benefits. The high amount of dietary fibre could permit the use of these in developing new natural ingredients for the food industry (Figuerola & Mar, 2005). Apple wastes are good sources of fibre with a well-balanced proportion between soluble and insoluble fraction (Eskıcioğlu et al., 2015). The apple pomace have 51.10 g 100 g⁻¹ DM of total dietary fibre, of which 14.60 g 100 g⁻¹ DM is soluble and 36.50 g 100 g⁻¹ DM is insoluble dietary fibre (Olfe et al., 2003). Comparable to whole grain oat that contains the highest amounts of soluble fibre (6–8 g/100 g) among all cereal grains (Rodehutsscord et al., 2016).

The apple peel may be used in the formulation of functional foods and beverages (Henri, Almonacid, Lutz, Simpson, & Valdenegro, 2013).

Extruded crispbreads are produced from cereals: rye, wheat, rice, maize, based on high starch content (Kaur et al., 2015, Guine et al., 2013). Grains are important energy sources providing much of the carbohydrates, some proteins, lipids, dietary fibre, and other micronutrients in many diets. Fruits, oats, whole grain cereals, bran and rye are good source of dietary fibre β- glycan, cellulose, hemicellulose and lignin (Dreher, 2001).

Dietary fibre (DF) includes a mixture of plant carbohydrate polymers, both oligosaccharides and polysaccharides, e.g., cellulose, hemicelluloses, pectin substances, gums, resistant starch, inulin, that may be associated with lignin and other non-carbohydrate components (e.g., polyphenols, waxes, saponins, cutin, phytates, resistant protein) (Elleuch et al., 2011). High DF diets prevent some diseases, such as diverticular and coronary heart diseases (Figuerola & Mar, 2005). DF improves serum lipid concentrations, improves blood glucose control in diabetes, lowers blood pressure and appears to improve immune function (Yde et al., 2011). Dietary fibre intake should range from 20 to 35 grams per day or 10–13 g per 1000 kcal (Kohajdová et al., 2011).

The purpose of the study is to incorporate apple by-products in cereal based extrudates to obtain product with higher total dietary fibre content and to determine how chemical composition of ABF and TDF influence the physical properties of the final product.

¹ Latvia University of Agriculture, Faculty of Food Technology, daigakonrade@gmail.com
² Latvia University of Agriculture, Faculty of Food Technology, dace.klava@llu.lv
³ Latvia University of Agriculture, Faculty of Food Technology, ilzegramatina@inbox.lv
Materials and methods
The study was realized at the scientific laboratories of the Faculty of Food Technology at the Latvia University of Agriculture.
For development of crispbreads we used wheat flour, rice flour obtained from rice grains by grinding, 2365 type wheat bran, rye flour and oat flour, water.
Experimental samples were prepared with addition of apple by-product powder 5%, 10%, and 15 % to dry ingredients.

Table 1: Composition of apple by-product flour and soft ingredients

<table>
<thead>
<tr>
<th>Sample</th>
<th>Moisture (%)</th>
<th>Pectins</th>
<th>Carbohydrates,%</th>
<th>Protein,%</th>
<th>Fat,%</th>
<th>DF,%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rye</td>
<td>12.8</td>
<td>53.3 ±0.28</td>
<td>10.44-11.02</td>
<td>1.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oats</td>
<td>12.1</td>
<td>72</td>
<td>12.4</td>
<td>8.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wheat</td>
<td>13.9</td>
<td>72</td>
<td>13.7</td>
<td>1.9</td>
<td>12.2</td>
<td></td>
</tr>
<tr>
<td>Rice</td>
<td>12.8</td>
<td>81</td>
<td>6.7</td>
<td>2.8</td>
<td>2.8</td>
<td></td>
</tr>
<tr>
<td>Wheat bran</td>
<td>4.0</td>
<td>64</td>
<td>15.5</td>
<td>4.3</td>
<td>4.2</td>
<td></td>
</tr>
<tr>
<td>Apple by product</td>
<td>5.36</td>
<td>20.42*</td>
<td>55.4(sugar)**</td>
<td>2.3 ± 0.2**</td>
<td>2.1**</td>
<td>42.7</td>
</tr>
</tbody>
</table>

Source: Author

Crispbreads were prepared with recipes attached in Table 2. All samples were based on 85–95% of cereals.

Table 2: Composition of samples

<table>
<thead>
<tr>
<th>Ingredient, g 100g⁻¹</th>
<th>S1</th>
<th>S2</th>
<th>S11</th>
<th>S12</th>
<th>S13</th>
<th>S21</th>
<th>S22</th>
<th>S23</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rye flour</td>
<td>80</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oat flour</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rice flour</td>
<td>24</td>
<td>22.8</td>
<td>21.6</td>
<td>20.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wheat flour</td>
<td>70</td>
<td>66.5</td>
<td>63</td>
<td>59.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wheat bran</td>
<td>4</td>
<td>3.8</td>
<td>3.6</td>
<td>3.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apple BPF</td>
<td>5.0</td>
<td>10.0</td>
<td>15.0</td>
<td>5.0</td>
<td>10.0</td>
<td>15.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Author

Extrusion was done with a laboratory single-screw extruder GÖTTFERT 1 screw Extrusiometer L series (Germany). An extrusion screw (compression ratio 2:1) at a speed of 60-80 rpm and a rectangular die (aperture: 20 mm wide, 1.0 mm high, 100 mm long) were used. Temperatures for the extrusion process were set 78±2°C/83±2°C /98±2°C.
The moisture content of the selected material was determined by standard method with Memmert equipment Modell-100-800 according to standard LVS EN ISO712:2010 A.
Water activity (aw) was determined according to ISO 21807: 2004.
The total content of dietary fibre (TDF) was determined according to the AOAC –AACC method No.985.29 -1986 by FOSS Analytical Fibertec E 1023 system.
Textural properties of extruded cereal- apple by-products were measured using a TA HD texture analyzer Stable Micro Systems. The test was performed by compressing the samples to 80% of their original diameter using a 35-mm compression plate at test speed of 2 mm s⁻¹. Peak force (N), number of peaks, and initial gradient (N mm⁻¹) of the force–deformation curve was recorded and used to calculate hardness, crispiness of the products. An average of 10 samples was used to determine these properties.
Piece density of extrudates was determined by using a sand displacement method. Piece density was defined as the ratio of the sample mass of the sample to its volume to include internal pores but exclude the void or space between the extrudates and was measured by filling a container of known volume with the product. The procedure was repeated five times for each set of samples.

Colour changes of product samples in the colour system CIE L*a*b* were determined by means of the Colour Tec – PCTM equipment according to ISO 11664-4: 2011

Results were expressed in SIE L*a*b* system as tri-stimulus values (L* lightness, a* greenness/redness, b* blueness and yellowness. Measures for each sample were done in 10 replications. Total color difference (ΔE) was determined using the equation described by Garau et al. (2007).

The analysis of the experimental data was done in accordance with mathematical statistical methods used MS Excel 2007 software.

**Results and Discussion**

**Determination of TDF and textural properties of samples**

Textural and functional properties are the main decisive factor for acceptability of a snack food in the market. The incorporation of fibre in the extruded crispbreads generally results in changes of the nutrient profile (moisture and water activity) and physical properties (structure and texture) of the final extruded products (Brennan et al., 2008a). Thermal and mechanical treatment can reduce total dietary fibre (TDF). By incorporating 5 to 15% ABF, the TDF content of extruded products increased from 9.39 to 15.89 g 100 g⁻¹ in crispbreads from wheat -rice flour and ABF addition, from 15.8 to 19.8 g 100 g⁻¹ in rye crispbreads with ABF.

<table>
<thead>
<tr>
<th></th>
<th>TDF, g 100g⁻¹</th>
<th>Moisture of samples, %,*</th>
<th>Piece density *</th>
<th>Water activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>9.39±0.37</td>
<td>4.24±0.02</td>
<td>0.15±0.02</td>
<td>0.42±0.01</td>
</tr>
<tr>
<td>S2</td>
<td>15.8±1.57</td>
<td>4.22±0.03</td>
<td>0.16±0.02</td>
<td>0.41±0.01</td>
</tr>
<tr>
<td>S1.1</td>
<td>10.6±0.59</td>
<td>4.25±0.02</td>
<td>0.12±0.03</td>
<td>0.45±0.01</td>
</tr>
<tr>
<td>S1.2</td>
<td>12.86±0.46</td>
<td>4.01±0.10</td>
<td>0.13±0.04</td>
<td>0.46±0.01</td>
</tr>
<tr>
<td>S1.3</td>
<td>15.89±0.96</td>
<td>4.12±0.09</td>
<td>0.17±0.02</td>
<td>0.49±0.01</td>
</tr>
<tr>
<td>S2.1</td>
<td>16.21±0.52</td>
<td>4.11±0.02</td>
<td>0.14±0.03</td>
<td>0.36±0.01</td>
</tr>
<tr>
<td>S2.2</td>
<td>18.22±0.56</td>
<td>3.87±0.04</td>
<td>0.16±0.02</td>
<td>0.36±0.01</td>
</tr>
<tr>
<td>S2.3</td>
<td>19.89±1.02</td>
<td>3.89±0.01</td>
<td>0.18±0.04</td>
<td>0.39±0.01</td>
</tr>
</tbody>
</table>

Source: Author

Fibre is usually used as a bulking agent, to provide nutritional attributes and to modify the texture of extruded products. Fruit fibre has better quality due to higher total and soluble fibre content, water and oil holding capacity and colonic fermentability, as well as lower caloric value (Figuerola & Mar, 2005, Dreher, 2001). The purity of the fibres has a direct influence on the expansion characteristics. Fibre usage is often limited by its effect on product expansion. The addition of oat and rice fibre normally reduces expansion characteristics (Huber, 2001). Fibre, cellulose, bran and fruit-derived pectin may be blended with cereal grain or protein blends to make healthful snacks. Fibre and proteins may each be added at 20% levels to expanded snack formulations. Higher levels can be added when more soluble fibres and proteins are used. Low levels of low-molecular weight starches also counter the effects of fibre and protein additions. Extrusion-reacted fibre or bran yields softer-textured snacks when high levels of fibre are desired (Huber, 2001). Apples are rich in components that influenced the extrusion process and final product.

The textural characteristics of samples with ABF are given in Figure 1 and Table 3. The toughness of the extruded products is highly dependent on its moisture and density. Starch structure is distorted at high temperatures leading to a harder product. ABF extrudates were crisper compared to cereal based extrudates that is a harder product. The 5-15% ABF incorporated products showed light in weight with piece density ranging from 0.15 to 0.17 g cm⁻³. Correlation between TDF and ABF addition is r=0.71.
Typical commercial low-density puffed snacks prepared by conventional steam extrusion have a density in the range of 0.02–0.7 g cm$^{-3}$ and the ABF-based extrudates fall well within this range, indicating the potential of incorporating of ABF into crispbreads without impairing their textural qualities. Compared to cereal-alone extrudates, in ABF incorporated extrudates, bulk density increased from 0.15 to 0.17 g cm$^{-3}$.

<table>
<thead>
<tr>
<th>S1, -control samples, S1.2- 5% ABF, S1.2- 10% ABF, S1.2-15% ABF</th>
<th>S2 -control samples, S2.2- 5% ABF, S2.2- 10% ABF, S2.2-15% ABF</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1 &amp; 17.2 &amp; 21.0 &amp; 18.1 &amp; 17.4 &amp; 15.3 &amp; 21.7 &amp; 20.0 &amp; 19.7</td>
<td></td>
</tr>
</tbody>
</table>

Source: Author

Colour

Colour is an important quality factor related to consumer acceptability. The addition of reducing sugars can have a detrimental effect on available lysine and browning can occur (Bhattacharya, 1981). The addition of ABF did not cause significant colour change, indicating the absence of the browning reaction in final extrudates even though the feed formulation of pomace contained a considerable amount of soluble sugars.

Colour changes were analyzed for samples with ABF addition.

Total colour difference $\Delta E^*=(L_0^*-L^*)^2+(a_0^*-a^*)^2+(b_0^*-b^*)^2)^{1/2}$

The results showed significant differences between all samples with ABF addition and control samples ($3.64<\Delta E^*<4.94$). The differences between samples of ABF from 5% to 15% were not significant ($\Delta E^*=0.82, 0.85, 0.66$ and 0.73).
Table 4: Colour difference of product samples in the color system CIE L*a*b*

|   | L*   | a*   | b*   | ΔE*  | ΔE*I 
|---|------|------|------|------|------
| S1 | 55.77| 1.92 | 23.97| 0.00 |      
| S2 | 58.45| 0.10 | 16.50| 0.00 |      
| S1.1|56.09|2.05|20.38|3.61|0.00 
| S1.2|56.84|2.36|20.55|4.91|0.83 
| S1.3|57.04|2.44|21.38|1.43|0.86 
| S2.1|59.45|0.28|19.71|3.37|0.00 
| S2.2|60.09|0.33|19.88|4.38|0.66 
| S2.3|60.77|0.59|20.01|4.34|0.74 

Source: Author

Extrusion of ABF additionally decreased the lightness of samples, colour saturation (L*) and hue did not show a clear trend. Some authors also reported a darkened colour of the extrudates due to Maillard browning during extrusion which also can cause the colour change (Devi et al., 2013, Nayak et al., 2011, Jain et al., 2013).

Conclusion

Results show that ABF from apple processing could be considered as an alternative dietary fibre in extruded cereal products. Utilization of apple pomace offers opportunity to produce extruded foods with functional properties. Apple by-products can increase the level of TDF of the new product. Extrusion is possible with 1 screw extruder at the temperature 78/83/98 °C.

Acknowledgments

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References


Abstract: Sedentary lifestyle has become a great concern to human health. City parks play a great role in the solution of this problem, but exposure to urban pollutants leads to the necessity to monitor environmental quality. Purpose of Study The aim of the study was to evaluate the possible cytotoxicity and genotoxicity of soil samples collected from Shumen city park using Allium cepa L.-test. Methods The following microscopic parameters were used: mitotic index, index of each phase of mitotic division, mitotic abnormalities and interphase cells with micronuclei or two nuclei. Findings and Results The decline of the mitotic activity and changes in the proportion of mitotic phases indicate soil cytotoxicity. Various mitotic abnormalities and binucleated cells revealed genotoxicity. Conclusions and Recommendations Established cytotoxicity and genotoxicity of soil revealed a potential health risk to park users. Further analyses should be provided, since positive results from Allium-test serve as an alarm. UDC Classification: 502/504; DOI: http://dx.doi.org/10.12955/cbup.v5.1086 Keywords: Shumen city park, Allium-test, soil cytotoxicity and genotoxicity

Introduction

More than a half of mankind now lives in towns. A sedentary lifestyle has become a great concern to human health (Owen et al., 2010). Physical inactivity is a major factor for various diseases. City parks play a great role in the solution of this problem. Numerous studies have documented the positive influence of urban green spaces on physical and mental health (Kabisch and Haase, 2013). On the other hand, being located in the towns, parks are exposed to various pollutants due primarily to traffic, industrial and domestic emissions (Galušková et al., 2011). Park demand determines the necessity to monitor environmental quality. Air pollution is deeply studied, but soil pollution has remained in the background (Science Communication Unit, 2013). It should be noted that citizens have direct contact with soils using recreational areas and adverse effects are generally associated with inhalation of dust (Moosavi and Zarasvandi, 2009). Exposure to contaminated soils may pose a health risk, especially for children because of the additional soil-hand-mouth pathway (Ljung et al., 2006).

Recently, a lot of studies have been focused on urban soil pollution (Karim et al., 2014; Luo et al., 2012; Yang and Zhang, 2015). The standard analytical approach is not appropriate for evaluation of health risk of complex mixtures like soil – bioassays are useful in such studies (Soodan et al., 2012). Special attention has been paid to soil mutagens (Monarca et al., 2002). A lot of studies have established genotoxic pollutants in soils (Watanabe and Hirayama, 2001; White and Claxton, 2004). Higher plant bioassays are used as genetic models for testing toxicity of various environmental contaminants (Chahal et al., 2014; Corneanu et al., 2009). The Allium cepa-test has been widely used to study of cytotoxicity and genotoxicity of different pollutants (Fiskesjö, 1993; Tedesco and Laughinghouse IV, 2012; Leme and Marin-Morales, 2009).

The present study is focused on an urban recreational area – Shumen city park (Bulgaria). A "site by site" approach is recommended in such studies, because of specific features of the particular site (Science Communication Unit, 2013). In the case of present study, the park is located near the center of the town of Shumen – a medium-sized city, an important transport hub with well-developed light industry. The park provides a variety of functions including spaces for relaxing, meeting friends, play areas for children, etc. The aim of this study was to evaluate the possible cytotoxicity and genotoxicity of soil samples collected from Shumen city park using Allium cepa-test.

1 Faculty of Natural Sciences, Konstantin Preslavski University of Shumen, Bulgaria, t.koynova@abv.bg
2 Faculty of Natural Sciences, Konstantin Preslavski University of Shumen, Bulgaria vanyakolleva@gmail.com
3 Faculty of Natural Sciences, Konstantin Preslavski University of Shumen, Bulgaria a.dragoeva@shu.bg
4 Faculty of Natural Sciences, Konstantin Preslavski University of Shumen, Bulgaria Ivayla.Kuleva@mu-varna.bg
Materials and Methods

Studied area and soil sampling

The study area in the present investigation is City Park in Shumen (CP), located in northeastern part of Bulgaria. Soil samples from CP (SCP) were collected during August 2015 under dry weather conditions. The latitude and longitude at sampling site were recorded using a handheld global positioning system (GPS) – N43° 16' 15.88" E26° 56' 21.47".

Sampling was provided by digging soil to depth of 0–10 cm (soil horizon A). Ten topsoil sub-samples were taken and bulked to give a composite sample. Sub-samples were taken in an ‘S-shape’ pattern at a distance of 5 m. The samples were air-dried at room temperature in laboratory to constant weight, pulverized and then sieved to < 1 mm particle size.

Allium cepa-test

The onion bulbs were purchased from a biofarm certified to the BCS Öko Garantie; GLOBALG.A.P and IFS Food. The outer scales of the bulbs and the old dry roots were removed without destroying the root primordia. The bulbs were kept for root germination in deionized water for 24 h. Bulbs with new roots with length of 1.5 cm were placed on soil:water suspension (25:1) and were allowed to root for 24 h at 25 ± 1 °C. The root tips were washed thoroughly with distilled water, fixed in Clarke’s fixative (95% ethanol: acetic acid glacial, 3:1) for 90 minutes and hydrolyzed in 1N HCl for 8 min and in 45% acetic acid for 60 min at room temperature. Then they were stained for 90 min in 1% aceto-orcein and the terminal root tips (1-2 mm) were excised and squashed in 45% CH₃COOH. Each soil sample and control group consisted of 9 meristems from 3 bulbs. At least 1000 cells of each root meristem were analyzed. The mitotic index was determined as a ratio between the number of cells in mitosis and the total number of analyzed cells, expressed as a percentage. The index of each phase of mitotic division was calculated as a ratio between the cell number in the respective period and the number of dividing cells. The frequency of aberrant cells was calculated as a percentage of the total number of analyzed cells. The following abnormalities were scored: mitotic cells with chromosome bridges, fragments, vagrant chromosomes, multipolar anaphase/telophase, diagonal spindle, C-mitosis and interphase cells with micronuclei or two nuclei.

Statistical analysis

Results were expressed as the mean ± standard deviation (SD), and significance was analyzed using Student’s t-test where significance was accepted at P ≤0.05.

Results and discussion

Effects of a soil sample from CP on mitotic index and phase indices in root meristematic cells of Allium cepa L. are summarized in Table 1. The mitotic index decreased in comparison with the negative control. The lower mitotic division could be associated with various factors (as listed by Lamsal et al., 2010): inhibition of protein synthesis, influence on enzyme function, reduction of oxidative phosphorylation. Several checkpoints in mitotic cycle ensure proper distribution of genetic material. If there is DNA damage or inhibition of DNA synthesis, the cells are blocked in G₂ phase (Selmi et al., 2014). Inhibition of mitotic activity is accepted as an indication of a cytotoxic effect (Olorunfemi et al., 2011). The treatment with soil suspension changed the mitotic phase distribution. The notable effect was a decrease of the telophase index. Changes in the proportion of mitotic phases also indicate the occurrence of a cytotoxic effect (İlbąg et al., 2011).

<table>
<thead>
<tr>
<th>Sample</th>
<th>Mitotic index (% ± SD)</th>
<th>Prophase index (% ± SD)</th>
<th>Metaphase index (% ± SD)</th>
<th>Anaphase index (% ± SD)</th>
<th>Telophase index (% ± SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>5.51 ± 0.76</td>
<td>34.31 ± 14.48</td>
<td>20.86 ± 6.42</td>
<td>11.89 ± 8.15</td>
<td>32.94 ± 9.65</td>
</tr>
<tr>
<td>SCP</td>
<td>4.14 ± 1.06*</td>
<td>42.15 ± 10.24</td>
<td>25.65 ± 6.85</td>
<td>14.40 ± 4.83</td>
<td>17.80 ± 9.36*</td>
</tr>
</tbody>
</table>

SCP – water suspension of soil from City Park of Shumen; Control – deionized water. Data are expressed as means ± SD (standard deviation), *P ≤0.05.

Source: Authors

Exposure to soil sample increased ~2.5-fold the percent of chromosome aberrations in comparison to negative control (Table 2). Different kinds of mitotic abnormalities were observed (Figure 1).
Diagonal metaphases and anaphases were the most frequent abnormalities. The occurrence of mitotic cells with diagonal position of spindle upon treatment with different compounds were reported in other studies (Bhattacharjee and Sakya, 2008; Lamsal et al., 2010; Tripathy et al., 2013). Presence of vagrant chromosomes was notable in the treated cells. Vagrant chromosomes served as a sign of spindle disturbances (Yildiz and Arikan, 2008). C-mitoses and bridges in ana-telophase also were scored. Disturbed metaphases may be caused by inhibition of spindle formation (Selmi et al., 2014). Bridges may be consequence of DNA breaks (Maluszynska and Juchimiuk, 2005). Fragments and multipolar anaphases were not detected. As can be seen, soil samples caused spindle disturbances (vagrant chromosomes and disturbed metaphases and anaphases) rather than clastogenicity (bridges and fragments).

Treatment did not affect percent of micronuclei (extranuclear bodies of chromatin material) as compared to negative control (Table 2). On the other hand, soil sample from CP increased the number of binucleated cells ~1.5 fold. Binucleated cells result from failure of mitotic cells to complete cytokinesis and are accepted as a sign of cytotoxicity (Leme and Marin-Morales, 2009).

<table>
<thead>
<tr>
<th>Sample</th>
<th>Dividing cells</th>
<th>Interphase cells</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B (%)</td>
<td>V (%)</td>
</tr>
<tr>
<td>Control</td>
<td>0.58</td>
<td>2.73</td>
</tr>
<tr>
<td>SCP</td>
<td>1.05</td>
<td>4.45</td>
</tr>
</tbody>
</table>

SCP – water suspension of soil from City Park of Shumen; Control – deionized water; B – Bridges; V – vagrant chromosomes; F – Fragments; MP – multipolar anaphase/telophase; CM – C-mitosis; DS – diagonal spindle. Data are expressed as means ± SD (standard deviation), *P<0.05.

Source: Authors

Figure 1: Aberrations induced by soil sample in *Allium cepa* root tips: A – bridge; B – vagrant chromosome in anaphase; C – diagonal anaphase; D – C-mitosis; E – micronucleus in interphase cell; F – binucleated cell.

Source: Authors

Studies on soil pollution could contribute to a municipal policy on environmental management (Žigová et al., 2008). Since soil pollutants can have harmful effect on human health, there is a necessity to find out proper bioindicators for ecotoxicological analyses (Fontanetti et al., 2011). Present study confirmed other data that *Allium cepa*-test can be recommended for detection of cytotoxicity and genotoxicity of complex mixtures (Fiskesjö, 1993; Leme and Marin-Morales, 2009; Tedesco and Laughinghouse IV, 2012). In our study, we compared effects of soil samples from CP on root meristematic cells with those of deionized water (as a negative control). The decline of the mitotic activity, changes in the proportion of mitotic phases, various mitotic abnormalities and binucleated interphase cells revealed cytotoxic and genotoxic effects. These observations indicate the existence of a health risk for people.

**Conclusion**

Established cytotoxicity and genotoxicity of soil sample from City Park revealed a potential risk to park users. Our study confirmed that bioassays could provide basic information about hazards of complex mixtures like soil. Further analyses on soils in City Park should be provided, since positive results from *Allium*-test serve as an alarm.
Acknowledgements
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doi:10.1002/tox.253080306

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DEVELOPMENT OF A NEW GENERATION OF MAGNETIC CONTACT BASED ON HALL-EFFECT SENSOR

Milan Kutaj,1 Martin Boroš2

Abstract: This paper describes the development of a new generation of magnetic contact. The development of this new generation of magnetic contact is a part of the research activity of the security engineering laboratory. The new generation of magnetic contact is based on the Hall-Effect Sensor and microcontroller unit. Older magnetic contacts use a simple reed relay with only two states – normally closed or normally opened. The combination of the Hall-Effect Sensor and microcontroller unit provides advanced possibilities such as a programmable level of magnetic field sensitivity, adding different communication modules, programmable inputs/outputs etc. The results of this paper explain proposal of the new generation of magnetic contact, which can be used not only as a part of intruder alarm systems but also as a part of smart homes and other autonomous systems. The content of the paper can be used for even deeper research and by security systems developers as well.

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Keywords: Development, magnetic, contact, hall-effect, programmable, smart, autonomous.

Introduction

Magnetic contacts are one of the basic components of electrical security and distress alarm systems (they are mostly used in securing the object and therefore are only used partially – in the alarm intruder system). They are very simple detectors of perimeter protection consisting of 2 parts (an encapsulated magnet and an encapsulated reed contact) which use magnetic hysteresis which values differ from one manufacturer to another. They are mostly used in securing windows and doors.

Magnetic contacts

Reed contact is a mechanical switch consisting of two ferromagnetic leads placed in a hermetically sealed glass capsule filled with inert gas. The magnet is installed on the movable part of the windows and doors and the reed contact onto the fixed part of windows and doors (frame). The magnetic contact can be in its standby state open or closed. Standby state is such when the magnetic field of the magnet does not act on the reed contact (figure 1) (Loveček et al., 2015).

Figure 1: Principle of the magnetic contact (open in standby state, closed by moving the magnet closer)

Source: Authors

Magnetic contacts based on the technology of reed relay can be overcome by simple methods without making too much effort. To sabotage them, we can use a parasitic magnet with higher magnetic field intensity or bypass cables, which contacts are connected to the alarm intruder system control panel (Veľas, 2010). To increase the probability of intruder detection, we can use magnetic contacts with integrated reed relays using several mechanical switches in one glass housing with different standby states or polarized reed relays which change their standby mode only when a correctly oriented magnet comes in contact with them (Veľas, 2010).

Due to the simplicity of magnetic contacts and the ease with which they can be overcome, it is necessary to test their technical parameters and reliability. The testing of magnetic contacts is the focus of norm STN EN 50131-2-6 (Alarm systems. Electronic security and distress systems. Part 2-6: Opening contacts

1 Faculty of Security Engineering, University of Žilina, milan.kutaj@fbi.uniza.sk
2 Faculty of Security Engineering, University of Žilina, martin.boros@fbi.uniza.sk
(magnetic)) (STN EN 50131-2-6, 2014). The aim of these tests is to verify the functionality of magnetic contacts and thus their reliability in given conditions (Loveček, 2008).

As part of its R&D activities, the Faculty of security engineering performed tests on many magnetic contacts and for the needs of this article, we have selected one specific magnetic contact from manufacturer USP SP-1000. All tests were performed in laboratory conditions, as specified by the norm:

- temperature 15°C – 35°C,
- relative humidity 25 % – 75 %,
- air pressure 86 kPa – 106 kPa (Ripka, 2001; Loveček et al., 2015) (STN EN 50131-2-6, 2014).

Tests were focused on measuring the distances of opening, which were clearly recorded in a chart and after calculating the arithmetic mean, they were compared with the technical documentation provided by the magnetic contacts manufacturer. During the first measurements, we used the UNI-T 70A multimeter in the mode for measuring the circuit integrity (short-circuit probe). After a few repetitions, we noticed a slow response of the multimeter and decided to create a simple electric circuit which served for optical signalization of “on” state (red LED lights up) and “off” state (red LED turns off) of the magnetic contact. To put it simply, it is a system which tests the electric continuity (figure 2) similarly to a connected multimeter, but the response is immediate.

![Figure 2: Block scheme of the testing circuit](image)

The procedure which we used in testing was as follows:

1. We created an electric circuit as described above.
2. Outgoing cables of the magnetic contacts were connected to the circuit.
3. The reed contact was placed on a solid pad using a 1-millimeter piece of paper.
4. The permanent magnet was moved on the millimeter paper back and forth, perpendicularly to the reed relay.
5. After each turning off of the LED, we recorded the distance between the permanent magnet and the reed relay into charts 1 and 2.
6. Using the formula \( \bar{x} = \frac{\sum_{i=1}^{n} x_i}{n} \) we calculated the arithmetic mean of distance of closure when moving the magnet in or distance of opening when moving the magnet away.

The results were compared to the technical documentation provided by the manufacturers.

<table>
<thead>
<tr>
<th>Magnetic contact</th>
<th>Number of measurement</th>
<th>Mean distance</th>
<th>Distance given by manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>USP SP-1000</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
<td>38 39 37 37 39 37 39 39</td>
<td>38.4 25.4</td>
</tr>
</tbody>
</table>

Source: Authors
The measured results show that the magnetic contact made by USP SP-1000 is not suitable. The distance of opening after moving the permanent contact away was 13mm greater than the information given out by the manufacturer, which can create a big enough opportunity for the intruder to break the protection or use and install an espionage device without being detected. Apart from the simple overcoming of a magnetic contact, the risk to the security of the object is increased due to installing a magnetic contact with inaccurate specifications.

**Development of magnetic contact based on advanced technologies**

For an intruder who has sufficient knowledge on the installation of an alarm intruder system, overcoming a magnetic contact with a reed relay becomes a matter of seconds. Reed relay is a simple technology, its roots going back to the 1930s and they are used in today’s alarm intruder systems mostly due to their simple structure and very low price (Ripka, 2001).

Taking into account the aforementioned drawbacks of reed relay-based magnetic contacts, development has been initialized that would replace the reed relay in magnetic contacts with an integrated semiconductor circuit using the Hall-Effect technology. Using a more advanced technology in designing a next-generation magnetic contact will provide exact setting of distance for opening/closing of the contacts. Values of distance can be changed in real-time thanks to the implementation of a microprocessor. Its memory can be programmed to hold the intensity value of the magnetic field stemming from the permanent magnet in the dynamic part of the security system (Bahreyni, 2006). Once there is no magnetic field acting on the Hall-Effect Sensor, the alarm is sounded. Almost all magnetic contacts available on the market work based on this logic. Implementing a processor allows for the use of other functions which reed-relay-based magnetic contacts don’t and can’t have. The task of the microprocessor is not only to evaluate the alarm state based on losing the permanent magnet’s magnetic field (Popovic, 2004). The high performance of a microprocessor allows for monitoring even the slightest changes of intensity of the magnetic field and based on this data, it can correctly analyze what sort of intrusion is occurring – alarm or sabotage.

**Concept of the new-generation magnetic contact – The nju:MAG**

The proposed next-generation magnetic contact (nju:MAG) is the result of a project, which was originally meant to utilize the MEMS technology (MicroElectroMechanical Systems). MEMS integrate a set of mechanical elements, sensors, action members and control and analysis electronics onto a ceramic substrate using various production technologies. Today this technology is an inseparable part of all smartphones, laptops, office tech, cars, planes … (Bilotti et al., 1997)

The MEMS based magnetic contact would offer a range of advanced functions. For instance, the tremor detection seemed a very attractive function. The high sensitivity of MEMS sensors and digital communication in combination with a high-performance microprocessor would allow for distinguishing knocking from an attempted intrusion by damaging the opening fillings (breaking a window, the destruction of doors, …etc.). Evaluation of these states is possible, but it would require programming complex algorithms for the microprocessor, which would increase the market price. Within our project, we decided to stay away from similar functions and only focus on the main function of the magnetic contact – detection of the permanent magnet’s magnetic field. Due to this rationale, there is no reason to utilize MEMS technology and substantially simpler semiconductor technology can be used for the magnetic field detection. MEMS will therefore not be used as the basis for the nju:MAG magnetic contact. However, a microprocessor as the centre for evaluating states remained as well as all other circuits ensuring the magnetic contact works as it is supposed to. The MEMS sensor was replaced with BiCMOS technology, specifically a Hall-Effect Sensor. The CMOS technology is known to be sensitive to temperature changes. The manufacturer took this into account and the Hall-Effect Sensor compensates for the temperature changes which ensures accurate output values within the entire range of the working temperatures (Randjelovic et al., 2002).

There was a very significant change as far as communication is concerned between the selected type of sensor and the microprocessor. While the MEMS sensor communicated with the microprocessor using the PC or SPI digital interfaces, the Hall-Effect Sensor outputs a continuous analog signal (Kanda & Migitaka, 1976). The output from the Hall-Effect Sensor can be connected directly into the microprocessors input pin, which processes the analog signal and converts it into a digital one (Analogue-to-digital converter – ADC). In the nju:MAG magnetic contact, the Hall-Effect Sensor output
is connected to the analog input of the microprocessor using a differential amplifier, which amplifies the output signal from the probe, doubling it, and changes the range of the output voltage of the Hall-Effect Sensor from the original 2.5-4.5V to 0-3.8V (Loflin, n.d.).

The microprocessor implemented in the nju:MAG magnetic contact can process an analog signal with a resolution of 10 bits, which represents 1024 (0-1023) values of the duty cycle. To calculate the value of the voltage of one step of the duty cycle, we use the value of the microprocessor’s system voltage and resolution of the analogue input of the microprocessor. These values we then put into equation 1:

**Equation 1: Value of one step of duty cycle**

\[
\text{One Step of Duty Cycle [mV]} = \frac{\text{System Voltage [V] \times 1000}}{\text{Resolution of the ADC}} = \frac{5V \times 1000}{1023} = 4.89 \text{mV}
\]

Source: Authors

Due to the modified range of the output voltage of the Hall-Effect Sensor amplified by the differential amplifier, which reaches values between 0-3.8V, the 10-bit resolution of the ADC won’t be fully utilized. The maximum value of duty cycle, which can be achieved can be calculated using equation 2:

**Equation 2: Maximum value of duty cycle**

\[
\text{Max Duty Cycle} = \frac{\text{Hall – Effect Max Output [V] \times 1000}}{\text{One Step of Duty Cycle [mV]}} = \frac{3.8V \times 1000}{4.89mV} = 777
\]

Source: Authors

Even despite the fact that we’re only using approximately two thirds of the entire range, initial tests have shown that in real-life conditions, this was no effect on the work of the magnetic contact. For future use, however, using and external reference voltage set exactly to 3.8V is being considered (Loflin, n.d.).

The microprocessor and other circuits are supplied stable, constant voltage – this is ensured using a linear voltage regulator, its input terminals can be connected to up to an 18V power supply. Use of such linear voltage regulator proves ideal, because components of alarm intruder system usually are supplied by voltage of 12V.

The nju:MAG magnetic detector is capable of detecting any sabotage attempt:

- forcible removal from a wall,
- forcible opening of the front cover,
- detection of a parasitic magnet
- detection of partial opening of the door.

Sabotage through the forcible removal from a wall or opening of the front cover is detected using two switches. The switch dedicated to the detection of forcible removal from the wall is placed on the back side of the motherboard, the switch responsible for detecting the forcible opening of the front cover is placed on the front side of the motherboard.
The detection of a parasitic magnet and partial opening of the door is possible thanks to the principle on which the Hall probe works; it measures the intensity of the magnetic field of the permanent magnet and based on the programmed values, the microprocessor can recognize it with a probability close to 1.

The nju:MAG magnetic detector integrates an RGB LED light to display information of the current status. Colours of individual states can be programmed; intensity of the light can also be adjusted and set at different values for each state, just like the color.

Communication with the alarm intruder system, specifically with the control center, is done only through a bus, and a loop circuit is not possible. A loop circuit would not be problematic from technical standpoint however, all advanced functions offered by the nju:MAG detector would go unused (Veľas, 2015). This is the main and only reason, why only a bus connection to the control unit was considered.

**Conclusion**

Initial tests of magnetic contacts performed as part of the research and development activities show the actual need for testing magnetic contacts. Not all magnetic contacts correspond to the specifications stated in the technical documentation of the manufacturers or coincide with the conditions specified by technical norms. Based on these findings and results of testing the specifications and resilience of magnetic contacts, a project was designed focused on eliminating their negative properties. The aim of the article is to design a nju:MAG magnetic contact, which brings new functions to this field and increases the amount of security provided. It offers advanced sabotage detection for any attempted breach and allows for programming of specific parameters of permanent magnets in real-time. The nju:MAG magnetic detector is without a doubt a great asset not only from a R&D standpoint, but also an interesting product for manufacturers and companies focused on security projects and installation of alarm intruder system.

**Acknowledgements**

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**References**


DETERMINATION OF ANTIOXIDANT CAPACITY OF SELECTED BOROXINES
Maja Marasović,1 Antonio Roščić,2 Borivoj Galić,3 Mladen Miloš4

Abstract: Our previous in vitro and in vivo studies on standard tumor cell lines: mammary adenocarcinoma 4T1, melanoma B16F10, and squamous cell carcinoma SCCVII have demonstrated that dipotassium-trioxohydroxytetrafluorotriborate, \(K_2[B_3O_3F_4OH]\), affects the growth of cancer cells. Based on indicative results of its anticancer activity, that are comparable to the standard cytostatic 5-fluorouracil, we decided to analyze the antioxidant capacity of \(K_2[B_3O_3F_4OH]\). In our research, we include two other simpler representatives of the boroxine family compounds: trimethoxyboroxine and trimethylboroxine, which are two other commercially available. The study objective is to explore the possibility of similar behavior within the same class of boron compounds, that is, to examine the activity of \(K_2[B_3O_3F_4OH]\) compared to simpler representatives of the same family of compounds. On the one hand, \(K_2[B_3O_3F_4OH]\), theoretically has the ability to exchange electrons in the extinction of reactive radicals, since two boron atoms are sp3-hybridized and use electrons from the inner shell. On the other hand, trimethoxyboroxine, and trimethylboroxine, in theory, should not exchange electrons. However, recent studies indicate the potential for the boron atom to act like carbon and participate in the exchange of protons. The study used the standard laboratory method of 2,2-diphenyl-1-picrylhydrazyl (DPPH) antioxidant assay. The selected boroxines were treated with a DPPH radical at a temperature of 35° C in various concentrations, and with a reaction time of one hour. Results of the DPPH test show an extremely weak antioxidant capacity exists for all investigated boroxines. When \(K_2[B_3O_3F_4OH]\) was tested at high concentrations, instead of decreased color in the DPPH radicals, there was an increase in absorbance readings, which could mean that this compound acts as a pro-oxidant at higher concentrations. Future research is recommended to examine the length of reaction times needed, and whether a change in the reaction conditions would boost the antioxidant capacity of \(K_2[B_3O_3F_4OH]\). Finally, future research could test the hypothesis that \(K_2[B_3O_3F_4OH]\), in the absence of the expected antioxidant activity, acts as a pro-oxidant.

UDC Classification: 615.1; DOI: http://dx.doi.org/10.12955/cbup.v5.1088

Keywords: antioxidant capacity, boroxine, DPPH, pro-oxidant

Introduction
In the last 20 years, the chemistry of boron compounds has been progressively investigated because of boron’s unusual characteristics. This element is at the boundary of metals and non-metals and thus, exhibits characteristics of both elemental types. Often characterized as highly toxic and as such, unacceptable in human medicine, boron compounds have been neglected and unexplored for some time. Within the family of boron compounds, boronic acids and boroxines are particularly interesting. Boroxines are compounds of the six-membered heterocyclic structure, anhydrides of boronic acids, which have a ring structure with three oxygen atoms and three boron atoms. Boroxines are prepared by dehydration of boronic acid. In some cases, the creation of a known six-membered heterocyclic ring can be achieved simply by heating the corresponding boronic acid in an anhydrous solvent, such as carbon tetrachloride or chloroform. Today, they are known as antimicrobials and enzyme inhibitors. Individual boroxines show potent antifungal activity, some anhydrides possess activity against a broad spectrum of gram-negative bacteria, which is based on inhibition of fatty acid synthesis.

Our primary interest is the halogenated boroxine (dipotassium-trioxohydroxytetrafluorotriborate), \(K_2[B_3O_3F_4OH]\), originally synthesized in 1951 in the Union of Soviet Socialist Republics (USSR) by Ryss and Slutskaya (1951). Galic (2012, 2013) observed that halogenated boroxine, \(K_2[B_3O_3F_4OH]\), acted on hyperkeratosis on the skin with dark-colored growths, exposed to small concentrations of \(K_2[B_3O_3F_4OH]\), losing their color and irrevocably shedding from the surface of the skin. Halogenated boroxine shows high solubility and stability in water, and these features can facilitate its eventual use in medical, dermatological and cosmetic formulations. Toxicological studies have shown that \(K_2[B_3O_3F_4OH]\) has low harmful effects on the health of humans and mammals. Haveric et al. (2011) investigated the antiproliferative, cytotoxic, and genotoxic potential of \(K_2[B_3O_3F_4OH]\) using an alamarBlue® test on the basal cell carcinoma and lymphocyte. Islamovic et al. (2014) and Vullo et al.

1 Department of Biochemistry, Faculty of Chemistry and Technology, University of Split, Croatia, maja.marasovic@ktf-split.hr
2 Faculty of Chemistry and Technology, University of Split, Croatia
3 Department of Chemistry, Faculty of Science, University of Sarajevo, Sarajevo, Bosnia and Herzegovina, borivoj.galic@gmail.com
4 Department of Biochemistry, Faculty of Chemistry and Technology, University of Split, Croatia, mladen@ktf-split.hr
(2015) investigated the kinetic parameters and mechanism of inhibition of enzymes, catalase and human carbonic anhydrases, in the presence of $K_3[B_3O_f_3OH]$. Ivankovic et al. (2015) showed the potent antitumor activity of $K_3[B_3O_f_3OH]$ that is comparable to the well-known anticancer drug, 5-fluorouracil. The antitumor activity was tested in vitro on a number of tumor cell lines (adenocarcinoma 4T1, melanoma B16F10, and squamous cell carcinoma SCCVII) and in vivo on solid tumors of the same type in syngeneic mice. The study revealed high sensitivity of tumor cells with the $K_3[B_3O_f_3OH]$, independent of the mode of application.

This study aims to determine the antioxidant capacity and antiradical activity of $K_3[B_3O_f_3OH]$ using the standard 2,2-diphenyl-1-picrylhydrazyl (DPPH) method of antioxidant assay. The research includes two other simpler representatives of the boroxine family (Figure 1), trimethoxyboroxine ($C_9H_9B_3O_6$) and trimethylboroxine ($C_9H_9B_3O_3$), which are commercially available. The objective is to explore the possibility of similar actions within the same class of boron compounds, that is, to examine the activity of $K_3[B_3O_f_3OH]$ compared to the simpler representatives of the same compound family.

**Figure 1: 3-dimensional structures of selected boroxines**

<table>
<thead>
<tr>
<th>Trimethoxyboroxine</th>
<th>Trimethylboroxine</th>
<th>Halogenated boroxine</th>
</tr>
</thead>
<tbody>
<tr>
<td>($C_9H_9B_3O_6$)</td>
<td>($C_9H_9B_3O_3$)</td>
<td>($K_3[B_3O_f_3OH]$)</td>
</tr>
</tbody>
</table>

**Data and Methodology**

All chemicals used were of analytical grade. 2,2-diphenyl-1-picrylhydrazyl (DPPH), trimethoxyboroxine, and trimethylboroxine were supplied by Sigma-Aldrich, Merck, Germany. The halogenated boroxine, $K_3[B_3O_f_3OH]$, was prepared through a simple reaction between potassium hydrofluoride, KHF$_2$, and boric acid in the molar ratio of 2:3, at room temperature, as reported in the literature by Ryss and Slutskaya (1951).

The DPPH method was the standard method for the determination of antioxidant activity using a stable free radical, 2,2-diphenyl-1-picrylhydrazyl (DPPH, $C_{18}H_{12}N_3O_6$, Mw=394.32 g/mol). 2,2-diphenyl-1-picrylhydrazyl is characterized as a stable radical due to the existence of delocalized electrons that are not concentrated in one place. The electrons’ influence is felt throughout the molecule, and therefore there is no dimerization. The radical system has a dark purple color. After mixing radicals with antioxidants, hydrazine is reduced to hydrazine, donating hydrogen atoms by antioxidants to unpaired electrons of nitrogen. The reduction from hydrazyl to hydrazine occurs through the gradual loss of color, which can be observed by measuring absorbances at a wavelength of 520 nm.

DPPH$^+$ + AH → DPPHH + A$^-$

As discussed in more detail by Kedare and Singh (2011), while the DPPH radical readily accepts an electron or proton and becomes a stable diamagnetic molecule, its oxidation is complex and irreversible.
The DPPH method is fast, simple, inexpensive, and widely used as a reliable method of determining the ability of molecular systems that act as ‘traps’ for free radicals or hydrogen donors. The method is unique because samples react with the DPPH radical, which is dissolved in methanol, ethanol, or water. The measured values are comparable with the results of other methods: ferric ion reducing antioxidant power (FRAP), 2,2’-azino-bis(3-ethylbenzthiazoline-6-sulphonic acid) (ABTS) etc. The advantage of this method is that the DPPH radical reacts with the entire studied molecular system. If the reaction time lasts long enough, the DPPH radical can react with weaker antioxidants, in polar and non-polar organic solvents. This allows the detection of hydrophilic and lipophilic antioxidant through the visible colorimetric change after 15–20 minutes of reaction, in a darkened room. The antioxidant efficiency is usually measured at room temperature, which reduces the risk of thermal degradation of the tested molecule. The limitation of the method is reflected in the DPPH radical reactivity towards other radicals, in that it loses the linear response curve of the standard state by varying the antioxidant:DPPH ratio. This radical is sensitive to some Lewis bases and the presence of oxygen. The method is generally accepted because the measurement results are easily reproducible and small volumes of chemicals in the slightly acidic pH range of 5.0 to 6.5 are used. The initial concentration of DPPH should give absorbance values less than one. The simplest approach to the interpretation of results is a graph showing the dependence of absorbance on the concentration of substrate.

The measurement of the DPPH radical scavenging activity was performed according to methodology described in Brand-Williams, Cuvelier and Berset (1995). The solution of 4 mg DPPH in 100 ml of H2O was freshly prepared. The solution was diluted with H2O until the absorbance readings were no longer detected in the area of 1.0 (± 0.2). All samples were made in the initial solution of 1 M (K3[B2O3F2OH], Mw = 251.50 g mol⁻¹; trimethoxyboroxine, Mw = 173.53 g mol⁻¹, ρ = 1.195 g mL⁻¹; trimethylboroxine, Mw = 125.53 g mol⁻¹, ρ = 0.898 g/ml). Ethanol was used as the solvent for trimethoxyboroxine and trimethylboroxine, while K3[B2O3F2OH] was dissolved in water. Lower sample concentrations (1 mM, 10 mM, and 100 mM) were prepared by serial dilutions of higher sample concentration. The cuvette microtiter plates were filled with 200 μL of DPPH and 10 μL of sample in various concentrations. The microtiter plate was allowed to stand in the dark, at a temperature of 35°C, for one hour, after which the absorbances were measured. The experiment was done in triplicate for each substance and each concentration. Radical scavenging activity was calculated using the following equation (1):

\[
\text{Radical Scavenging Activity [\%]} = 100 \times \frac{(A_{\text{control}} - A_{\text{sample}})}{A_{\text{control}}} \tag{1}
\]

where

- \(A_{\text{control}}\) is absorbance of control, and
- \(A_{\text{sample}}\) is absorbance of sample

Measurements were obtained using a spectrophotometer Tecan Sunrise-Basic Tekan 2007 at the Department of Biochemistry at the Faculty of Chemical Technology, University of Split.

**Results and Discussion**

The results are shown as the dependence of absorbance readings on boroxine concentrations (Figure 2). The graph shows the mean absorbance value of samples and controls. The standard deviation expressed as a percentage of the mean value (for all measurements) was ±4.5%. Spectrophotometric test specimens themselves without DPPH radicals, showed no discoloration in a wide range around and at a wavelength of 520 nm, at which the measurements were made.

The absorbance readings of trimethylboroxine and trimethoxyboroxine show a slight color increase of DPPH radical-sample complex almost in all tested concentrations. If the formula that calculates the percentage of radical inhibition is applied to calculate the percent of increase in color of DPPH radical-sample complex, the trimethylboroxine is 0.06% to 1.45%, and the trimethoxyboroxine 1.78% to 6.51%. Results show that trimethylboroxine and trimethoxyboroxine do not act as antioxidants by the principle of giving electrons to free radicals to ‘turn off’ their radical activity.
Similar results were measured with halogenated boroxine \( \text{K}_2\text{[B}_3\text{O}_3\text{F}_3\text{OH]} \). At lower concentrations, it showed weak antioxidant activity (from 0.38% to 0.92%). The slight color increase in the DPPH radical-sample complex occurred in the sample of 100 mM (2.33%), while at a concentration of 1 M a strong color increase (33.55%) was observed. The results indicate that the halogenated boroxine acts as a highly weak antioxidant according to the principle of surrender electrons to free radicals at lower concentrations, whereas at higher concentrations shows no antioxidant activity.

![Figure 2: Measured dependence of absorbance (ABS) and the concentration of tested samples](source: Author)

The results suggest that boron atoms in the ring of trimethylboroxine and trimethoxyboroxine connect with three valence electrons from the outer shell (sp\(^3\) hybridized form). These compounds do not include OH groups, which could indirectly release electrons to the free radicals. Carbon in a CH\(_3\) group is less electronegative than oxygen, and there is a small possibility that the CH\(_3\) group releases a proton, and then an electron. It was expected that trimethylboroxine and trimethoxyboroxine would exhibit insignificant antioxidant activity, although according to the results of recent studies, boron, like carbon, has the ability to create individual ions and possibly exchange rings with radicals and halt their most reactive form.

The halogenated boroxine has two boron atoms in the ring that form four links. This configuration allows the boron atoms to connect through electrons of the inner shell, which are strongly affected by the attracting force of the core, especially in small atoms such as boron. Thus, these atoms convert to sp\(^3\) hybridized forms. Both forms of boron atoms are strongly influenced by electronegative fluorine atoms, and excitation of electrons from the inner shell provides a theoretical possibility of giving but also receiving electrons. The halogenated boroxine molecule has one OH group, which could free an electron. It was expected that the halogenated boroxine would show some antioxidant activity at lower concentrations than observed. The readings of increased color may indicate that the atoms of boron, especially in halogenated boroxine, are ‘hungry’ for electrons, and that instead of terminating free radicals, they continue their propagation.

The experiment with a sample of the 1-M concentration of halogenated boroxine was repeated many times with results that consistently showed a pronounced standard deviation relative to the mean of ±1.9%. We conclude that at the high concentration, the halogenated boroxine reacted with the DPPH radical in an unusual way. As the solvent for the DPPH radical and halogenated boroxine is water, it was not expected to contribute to the observed reaction. If the reaction occurred at a high concentration, then there is no reason for a weaker form repeated at lower concentrations.

In the assay, at higher concentrations the ratio between the quantity of DPPH radical and that of the sample was affected, as compared to similar tests at lower concentrations, and it is possible that this
ratio affects the results. Future studies could first determine the sensitivity of the results on reaction parameters, such as temperature, reaction time, type of solvent, and the ratio of DPPH radicals to sample, and then determine how to lessen these effects on the results.

Where the reaction parameters show no substantial effect, and since a reduction in color intensity means antioxidant activity, an increase of color intensity could indeed be interpreted as a pro-oxidant effect. Future research, in such a case, would be needed to confirm the thesis that halogenated boroxine are pro-oxidative.

According to recent literature, a pro-oxidant activity is not insignificant in the fight against cancer, because tumor cells have a particularly high sensitivity to the accumulation of free radicals in the cytoplasm. Thus, pro-oxidants are cytotoxic for the tumor cells, though not for healthy cells. Nevertheless, research into pro-oxidative properties is in the early stages, and there remains a lack of substantial evidence supporting this case.

**Conclusion**

The tested boroxines showed an exceedingly weak antioxidant (halogenated boroxine at lower concentrations) or no antioxidant activity. In most samples, the color absorbance increased in the DPPH radical-sample complex, especially at the 1-M concentration of halogenated boroxine. Future research is needed to investigate whether the parameters of the test reaction (reaction time, temperature, the ratio of DPPH radicals, and sample) influence the results and how this might occur, and whether the tested boroxines behave as pro-oxidants.

**Acknowledgment**

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**References**


SYNTHESIS OF FUNCTIONALIZED MCM-41 MESOPOROUS SILICA

Nevin Karamahmut Mermer,¹ Muge Sari Yilmaz²

Abstract: The invention of mesoporous materials is of significant interest to many scientists worldwide. The Mobil Crystalline Materials No 41 (MCM-41) is a well-known mesoporous molecular sieve that was discovered in 1992 by a scientist at the Mobil Oil Corporation. The MCM-41 is widely used in catalysis, ion exchange, drug delivery, optics, gas sensing, and sorption. In this study, the surface of a mesoporous silica MCM-41, synthesized from pure silica, is functionalized with a methyl group by grafting. The synthesized and functionalized samples are characterized by X-ray powder diffractometer (XRD), and the functionalized sample are also characterized by Fourier transform infrared spectroscopy (FTIR). The textural properties of the samples are determined using N₂ adsorption and desorption analysis. Thermal behaviors of the samples are analyzed using thermogravimetry (TG) and derivative thermogravimetry (DTG). The results of the analyses show that the functionalization of the synthesized material through grafting was accomplished with the surface area of the functionalized sample determined as 600.87 m² g⁻¹.

UDC Classification: 66.03; DOI: http://dx.doi.org/10.12955/cbup.v5.1089

Keywords: MCM-41, grafting, methyl group, functionalization, XRD

Introduction

The Mobil Crystalline Materials No 41 (MCM-41) is a member of the M41S family and was first discovered by researchers at the Mobil Research and Development Corporation in 1992 (Gaydhankar et al., 2006; Feil et al., 2009). Porous materials can be classified based on certain criteria, such as pore shape, pore size, and production method. The most widely accepted classification is that of the International Union of Pure and Applied Chemistry (IUPAC) using pore sizes: microporous (pore diameter < 2 nm), mesoporous (pore diameter 2 – 50 nm), and macroporous (pore diameter > 50 nm; Kenneth, 1998).

The MCM-41 is an ordered mesoporous hexagonal structure that has an increasing number of applications, such as adsorption, optics, gas sensing, catalysis, drug delivery systems, molecular sieving, and membranes for filtration and ion exchange (Belmabkhout et al., 2009; Kim et al., 1995; Kozhevnikov 1995; Selvam et al., 2001; Xiao-Dong et al., 2010; Yuliarto et al., 2004; Zhao et al., 1996). It is an ideal candidate for specific adsorbent design because the pore size can be adjusted by modifying or functionalizing the organic functional groups that are used in quite extensive experimental investigations (Araki et al., 2009; Vartuli et al., 1996). Functionalization with organic and inorganic groups is carried out to improve the physical and chemical properties of mesoporous silica materials. These new organic-inorganic hybrid mesoporous silica structures have attracted attention due to their large surface areas, pore structures, and functionalized structures. These properties avail its extensive use in several areas of application (Taib et al., 2011). Studies on using mesoporous silica modified with amine groups as adsorbents in CO₂ adsorption are quite extensive (Belmabkhout et al., 2010; Builes & Vega, 2012; Gholami et al., 2016; Klinthong et al., 2013; Liu et al., 2015; Wang et al., 2015). The various chemical ligands that are either organic or inorganic can be anchored on the surface of MCM-41. These modifications have a considerable effect on the surface and structural properties of the mesoporous materials (Zhao et al., 2000). For instance, silylation of the MCM-41 improves the hydrothermal and mechanical stability of material due to its advanced hydrophobicity (Zhao & Lu, 1998). There are studies that attract great interest regarding the application of the functionalized mesoporous materials by organic compounds. These include heavy metal removal from water, CO₂ capturing, drug delivery system, and catalytic applications (Builes et al., 2012; Faghihian & Naghavi, 2014; Manzano et al., 2008; Rath et al., 2014; Wu et al., 2010). In the present study, the MCM-41 mesoporous silica was synthesized from sodium metasilicate pentahydrate, and then, modified using tri-methoxymethyl-silane (TMMS). The synthesized pure sample was characterized by X-ray powder diffraction (XRD), N₂ adsorption and

¹ Faculty of Chemical and Metallurgical, Yildiz Technical University, nevinkaramahmut@hotmail.com
² Faculty of Chemical and Metallurgical, Yildiz Technical University, mugesari@yildiz.edu.tr
desorption, and DTA or TG. The functionalyzed sample was also characterized by XRD, Fourier transform infrared spectroscopy (FTIR), N₂ adsorption and desorption, and DTA or TG.

**Data and Methodology**

The pure silica source used in the synthesis of MCM-41 was sodium metasilicate pentahydrate (SMP, SiO₂Na₂·5H₂O, 99% purity). The organic template hexadecyltrimethylammonium bromide (HTABr, 99% purity), sodium hydroxide (NaOH), sulfuric acid (H₂SO₄, 95-98%), trimethoxymethylsilane (TMMS), CH₃Si(ΟCH₃)₃, ≥ 98.0 %, and toluene (C₆H₅CH₃, ≥ 99.9 %) were obtained from Merck.

In the functionalization process, the sample was mixed in the Zhicheng ZHWY-200B brand incubator shaker. Crystallographic properties of the synthesized samples were investigated using a PANalytical XPert-Pro XRD instrument with Cu-Kα tube (λ = 0.153 nm). The functional band of the modified sample was determined by the FTIR-KBr technique with Perkin Elmer Spectrum One FT-IR spectrophotometer at a wavelength of 400–450 cm⁻¹.

Textural properties of the samples were determined on a Micromeritics ASAP 2020 surface area and porosimetry system. The specific surface area of the synthesized samples was calculated using the Brunauer-Emmett-Teller (BET) method. The BET surface area (S BET, m² g⁻¹) was calculated using an adsorption data, with a relative equilibrium pressure (P/P₀) in the range of 0.03 to 0.30. Thermal properties of synthesized and modified MCM-41 samples were subjected to thermal analysis in a Perkin Elmer Pyris Diamond DTA-TG thermogravimetry instrument. Analyses of the samples were carried out at nitrogen flow rate of 200 ml min⁻¹. The samples were heated from 35 °C to 900 °C with a heating rate of 10 °C min⁻¹ by using a platinum crucible.

The Synthesis of MCM-41

For the synthesis of MCM-41, a certain amount of SMP was dissolved in water to prepare 1.5-M sodium silicate solution. The appropriate amount of sodium silicate solution was added drop by drop into the prepared HTABr solution, and then, the obtained solution was stirred for one hour with a magnetic stirrer. The pH of the solution was adjusted to 11 with sulfuric acid. After the pH adjusting, the solution was aged overnight. The solution with the precipitate was filtered and washed with distilled water. The resulting white-solid sample was dried overnight at 100 °C and then, calcined at 550 °C to remove the template from the structure.

Functionalization of Obtained MCM-41

Functionalization of the synthesized sample with methyl groups was carried out by a grafting method. Firstly, a certain amount of MCM-41 sample was dissolved in dry toluene, then TMMS was added to the mixture under stirring. The resulting mixture was added to an incubator shaker and stirred at room temperature for 24 hours. At the end of the shaking period, the solution was left under reflux for six hours. The mixture was filtered, washed several times with dry toluene, and then dried at room temperature. The functionalized sample was named MCM-41-TMMS.

**Results and Discussion**

Figure 1 presents the XRD diagrams of prepared MCM-41-TMMS and MCM-41 adsorbents. The diagrams show characteristic peaks of MCM-41, namely, a strong (100) reflection peak with two small peaks (110 and 200) resulted after functionalization. This result indicates that the regular structure of MCM-41 was preserved after functionalization. In comparison, the peak intensities of MCM-41-TMMS (MCM-41 after the methyl group grafting) were noticeably lower.

The FTIR spectrum of the MCM-41-TMMS is shown in Figure 2. Only the peaks that differed from the MCM-41 sample were marked in the spectrum. Accordingly, the observed peaks at 2974.13 and 2922.41 cm⁻¹ belonged to the C–H asymmetric stretching vibrations of the methyl groups. The symmetric stretching vibration of C–H appeared at 2853.44 cm⁻¹. The observed peak at 1277.06 cm⁻¹ was affiliated to the symmetric deformation bending of C–H. The FT-IR spectrum of MCM-41-TMMS indicates whether a methyl group has been successfully grafted on the MCM-41 structure (Al-Oweini & El-Rassy, 2009).
Figure 1: X-ray powder diffraction patterns of Mobil Crystalline Materials No 41: a) alone and b) grafted with trimethoxymethylsilane

Source: Authors

Figure 2: The Fourier transform infrared plot of Mobil Crystalline Materials-41 grafted with trimethoxymethylsilane

Source: Authors
The TG or DTG curves of the samples are shown in Figure 3. For MCM-41, only one weight loss was found to occur between 35 °C and 105 °C, with the weight loss of 0.65% due to the removal of physisorbed water on the external surface of the adsorbent. From 105 °C to 900 °C MCM-41 presented no obvious weight loss (Taib et al., 2011). The MCM-41-TMMS demonstrated minor weight loss up to 220 °C. From this temperature to 820 °C, a weight loss of 5.6% was observed due to the decomposition of the TMMS (Deepak et al., 2014).

### Table 1: Structural properties of the adsorbents: Mobil Crystalline Materials-41 (MCM-41) alone and with grafting with trimethoxymethylsilane (MCM-41-TMMS)

<table>
<thead>
<tr>
<th>Adsorbents</th>
<th>$S_{BET}$ (m² g⁻¹)</th>
<th>Pore volume (cm³ g⁻¹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCM-41</td>
<td>939.98</td>
<td>0.61</td>
</tr>
<tr>
<td>MCM-41-TMMS</td>
<td>600.87</td>
<td>0.47</td>
</tr>
</tbody>
</table>

$S_{BET}$: Specific area surface under Brunauer-Emmett-Teller theory.

The textural properties of the samples are listed in Table 1. There was a decrease in both the specific area surface ($S_{BET}$) and the pore volumes of the MCM-41 after functionalization (MCM-41-TMMS) that was related to replacing the silanol groups on the silica inner surface with methyl groups.

### Conclusion

In this study, MCM-41 was successfully synthesized from pure silica source. The obtained sample was functionalized with methyl groups to improve surface properties. The characterization of the samples was carried out using different analysis techniques. According to the results of these, the methyl groups were successfully grafted on the sample surface. The $S_{BET}$ and pore volumes of the MCM-41-TMMS were lower after the functionalization. The thermal stability temperature of MCM-41-TMMS in a nitrogen atmosphere was determined at about 220 °C.

### References


Abstract: The article presents an unsupervised learning algorithm that groups technological features in a setup for machining process. Setup generation is one of the most important tasks in automated process planning and in fixture configuration. A setup is created based on approach direction of the features. The algorithm proposed in this work generates a neural network that determines the setup each feature belongs to, and the number of setups generated is minimal. This algorithm, unlike others, is not influenced by the order of the input sequence. Parallel implementation of the algorithm is straightforward and can significantly increase the computational performance.

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Keywords: neural networks, setup generation, interacting features, technological process

Introduction

The last 20 years have seen many works on automated process planning. Particular attention has been paid to fixture design and the setup and ordering of features (Joneja et al., 1999). Setup planning deals with the grouping of features into setups in proper sequences, sequencing the setups, and choosing machines, tools, and fixturing. Setups are used to group similar features that are processed at each step of the process. Setup generation done during the fixture design phase is aimed at determining the axial orientation and position of the grouped features as well as the cutting tools required to manufacture them (Rong, 2007). The setup generation phase takes into account both the requirements of the process planning and fixture design (Stampfer, 2009). Setup generation in Sakurai (1992) uses the location tolerance of the workpieces. Other CAPP systems (Delbressine et al., 1993) employ tolerances of the workpieces as criteria for setup generation and sequencing.

Neural network generation

In recent years many researchers have employed the neural network approach to solve setup generation problems (Pao et al., 1993, Westhoven et al., 1992). The standard approach is to either use different relationships between the approach directions in the given features, or based on approach direction and another factor such as tool commonality. Such algorithms do not always give optimal results for real technological processes. The number of generated setups strongly depends on the input features sequence.

The algorithm proposed in this work generates a neural network that determines the setup each feature belongs to, and the number of setups generated is minimal. The proposed unsupervised neural net can be viewed as modification of the one in Chen (1993) and solves the problem of the input feature sequence. An approach direction is a straight path that gives a tool an unobstructed access to the feature in the workpiece. Some features may have more than one approach direction. A neural network consists of clusters and every cluster represents a set of features that have at least one approach direction in common (Chen, 1993). We say that two clusters have a common approach direction if all features of the two clusters combined have a common approach direction. The net under consideration has a leveled structure. Each level of the net consists of a number of clusters and the clusters of this level may or may not share a common approach direction. One can merge clusters with common approach directions to form new cluster on the next level of the net. The idea behind the algorithm is to create the next level by merging clusters and thus producing fewer clusters with fewer common approach directions. Eventually the net reaches a level where any two given clusters do not share a common direction. This last level will determine the number of setups and their layout.

Self-Organized net generation algorithm

Let \( k \) be the number of different approach directions. For each feature \( F_j \) we associate the vector \( B_j = B_j^1 B_j^2 \ldots B_j^k \) in the following way: \( B_j^i = 1 \) if \( j \) is a valid approach direction, otherwise \( B_j^i = 0 \).

1 Faculty of Industrial Technology, Technical University of Sofia, Bulgaria, omihaylov@tu-sofia.bg
2 Faculty of Industrial Technology, Technical University of Sofia, Bulgaria, ginic@tu-sofia.bg
3 Institute of Information and Communication Technologies, Bulgarian Academy of Sciences, Sofia, Bulgaria, p.t.popov@city.ac.uk
other words, $B_i$ represents the bit mask of the allowed approach directions. It can also be treated as a binary number or as a $k$-dimensional vector of zeros and ones.

The neural network consists of $k$ levels numbered $0, 1, ..., k-1$. Clusters are denoted as $A_i^j$ - the $j$th cluster on the $i$th level of the net. Each cluster in the net possesses internal memory in the form of a single integer value which we denote $a_i^j$. Let this cluster represent the features $F_i, ..., F_i$. Then we have $a_i^j = B_i & B_i ... & B_i$, where & is the binary AND operator. In this way the 1s in the binary representation of $a_i^j$ indicate the approach directions that are common to all the features in this cluster, and the 0s represent approach direction that are not allowed for at least one feature in the cluster. Clearly two clusters, say $A_i^h$ and $A_i^j$, share a common approach direction if and only if $a_i^h & a_i^j \neq 0$.

Only clusters from neighboring levels are interconnected. For any level $p < k$ we introduce an integer weight function $e(A_p^j, A_{p+1}^j)$ associated with the connection from $A_p^j$ to $A_{p+1}^j$. The clusters can send the value of their memory $a_i^j$ across each connection (Chen C.L. P., 1993). The weight functions are determined as each cluster sends its internal memory across the newly formed connection. Each weight function assumes a nonzero value equal to the value sent from $A_p^j$ to $A_{p+1}^j$ if the cluster $A_p^j$ is grouped to $A_{p+1}^j$ (i.e. we also say that $A_p^j$ is being merged with some other clusters from that level to produce $A_{p+1}^j$) and is equal to zero otherwise. After the construction of the net is complete the internal memory of the clusters on the last level will tell the number of setups and the features that belong to each one of them.

At any time the value $a_i^j$ - in binary form - gives the allowed approach directions for this cluster. A new cluster is created at level $j+1$ if $A_i^j$ is determined to have approach directions incompatible with any existing cluster at level $j+1$. The internal memory of this newly created cluster is initially set to $a_i^j$. Clusters are grouped based on the similarity of the approach directions they represent. This “similarity” is expressed by the function $g(B_i, B_j)$ that takes two $k$-digit binary numbers $B_i$ and $B_j$ as arguments. It is defined as follows:

$$g(B_i, B_j) = \begin{cases} \lambda(B_i \text{ XOR } B_j) & \text{ if } B_i \text{ and } B_j \neq 0 \\ \infty & \text{ otherwise} \end{cases}$$

where $\lambda(N) = \sum_{i=0}^{k} N_i$, for the binary number $N = N_1N_2...N_k$ and the binary operation $\text{XOR}$ (exclusive or) is Figure 1.

When we write $g(F_i, F_j)$ we imply $g(B_i, B_j)$ where $B_i$ and $B_j$ are the bitmasks of the two features $F_i$ and $F_j$. When we write $g(a_i^j, a_i^j)$ we simply treat $a_i$ and $a_i^j$ as binary numbers.

When the two features (or clusters) $F_i$ and $F_j$ have at least one common direction then $g(\cdot, \cdot)$ returns the number of directions that are acceptable for $F_i$ and are not acceptable for $F_j$ and vice versa – acceptable for $F_j$ and unacceptable for $F_i$. It appears that the distance between $F_i$ and $F_j$ is simply the square of the usual Euclidean distance between the vectors $B_i$ and $B_j$ that is $\sum_{i=1}^{k} (B_i^j - B_i^j)^2$. If, however, $F_i$ and $F_j$ do not share a common direction then $g = \infty$ and as will be shown below, this does not allow for the two clusters to be grouped (in practical implementations one simply sets $g(\cdot, \cdot)$ to a sufficiently big integer). The distance between two features (or clusters) depends not only on the
shared approach directions, but also on the ones that are incompatible. The higher the value of \( g \) the more incompatible approach directions the two clusters have.

The structure of the net is shown in Figure 2. The description of the algorithm is inductive with respect to the number of levels. The order in which new clusters are created on any given level is not important. We suppose that level \( p \) is created and show how to create the next level \( p+1 \). For the sake of simplicity we assume that the clusters from level \( p \) are read in the order of their creation. By reading an input cluster we mean that its internal memory is sent to the next level.

1. The generation of the net begins with the creation of level 0: All input features \( F_i \), \( i = 1,2,\ldots,n \) are read from the input and the respective clusters \( A_0^i, a_0^i = F_i \) are created.

2. Suppose all levels of order up to \( p \) inclusively are already constructed. Let level \( p \) have \( m \) clusters. Level \( p+1 \) is constructed as follows:
   a. Step 1. [Create first cluster on level \( p+1 \)] Read the first input \( a_1^p \). Create cluster \( A_{p+1}^1 \) (on level \( p+1 \)) with initial internal memory \( a_{p+1}^1 = a_p^1 \) (and a single link) \( e(A_p^1, A_{p+1}^1) = a_p^1 \).
   b. Step 2. [Next input] Read next input - \( a_i^p \).
   c. Step 3. [Determine distance] Let level \( p+1 \) contain the clusters \( A_{p+1}^1, A_{p+1}^2,\ldots,A_{p+1}^{q-1} \). Evaluate \( g(a_p^j, a_{p+1}^j) \) for all \( j = 1,\ldots,q-1 \). If \( g(a_p^j, a_{p+1}^j) \leq p \) is true for at least one \( j \), then go to step 4 (NOTE: if \( g(a_p^j, a_{p+1}^j) \leq p \) for several values of \( j \) simple choose one of them arbitrarily). Otherwise, if \( g(a_p^j, a_{p+1}^j) > p \) for all \( j = 1,\ldots,q-1 \), go to step 5.
   d. Step 4. [Grouping] Group \( A_p^j \) to \( A_{p+1}^j \):
      i. Set the memory of \( A_{p+1}^j \) to \( a_{p+1}^j = a_p^j \& a_p^j \).
      ii. Update the weights of all links from \( a_p^j \) to clusters on level \( p+1 \): set \( e(A_p^l, A_{p+1}^j) = a_p^j \) and set \( e(A_p^l, A_{p+1}^l) = 0 \) for \( l \neq j \). Go to step 6.
   e. Step 5. [Create new cluster]. Create new cluster \( A_{p+1}^q \):

---

**Figure 1: Binary operation XOR (exclusive or)**

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>A XOR B</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

**Figure 2: Structure of the neural net.**

Source: Authors

Source: Authors
i. Set its memory to \( a'^{q}_{p+1} = a'_p \). Create a single link from \( A^i_p \) to \( A^{q}_{p+1} \) with

weight \( e(A'_p, A^{q}_{p+1}) = a'_p \). All other weights are equal to zero, i.e.

\( e(A'_p, A^{l}_{p+1}) = 0 \) for \( l = 1,2...q-1 \) and \( e(A'_p, A'^{q}_{p+1}) = 0 \) for \( l = 1,2...l-1 \).

Go to step 6.

f. Step 6. If there is no further input from level \( p \), then level \( p+1 \) is constructed. STOP.

Otherwise go to step 2.

3. The generation of the net is completed when level \( k-1 \) is constructed.

Suppose that when the last level \( k-1 \) (remember that \( k \) is the number of different approach direction and we have \( k \) levels – 0,1,…,\( k-1 \)) we have the clusters \( A^0_{k-1}, A^1_{k-1}, A^2_{k-1},... \). The definition of the function \( g(\cdot,\cdot) \) guarantees that \( a'_{k-1} \& a^l_{k-1} = 0 \) is true for every two different clusters \( A^l_{k-1} \) and \( A^j_{k-1} \). These clusters determine the number of setups – \( l \), as well as the approach directions for each setup – the bitmask of the internal memory \( a^i_{k-1} \) for \( i = 1,\ldots,l \). Note the following: it might happen that for some \( s < k \) it is true that \( a'_{i} \& a^s_{i} = 0 \) for any two clusters on that level, and thus any subsequent level \( s+1,\ldots,k \) will have the same clusters as level \( s \). If this happens it is not necessary to build any subsequent levels. However each time we generate a new level we should make the comparisons \( a'_{i} \& a^j_{i} \) in addition to all other operations involved to check for this condition, while building all levels up to number \( k \) eliminates these additional computations.

To determine the setup to which a feature \( F_i \) belongs to one proceeds in the following way: starting from cluster \( A^0_0 \) one follows the one link that has a non-zero length and reaches level. Then one follows the only non-zero weighted link that leads to level 2. The procedure is repeated until the last level \( k-1 \) is reached. The cluster that we reach on that last level is the required setup.

<table>
<thead>
<tr>
<th>Table 1: Features and approach directions of a sample part.</th>
<th>Figure 3. First part.</th>
</tr>
</thead>
<tbody>
<tr>
<td>( F_1 )</td>
<td>0</td>
</tr>
<tr>
<td>( F_2 )</td>
<td>0</td>
</tr>
<tr>
<td>( F_3 )</td>
<td>0</td>
</tr>
<tr>
<td>( F_4 )</td>
<td>0</td>
</tr>
</tbody>
</table>

Source: Authors

Testing of the neural network

In order to test the neural network two benchmark parts were designed. The first part to be tested is shown in Figure 3. It has four different features, and the approach directions are shown in Table 1.

The structure of the net with the appropriate weight functions is shown in Figure 4. It is constructed in the following way:

1. Level 0 of the net consists of four clusters - \( a^1_0, a^2_0, a^3_0 \) and \( a^4_0 \) - that represent the features \( F_i \), \( i = 1,2,3,4 \) with their respective approach directions.
2. Level 1 is built according to steps 2 through 5 of the algorithm. Here is an outline of the execution path (we have \( p=0 \)):

a. Cluster \( A_0^1 \) is read from the input (it corresponds to feature \( F_1 \), see the way level 0 is defined) and cluster \( A_1^1 \) is generated: \( a_1^1 = a_0^1 = [010010] \)

b. Cluster \( A_0^2 \) (= \( F_2 \)) is read and we get \( a_0^2 = [001011] \); \( g(a_0^2, a_1^1) \), which is evaluated: 

\[ g(a_0^2, a_1^1) = 3 > 0 = p \]

c. A new cluster \( A_1^2 \) is created, \( a_1^2 = a_0^2 = [001011] \) and the respective weight is

d. \( e(A_0^2, A_1^2) = a_0^2 = [001011] \)

e. The input from the previous level – level 0 – is not empty. So, we repeat again steps 2 through 5.

f. Level 1 is completed when \( A_0^4 \) is created.

3. Finally a network of five levels is generated. The last level consists of two clusters, namely \( a_5 \) = \([010010]\) representing features \( F_1 \), \( F_2 \) and \( F_3 \), and cluster \( a_5^2 = [001001] \) that represents only \( F_4 \). Although levels 3, 4 and 5 have the same number of clusters, we generate all levels up to 5 (the number of different approach directions is 6). A simple inspection of Table 2 reveals that the minimal number of setups for this part is 2, and this was the result of the algorithm.

The second part that was tested is shown in Figure 5 and has 12 features. The algorithm was tested for various ordering options of the input features. In all cases the number of clusters at the final level is two - \( A_1^2 \) (representing features \( F_1, F_2, F_3, F_4 \) and \( F_{12} \)) and \( A_2^2 \) (representing features \( F_5, F_6, F_7, F_8, F_9, F_{10} \) and \( F_{11} \)). Again, two is the minimal number of setups possible for the part.

---

**Parallel generation of the net.**

It is clear that each cluster generated on level 0 and level 1 is initialized once and then its internal memory is not changed. Indeed, level 0 does not involve any grouping. Clusters on level 1 are grouped only if the distance between the clusters from level 0 is 0, that is the bit masks of the clusters being grouped are the same.

This means that these clusters on level 1 and 2 can be formed as soon as the clusters from the previous level become available. Another possibility for parallelism becomes available when a given \( a_i^j \) (from any level \( i \)) assumes a bit mask that has a single 1. If this is the case, any clusters that are grouped to \( A_i^j \) should have at least one common approach direction and since \( A_i^j \) has only one allowed direction (the bit mask contains a single 1) its internal memory will not change. Under such circumstances the
value of $a_i$ can be used to begin construction of the next level – $i+1$ before level $i$ is entirely generated. Other situations where parallelism is possible can also be identified but they require additional comparison operations between clusters and are not presented here.

Conclusions

Setup design is an important part of the automated process planning and fixture configuration. The proposed algorithm for setup generation is based on unsupervised neural network. It provides minimal number of setups when the approach directions are used as a criterion. The number of setups that the network generates, unlike (Chen C.L. P., 1993) is independent of the input ordering of the features. A parallel implementation of the algorithm is straightforward and can significantly increase the computational performance. This is important for details with a large number of features.

References


AN INTEGRATED RBR FIXTURE DESIGN SYSTEM

Oleg Mihaylov,¹ Galina Nikolcheva,²

Abstract: Traditionally fixture design processes are costly and time-consuming when carried out manually. To try to reduce the negative features, we are creating a computer-aided fixture design system, integrated in the SolidWorks’ environment. This system uses rule-based reasoning in the form of If-Then-Else rules, incorporated in its VB.NET code. This paper presents our progress in the form of an interactive add-in program for locating parts. This program generates modular fixtures for locating prismatic or cylindrical parts, using rules and mathematical equations. Its usage can shorten the time needed for determining the type and position of every module of the fixture, their assembling, and inspection.

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Keywords: Fixtures, computer-aided fixture design, solidworks, add-in

Introduction

A fixture is a work-holding or support device used in the manufacturing industry – job, batch, and mass production. Fixtures are used to position the workpiece in a specific location and orientation, and support it during machining, ensuring that all parts produced using the same fixture will maintain conformity and interchangeability. These tasks require restricting the six degrees of freedom of the workpiece (Fig. 1a) and there are a variety of locating methods that can facilitate this such as: the 3-2-1 locating principle (6 points location), plane and pin-hole locating, long-pin locating, V-block locating (Fig. 1b).

Figure 1: The six degrees of freedom (a) and methods of constraining them (b).

The costs associated with fixture design and manufacture can account for 10%–20% of the total cost of a manufacturing system (Bi et al., 2001). These costs relate not only to fixture manufacture, assembly, and operation but also to their design. Approximately 40% of rejected parts are due to dimensioning errors that are attributed to poor fixture design (Nixon, 1971). Hence there are significant benefits to be gained by reducing both the design time and the costs associated with fixturing.

Modular fixturing systems are the most widely used flexible fixturing systems in manufacturing. They are based on the standardization of their components and they are designed as groups of pre-manufactured standard elements and units with relatively tight tolerances. Those elements can be assembled in variety of different fixtures for locating and clamping a variety of parts with different geometries, sizes and fixturing requirements. Once all the needed processes are completed the fixtures can be disassembled and reassembled in other completely different configurations (Zhu & Zang, 1990). This is the modular systems’ biggest difference and biggest advantage over the dedicated fixtures as the latter are usually scraped after completing their task. Generally, there are two types of modular fixture systems – T-slot-based and dowel-pin-based, each with their advantages and disadvantages.

¹ Faculty of Industrial Technology, Technical University of Sofia, Bulgaria, omihaylov@tu-sofia.bg
² Faculty of Industrial Technology, Technical University of Sofia, Bulgaria, ginic@tu-sofia.bg
Fixture design system – interface and operation

SolidWorks is a CAD system allowing the use of an application programming interface (API), which allows the automation of many designing and analytical processes for both single parts and assemblies. This is achieved by creating a program with one of the supported programming languages (C++, C#, Visual Basic etc.).

An add-in integrated in the SolidWorks’ environment was developed by using the SolidWorks’ API and the VB.NET programing language. Its task is to automate the fixture design process for locating both prismatic and cylindrical workpieces. The locating is by one of three types – the 3-2-1 locating principle, the plane and pin-hole locating, or the V-block locating. These three options is what gives this add-in greater versatility than other programs which are concentrated only on one method or one type of parts. The automation of the design process is partial because the program needs the user to select locating surfaces, in other words the program is interactive.

The working principle of the add-in is as follows:

With an opened file of type “PART” the user starts it from the Toolbar which opens a new Property Manager Page on the left side of the window (Fig. 2). This page consists of:

- button “Clear” – deletes all names and additional features (axes, planes, points etc.);
- 3 buttons for surface selection – the user selects a surface then presses a button to confirm the selection and to check if the surface isn’t already selected;
- 4 text fields – for displaying information to the user (e.g. The surface is selected, The surface is not acceptable, etc...);
- button “START” – it starts the automated creation of an assembly file.

The user selects a surface and then presses one of the three buttons for selection to let the system collects data from it. The system’s first task is to determine what type of surface is selected – planar, cylindrical or other – and to decide which locating method to use. After that the system collects data on the shape and size of the surface and calculates the positions of the locating elements. The user has to wait for the system to finish its task for each surface before he can select the next one, depending on the surface’s shape and complexity this may take from a few seconds up to 1-2 minutes. After the selections, the user lets the system create the fixture assembly with the button “START.”

![Figure 2: Interface of the ADD-IN.](source: Authors)
Determining the positions of the locating elements

With the location of the parts it is crucial for the locating elements to be correctly positioned. Those positions directly depend on the surface’s shape (rectangle, circle, polygon), its dimensions, and if it’s solid or not, i.e.: are there holes, steps, etc… The program needs to “understand” what portion of the part it can use for locating with the help of the user and the set of rules. This allows the program to find other surfaces in the same plane without the user selecting all of them. The rules are using the SolidWorks’ options, available through the application programming interface (API). After the user selects a surface and presses a button, the program determines its orientation by extracting its normal vector data and gets the coordinates of the end points. Then the program checks every surface of the part for others with the same orientation and in the same plane. If there are such surfaces their end points’ coordinates are added to those of the selected surface.

After the comparison is concluded, a new sketch is created on the selected surface. The coordinates gathered from all end points are transformed to the local coordinate system of the sketch and the maximal and minimal values for each axis are determined - $x_{1\ max}, x_{1\ min}, y_{1\ max}, y_{1\ min}$. Those values are used for the calculation of a center point $O_1$:

$$x_{10} = \frac{x_{\ max} + x_{\ min}}{2}, \quad y_{10} = \frac{y_{\ max} + y_{\ min}}{2}. \quad (1)$$

The locating points are going to be calculated in relation to this center point in such manner that they will imitate the holes pattern on the base plate. Next the distance between the minimal and maximal value for each axis is calculated:

$$\Delta_x = x_{1\ max} - x_{1\ min}, \quad \Delta_y = y_{1\ max} - y_{1\ min} \quad (2)$$

$$k_x = \left\lfloor \frac{\Delta_x}{0.050} \right\rfloor, \quad k_y = \left\lfloor \frac{\Delta_y}{0.050} \right\rfloor. \quad (3)$$

The coefficient $k$ shows the multiplicity of the distance $\Delta$ to the step of the holes on the base plate ($50\ mm$) rounded down to an integer. Those coefficients are used for the calculation of the coordinates for the location elements so the round down guarantees that they will be between the endpoints of the surface. The coordinates are calculated as follows:

$$u_{11} = u_{12} = u_{10} - k_u \cdot 0.025; \quad u_{13} = u_{10} + k_u \cdot 0.025; \quad (4)$$

$$v_{11} = v_{10} - k_v \cdot 0.025; \quad v_{12} = v_{10} + k_v \cdot 0.025; \quad$$

$$v_{13} = v_{11} + \left\lfloor \frac{0.5 \cdot (v_{12} - v_{11})}{0.050} \right\rfloor \cdot 0.050. \quad$$

The values for $u_{10}, k_u, v_{10}$ and $k_v$ are taken from equations (2) and (3) depending on which value of $\Delta$ is greater – for $\Delta_x \geq \Delta_y \rightarrow u = x, v = y$, and for $\Delta_x < \Delta_y \rightarrow u = y, v = x$. The same logic is applied for the values of $x_{11}, x_{12}, x_{13}, y_{11}, y_{12}$ and $y_{13}$. With the calculated coordinates the program creates points in the sketch and closes it. Next there are checks on whether the points lie on the surface (or surfaces). The task of those checks is to avoid placing a locating element in a hole, a groove or outside the surface. If at least one point is not on the surface (or surfaces) (Fig.3,a) the program implements one or series of corrections aiming to get all points on the surface.

The corrections can be the mirror reversal of the points to one axis (Fig.3b) or a single or multiple displacement of all the points along one or both axes at a distance equal to the portion of the free space $f$ (Fig.3c), i.e. from (2) and (3):

$$f = \frac{\Delta - (k \cdot 0.050)}{2}. \quad (5)$$
Other corrections are recalculation of the coordinates with coefficient \( k-1 \), with the possibility of repetition until \( k = 1 \) or swapping the coefficient \( u \) and \( v \). The different corrections can be combined in various ways so after one type of correction, multiple corrections of different type can be executed.

When all points are lying on the surface, the program checks if the center of gravity (its projection on the plane of the surface) lies in the triangle of the three points. If it does, then the determination of coordinates is completed successfully, otherwise additional corrections are implemented. The corrections consist of displacement of one or two points along one or both axes at distances which are multiples of 50 mm (Fig. 4).

After the successful selection of the first surface (i.e., all checks are passed successfully) the user can make a selection for the second and third surfaces. For determining the locating points on the second and third surfaces the center point \( O_1(x_{10}, y_{10}) \) is projected onto their planes (thus ensuring the same symmetry in all planes) but the coordinates are determined differently than for the first surface. For the second surface the coordinates for one of the axes (the one parallel to the projection of the first surface) are calculated according to \( O_1 \):

\[
(6) \quad u_{21} = u_{20} - \left( \frac{|u_{2\text{max}} - u_{2\text{min}}|}{0.050} \right) * 0.050/2; \quad u_{22} = u_{20} + \left( \frac{|u_{2\text{max}} - u_{2\text{min}}|}{0.050} \right) * 0.050/2.
\]

In (6) \( u_{21}, u_{22} \) are the coordinates on the first axis; \( u_{20} \) is the coordinate of the projected point \( O_1 \) on this axis. The coordinates on the second axis \( v_{21}, v_{22} \) are selected according to the selected adjustable stops (Fig. 5).
The height of the adjustable screw is selected so that the center of gravity (its projection on the plane) is between the locating points and the first surface’s projection. The program creates a point with the calculated coordinates and starts the checks and corrections, similar to those for the first surface. The corrections can be mirror reversal or displacement of one or both points by 50mm on each of the axes. If necessary the locating points can be moved below the center of gravity.

For the third surface the coordinate \( u_{31} \) is calculated similar to \( u_{21} \) and \( u_{22} \):

\[
(7) \quad u_{31} = u_{30} \mp \left( \left[ u_{3max} - u_{3min} \right] * 0.050 \right) / 2.
\]

The symbol \( \mp \) in (7) is replaced with + or - so that the point of center of gravity is between the locating point and the second surface’s projection (Fig.6). For the second axis the coordinate of the point is selected the same way as \( v_{21} \) and \( v_{22} \). The checks and corrections are same as for the second surface.

**Assembly**

Once the selection process is completed successfully the user can select the button “Start” and let the program create a new file of type “ASSEMBLY” (.sldasm). In this file, the program places the base plate as a fixed part and starts inserting and mating processes for all locating and supporting elements and the part. The program inserts the default configuration of every element and changes it according to the values of the \( v_{21}, v_{22} \) and \( v_{31} \) coordinates (for 3-2-1 locating) or the diameter (for the stopping elements with the V-bloc). If it’s needed the adjustable stopper’s body can be placed on raising elements for additional height. The need, type and dimensions of the raising elements are automatically selected by the system.
All elements are mated together at the calculated positions and the system concludes its work by leaving the new assembly for the user to interact with it – to inspect, to manually correct it if needed, to save the file with a selected name and in a selected folder etc. The system can design a locating fixture for one of three methods – 3-2-1 location, plane and pin-hole locating, or V-block locating (Fig. 7).

Conclusions
This paper reports the development of a fixture design system that is able to generate modular fixtures for locating prismatic or cylindrical parts. The system is integrated in SolidWorks and uses the SolidWorks’ options and virtual environment to create an assembly of modular elements from a database. The system is interactive – it needs input information from the user in the form of a selection of surfaces. This information is passed through a series of If-Then-Else rules (Rule-Based Reasoning), compiled by the authors, for the accurate determination of the positions of the locating elements. The system automatically determines the needed modules (type, configurations, number) and their position on the base plate, and mates them into a new assembly file.

A methodology for determining the locating elements’ positions is developed, with rules and mathematical equations. The equations and the rules ensure the precise determination of the locating coordinates for the modules, and their further assembly in the new file. The methodology was developed for the 3-2-1 locating principle, but part of it is used in the Pin-hole locating method.

By using this program, the user can shorten the time needed to determine the type and position of every module of the fixture and in assembling them. The user can also use it for the visual inspection of the design without the need of assembling the fixture, or for comparing two types of locating (e.g. 3-2-1 principle and Plane and pin-hole locating) for comparing locating by different sets of surfaces.

Work is currently being carried on completing the system with clamping and verification.

References
www.fixtureworks.net
ANALYZING WAREHOUSE ERGONOMICS USING SMART TEXTILES

Anca Mocan,1 Ştefan Călin Daniel,2 Anca Drăghici3

Abstract: Ergonomics is well recognized as the study of the design of workplaces, equipment, machines, tools, products, the environment, and systems which takes into consideration a human being's physical, physiological, biomechanical, and psychological capabilities. Within warehouse logistics the need for ergonomic improvements is considerable, given the high level of manual labor and range of movement. Wearable technologies have the potential to improve the means through which an ergonomic study is accomplished. This paper discusses smart textiles and the ways in which they can help with ergonomic modelling by providing a faster and cheaper alternative to video capturing and subsequent computer rendering as well as how they can help in reducing the Hawthorne effect during data collection.

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Keywords: warehouse, logistics, ergonomics, modelling

Introduction

Upon reading the description of ergonomics given by the International Ergonomics Association (2017) it is clearly understood that ergonomics deals with the design of products and processes in order to improve a ‘human well-being’ as well as the ‘overall system performance.’ As Dul (2003) mentions ergonomics seeks to improve the human-machine interaction by assessing both the social as well as the economic impact of product and process design, striving to find a solution that maximizes the positive impact for both. Warehouse logistics is a field that offers vast opportunities for ergonomic process design and analysis as much of the labour done in this area is manual and with a high impact on the body, given the range of movements and positions a worker would be subjected to during the course of a regular work day.

According to Chapanis (1995) the field of ergonomics can be split into two major areas: the conduction of basic ergonomic research that improves the body of ergonomic knowledge, and the assistance in product development and design. In order to conduct ergonomic research, a lot of emphasis is put on finding models of interaction between humans and their respectively analyzed work environments. These models involve an ergonomics expert that analyses the current work environment and acts as a change agent, by modelling the perceived actions of the subject and analyzing their impact. The problem with this approach is that the perceived actions and the actions actually done are never 1:1. Monitoring sensors are often uncomfortable and movement restraining, causing the analyzed person to change their movements in order to be able to accommodate the new machinery. This leads to wrong assumptions and measurements and reduces the added benefit that an ergonomics assessment can bring. Participatory ergonomics seeks to reduce this misinterpretation. Motamedzade et al. (2003) discuss how it is a branch of ergonomics that emphasizes employees’ self potential for conducting ergonomic improvements at work, specifying that end-users should be actively involved in planning and implementing ergonomics solutions. The challenge in this case is to create an environment that is auspicious both to scientific enquiry as well as worker input. One of the ways in which both can be accommodated is with the help of wearable technologies.

In her thesis, King (2011) states that wearable technology is a term that refers to clothing or accessories that are created or enhanced using embedded electronics, while Svanberg (2013) posits that it can be used to aid their users by monitoring information about the user themselves or the surroundings they interact with on a regular basis. While currently the general market for wearable technologies is small, due to the high cost of manufacturing on the one hand and the sense of intrusion of privacy on the other, innovations in the mobile and electronic healthcare area are already providing doctors and patients with expanded capabilities of physiological monitoring. Appelboom et al. (2014) describe how smart sensors are being used for perioperative monitoring and rehabilitation medicine allowing physicians to monitor patients in home and in community settings, which lead to a better understanding of the impact clinical interventions have on the level of mobility and the quality of life.
of the patient. Sanchez et al (2016) claims that the creation of effective and unobtrusive wearable devices is one of the basic applications of pervasive computing, and that this creation can be used to improve the quality of ergonomic research by providing both the means of seamless user analysis as well as the solution to specific ergonomic issues that arise in warehouse logistics.

How smart textiles can help
It is important to first make the distinction within wearable technologies between wearable computers and smart textiles. Wearable computers imply electronics that are housed within a fashion accessory and which allow the consumer to carry out their tasks without being obstructed. Hertleer et al. (2012) define smart textiles as products where using either the physical properties of the material, or electronics woven into the fabric can measure and/or react to stimuli from the user or environment. They have a smaller range than wearable computers, but allow the comfortable wearing of sensors for longer periods of time, making long term monitoring studies easier to do. This paper will further present the benefits of smart textiles in ergonomics research and work design applications.

Smart textiles are defined as textile products such as fibres and filaments, yarns together with woven, knitted or non-woven structures, which can interact with the environment/user. Stoppa et al (2014) divided smart textiles into 3 subgroups:

- Passive smart textiles: only able to sense the environment/user, based on sensors;
- Active smart textiles: reactive sensing to stimuli from the environment, integrating an actuator function and a sensing device;
- Very smart textiles: able to sense, react and adapt their behavior to the given circumstances.

Passive smart textiles can help researchers via fabric sensors which can offer access to information such as body temperature (Sibinski et al., 2010), heart rate (Coosemans et al., 2006), movement and muscle tension (Meyer et al., 2006; Bonato, 2005), amongst others. At the same time carbon electrodes integrated into fabrics allow for the reading of environmental features such as moisture, salinity and contaminants, Zadeh (2006).

Ergonomics analysis often relies on models of human movement. Lämkulla et al. (2006) have shown that the human modelling tool used when showing and visually evaluating results makes a difference, in that there’s a bias that leads to a more thorough analysis of “human looking” models and their postures than that of manikins or enhanced stick figures. The issue with this is the fact that the more humanoid a model looks like the more time and effort have to be spent to add the extra layers of information and design. It’s also safe to say that regardless of the amount of time spent improving the model, by its very definition a model is a representation of a human and not an actual human, thus there is a compromise being made between the number of characteristics a human model retains and which information is eliminated in the process of digitalization and abstraction of the real life information.
Due to the cost efficiency of smart textiles in contrast with the combination of motion capture suits and cameras, analysis on actual humans during the work that they do in their actual working environments becomes a possibility, especially given that traditional warehouse logistics work involves a wide range of movements and positions that would be difficult to catch on a static camera. At the same time, due to the influence of the Hawthorne effect, as McCambridge et al (2014) have reviewed, the knowingly observed subject behaves differently under scrutiny. As represented in Figure. 1 textiles can gather information remotely and repeatedly over the course of a study, therefore creating an environment where the information can be extracted easily while limiting any possible observational biases would decrease the quality of the raw data thus leading to a better understanding of the underlining issues.

As a second step, after a baseline has been established, the possibility of using active smart textiles comes into play. These react to stimuli from the environment, by integrating both actuators and sensors. These textiles are capable of reacting automatically to the stimuli they receive, by becoming, among other things thermo-regulated or water resistant. At this point the same type of analyses can be done as for the baseline, but with modified parameters allowing to see how the change in environment impacts the workers and what kind of changes can improve or worsen the working situation. The third and final step would be to implement a study with the worker wearing very smart textiles, where the textiles can react in a personalized way with the wearer, adapting themselves based on previous experience and learning to react better to the wearer’s movements so that they lessen ergonomic strain whenever possible. Depending on the type of material used and the strength of the fabric, the possibility of a movement training harness arises, which would teach the wearer how to do correctly their daily movements and offer support when the movement done is straining. By changing the fabric of the textile to a material that offers more support one can effectively create an exoskeleton that could take on part of the physical strain, removing it from the wearer’s.

An experimental analysis should therefore have a minimum of 4 settings:

- Normal textiles
- Baseline/passive smart textiles
- Activated smart textiles
- Activated very smart textiles

These settings would allow the researcher to gain a deeper knowledge of the means through which ergonomic improvements can be brought to the analyzed workspace. In Table 1 an example evaluation form is given, which could be used to collect data about the measured bodily outputs of an experimental setting. For each experimental setting one such table should be filled in and, in the end, ranked according to best desired output.

<table>
<thead>
<tr>
<th>Item</th>
<th>Normal textiles</th>
<th>Passive smart textiles</th>
<th>Active smart textiles</th>
<th>Active very smart textiles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>37.5</td>
<td>37.3</td>
<td>36.7</td>
<td>36.6</td>
</tr>
<tr>
<td>Movement deviation</td>
<td>7%</td>
<td>5%</td>
<td>4%</td>
<td>3.2%</td>
</tr>
<tr>
<td>Visual accuracy</td>
<td>98.2%</td>
<td>98.5%</td>
<td>99.5%</td>
<td>99.8%</td>
</tr>
</tbody>
</table>

Table 1: Example ergonomics evaluation sheet

New fibres and textile materials are being discovered and improved upon every day, making intelligent clothing not only a possible future for ergonomics research, but a plausible one, where intelligent clothing can be worn like ordinary clothes and ensure that the wearer is protected from strain and discomfort when working.

**Conclusion**

Wearable technologies have the opportunity to make ergonomics analysis more reliable and easier to undertake. Whether it’s the use of smart textiles to perform a long term analysis of the day to day work
of a warehouse employee or to actually offer them a tool through which their job becomes easier, there is clear merit in the analysis of the applicability of emerging technologies in aiding participatory ergonomics. More analysis is needed into the applicability of smart textiles in a warehouse environment particularly the type and amount of sensors necessary to collect relevant and qualitative data while not constraining the wearer by creating an environment where their moves would not be natural. Similar attention should be paid to the interaction between the electro-magnetic fields created by wearing electrically charged clothing and the human body. Previous studies have shown that there can be serious health consequences as a result of electromagnetic interference within the human body, so the development of smart textiles should not be prioritized at the expense of human health.

As a final point, while the science is quickly advancing it is necessary to proceed with cautious optimism and make sure that the safety and security of the human wearer takes precedence to the possible advantages that smart textiles can offer, approving their utilization only after thorough analysis.

References


Abstract: In this paper composition of a non-ideal lithium-hydrogen-uranium plasma was studied using the Saha equation. The results obtained in this paper can be used both in theoretical calculations and in the implementation of various experimental projects related to non-ideal plasma, in particular, for studying the thermodynamic properties of nuclear fuel detected in gaseous plasma form in nuclear jet engines. The degree of ionization of lithium, hydrogen, and uranium atoms was determined as the ratio of the number of free electrons to the total number of nuclei in the plasma. The composition of the ionized plasma was calculated in the framework of the system of the chemical model of plasma. A system of nonlinear Saha equations is obtained, which was solved by numerical methods. The calculations were carried out in the Debye approximation, taking into account the screening effects. As a result, the dependence of the degree of ionization of lithium, hydrogen, and uranium atoms on concentration and temperature at different percentages of these atoms in the substance is presented: 10-85-5%, 9-90-1%, respectively.

UDC Classification:533.9; DOI: http://dx.doi.org/10.12955/cbup.v5.1093

Keywords: plasma, composition, ionization.

Introduction

The rocket engine is a jet engine that does not use a medium such as air or water to work. Many types of rocket engines such as chemical, electrical, nuclear and others are being developed and tested. In nuclear missile engines, it seems possible to use the colossal energy that is derived from the decomposition of the nuclear “fuel” to heat the gas. The principle of operation of nuclear rocket engines is based on a nuclear reaction or radioactive decay that occurs when the released energy heats a working medium, which can be either reaction products or some other substance, such as hydrogen. By using nuclear rocket engines, it is possible to obtain specific impulse values that are much higher than those provided by chemical rocket engines.

The working body is passed through a nuclear reactor in which the fission reaction of atomic nuclei (for example, uranium) occurs, and at the same time it heats the working body up. Nuclear missile engines do not need an oxidizing agent and therefore only one liquid can be used. As a working fluid, it is advisable to use substances that allow the engine to develop a large traction force. This condition is most fully satisfied by liquid hydrogen, followed by ammonia, hydrazine and water. The processes that release nuclear energy are divided into radioactive transformations, fission reactions of heavy nuclei, and the synthesis of light nuclei. Radioisotope transformations are realized in so-called isotope energy sources. Specific mass energy (the energy that can be extracted by a substance with a mass of 1 kg) of artificial radioactive isotopes is much higher than chemical fuels. Thus, for 210Po it is equal to $5 \times 10^8$ kJ/kg, while for the most energy-efficient chemical fuel (beryllium with oxygen) this value does not exceed $3 \times 10^4$kJ/kg. There are many radioactive isotopes, but uranium is more energy-efficient in nuclear reactors. Thus, the specific mass energy of 235U (the fissile uranium isotope) is equal to 6.75×10^6kJ/kg, that is about an order of magnitude higher than that of the isotope 210Po according to the work done by Liozov (1999).

The study of the thermodynamic properties of nuclear fuel found in a gaseous plasma form in nuclear jet engines is of great interest. Thus, we wrote a program for calculating various proportions of the complex plasma composition. For example, in this paper the results for ionization equilibrium and the composition of the lithium-hydrogen-uranium plasma are presented.

The composition of partially ionized plasma

The ionization equilibrium and composition of the lithium-hydrogen-uranium plasma were considered in the chemical model of plasma. From work by Gabdullin (2013) we have the following reactions of ionization and recombination of hydrogen, lithium and uranium:

1. NNO, al-Farabi Kazakh National University, gabdullin@physics.kz
2. ITEP, al-Farabi Kazakh National University, ramazan@physics.kz
3. ITEP, al-Farabi Kazakh National University, otarbay@physics.kz
4. ITEP, al-Farabi Kazakh National University, mira2604@mail.ru
5. ITEP, al-Farabi Kazakh National University, mira@mail.ru
\[ H \rightarrow H^+ + e, \quad Li \rightarrow Li^{1+} + e \]
\[ Li^{1+} \rightarrow Li^{2+} + e, \quad Li^{2+} \rightarrow Li^{3+} + e \]
\[ U \rightarrow U^{1+} + e, \quad U^{1+} \rightarrow U^{2+} + e \]
\[ U^{2+} \rightarrow U^{3+} + e, \quad U^{3+} \rightarrow U^{4+} + e \]

The relationship between the concentrations of plasma components can be described as follows:

\[
\alpha_{Li}^+ = \frac{n_{Li}^+}{n_{tot}}, \quad \alpha_{Li}^2 = \frac{n_{Li}^{2+}}{n_{tot}}, \quad \alpha_{Li}^{3+} = \frac{n_{Li}^{3+}}{n_{tot}}, \quad \alpha_{Li}^{4+} = \frac{n_{Li}^{4+}}{n_{tot}},
\]
\[
\alpha_{H}^+ = \frac{n_{H}^+}{n_{tot}}, \quad \alpha_{H}^2 = \frac{n_{H}^{2+}}{n_{tot}}, \quad \alpha_{H}^{3+} = \frac{n_{H}^{3+}}{n_{tot}}, \quad \alpha_{H}^{4+} = \frac{n_{H}^{4+}}{n_{tot}}.
\]

The system of Saha equations for calculating the Li-H-U plasma composition with the maximum ionization multiplicity:

\[
\frac{n_{H}}{n_{H}^{free}} = \frac{g_0}{g_1} \frac{\lambda^3}{2} \exp \left( \frac{I_1 - \Delta I}{k_B T} \right), \quad \frac{n_{Li}^{i+}}{n_{Li}^{i+}^{free}} = \frac{g_0}{g_1} \frac{\lambda^3}{2} \exp \left( \frac{I_{i+} - \Delta I}{k_B T} \right), \quad \frac{n_{U}^{i+}}{n_{U}^{i+}^{free}} = \frac{g_0}{g_1} \frac{\lambda^3}{2} \exp \left( \frac{I_{i+} - \Delta I}{k_B T} \right),
\]

In these equations \( n_{Li} \), \( n_{H} \), \( n_{U} \) are the concentrations of non-ionized Li, H and U ions, respectively, \( n_{Li}^{i+} \), \( n_{H}^{i+} \), \( n_{U}^{i+} \) are the concentration of \( i \)-times ionized Li and U ions, \( n_{H}^{i+} \) is the concentration of singly ionized H ions, \( n_{tot} \) is the concentration of all particles, \( n_{e}^{free} \) is the concentration of free electrons of Li, H and U, \( I_{i} \) is the ionization potential of Li, H, and U atoms, \( \Delta I \) is the Debye correction, \( \frac{g_0}{g_1} \) is the partition function.

The law of conservation of the number of nuclei
\[
n_{tot} = n_{H} + n_{Li} + n_{U} + n_{Li}^{i+} + n_{H}^{i+} + n_{Li}^{2+} + n_{Li}^{3+} + n_{Li}^{4+} + n_{U}^{i+} + n_{U}^{2+} + n_{U}^{3+} + n_{U}^{4+}.
\]

The law of conservation of the total charge in the system:
\[
n_{e}^{free} = n_{H}^{i+} + n_{Li}^{i+} + n_{U}^{i+} + 2n_{Li}^{2+} + 2n_{H}^{2+} + 2n_{Li}^{3+} + 3n_{Li}^{4+} + 3n_{U}^{3+} + 4n_{U}^{4+}.
\]

The system of equations (3) was solved by numerical methods. As a result, the degree of ionization was obtained as a function of concentration and temperature.

The results of the calculations are shown in figures 1-4. Figure 1 presents the results for the ratio of Li-H-U equal to 10-85-5%. The results of the calculations for the Li-H-U ratio of 9-90-1% are shown in Figure 2.
Figures 1 and 2 show the composition of the Li-H-U plasma as a function of temperature. With increasing temperature the concentration of hydrogen, lithium, and uranium ions increases and, starting from 160,000 K, the plasma becomes completely ionized. It can be seen from the figures that the ionization of hydrogen ions begins at a higher temperature value than for the remaining ions, which is explained by the fact that hydrogen has the highest ionization potential. The concentration of singly ionized lithium increases first, since the ionization potential is the smallest for lithium. The concentration increases with increasing temperature up to ~ 20,000K, then reaches a plateau, which is
due to the need for additional energy to fill the next electron shell. With a further increase in temperature (from ~ 70000K) the concentration of singly ionized lithium begins to decrease, the concentration of doubly ionized lithium increases, which reaches a maximum at ~110,000 K and decreases. At the same time, the concentration of triply ionized lithium increases from about 110000K to the plateau at 160000K. The concentration of singly ionized uranium increases with increasing temperature up to ~ 12000K, then decreases, the concentration of doubly ionized uranium begins to increase, which reaches a maximum at ~ 20000K and decreases. Simultaneously, the concentration of triply ionized uranium increases and reaches its maximum at ~ 30000K and decreases, the concentration of the four times ionized uranium reaches its plateau at ~ 70000K. At 160 000 K the plasma becomes completely ionized.

Figures 3 and 5 show the composition as a function of the concentration at a constant temperature T = 10000K. Ionization in dense plasma is a complex process, accompanied by a decrease in the concentration of free electrons and an increase in the concentration of atoms. As the density increases, the average distance between particles decreases, the interaction of the charge with the atomic nucleus increases, and the ionization of atoms is more difficult in dense plasma. The concentration of hydrogen ions gradually decreases with increasing plasma density, the concentration of doubly ionized uranium decreases down to n = 5×10^{20} cm^{-3}, while the concentration of singly ionized uranium gradually increases.

Figure 3: Dependence of the degree of ionization on the concentration at K for the ratio of Li-H-U is equal to 10-85-5%.

![Figure 3](image)

Source: Authors

Figure 4: Dependence of the degree of ionization on the concentration at K for the ratio of Li-H-U is 9-90-1%.

![Figure 4](image)

Source: Authors
Conclusion

The composition of non-ideal deuterium and tritium plasma was calculated using the Saha equation while taking into account the lowering of the ionization potential. The composition of dense non-ideal plasma was calculated using numerical methods. The system of Saha nonlinear equations was solved. As a result, the curves showing the degree of ionization depending on concentration and temperature have been obtained.

References

MODERN MEANS OF PRODUCTION AND THE STAFF AWARENESS OF THE TECHNICAL IN THE PLANT OF THE MINING INDUSTRY

Dorota Palka,¹ Jaroslaw Brodny,² Kinga Stecula³

Abstract: The rapid rate of introducing new technology leads to the issue of staff awareness in operating the latest equipment. Many users do not understand how new devices work and how to use the new machines and gadgets. This article presents the results of research aimed at determining the influence of new technology on the technological awareness of mining workers. Surveys and advanced expert interviews have shown that the lack of technical knowledge means the introduced changes are often perceived negatively by staff and that the main reason for this outcome is the absence of effective education. Lack of knowledge means that frequently the effectiveness of the new and technologically advanced machines is marginal. Presented problems due to the high competition in the energy market have a crucial practical significance. The results of this research may be valuable as a source of information and knowledge for companies.

UDC Classification: 622.8; DOI: http://dx.doi.org/10.12955/cbup.v5.1094

Keywords: mining, employees’ awareness, technological culture, technology assessment

Introduction

The increasing competition in the world energy market has adversely affected the hard coal market. Recently, Polish mining has faced serious economic challenges relating to the efficiency of work and the profitability of mines. The expectations of mine workers regarding salaries and overall improvement in the standard of living have increased. However, in the current economic situation, mining companies are not able to meet these expectations. At the current level of employment, the increase in wages sought is deemed impossible for these companies to meet. The main reason is that the industry employs too many people. Nevertheless, another reason for this situation is the low efficiency of the mining industry. The technical and organizational modernization of the mining industry provides an opportunity to improve this situation.

Organizational modernization could advance the situation through introducing modern management systems for mining companies, organizational restructures, and new ways of organizing the complete labor system. Improvement could also arise from optimizing employment and cooperation between all personnel working in the mine (Fayyad, Wierse, & Grinstein, 2002).

Technical modernization mainly involves the introduction of constantly improved, more efficient and modern machines and devices. The purpose of such modernization is to base mining on knowledge. Effective mining of hard coal requires the use of ever-increasing technology of exploitation, implementation of innovative mechanical systems, as well as advanced safety systems limiting the risk of adverse events (Ławniczak, Mazurek, Iwanowicz, & Mrugalska, 2013)

High competition in the raw energy resources market and dynamic changes in the global economy force mining companies to introduce modern technologies. It is necessary to optimize the cost and time of production, while at the same time shaping the environment in terms of work safety (Walczyńska & Lucjan, 2012).

In summary, the aim of all these activities is to improve the economic efficiency of mining enterprises, which should, in turn, also contribute to improving their employees’ livelihood.

One such effort to improve mining productivity is the introduction of increasingly modern, safe, efficient, and reliable mining machinery. In practice, it has emerged, that despite significant costs incurred for the purchase and introduction of these machines for production, there has been no significant increase in productivity of the mines. The economic effects of the investment have been unsatisfactory.

An analysis into the causes of this situation revealed that only marginal increases in efficiency result from using these highly efficient and costly machines (Brodny, Stecula, & Tutak, 2016; Stecula &
Brodny, 2016). Studies indicated that, in the area of efficient use of machinery, measures are needed to effectively reduce production costs. It must be assumed that one of the main reasons for improving the economic condition of mining enterprises is their technical modernization. Only in using modern machinery and equipment to their full potential can opportunities arise for the efficient operation of these companies. For this process to be successful, it is necessary to have a suitably trained crew who are convinced of the necessary changes (Guo-fa, 2010).

Employees, as beneficiaries, need to be extremely interested and strongly supportive of the changes. It is, therefore, necessary to educate employees about the need for change and implement appropriate training. The modern machinery required for operation requires proper maintenance and introducing innovative technical solutions requires proper preparation of employees. The employees’ high cultural and technical awareness are necessary to handle these machines and improve their efficiency (Robson, Stephenson, Schulte, Amick, Irvin, Eggerth, & Peters, 2012).

This article presents the results of surveys and in-depth expert interviews, aimed at identifying barriers and problems experienced by mine workers when modern technical means are introduced. The results of these studies have shown that, with the introduction of modern technical solutions, intensive educational activities are required for the employees. In the absence of such measures, it is very difficult to achieve the expected effects of these changes.

**Survey Research**

This study aimed to determine the state of technical awareness in mining enterprises by surveying employees of these companies. Another purpose of this study was to determine the reasons for low efficiency in use of modern machines owned by these companies.

Anonymous surveys were conducted among employees of mining companies. The survey consisted of three parts, containing a total of 12 questions. The first part involved verifying the details of the respondents, including age, seniority, and education. The second part contained closed questions concerning modern technologies and technical measures introduced at the mine. The third part contained open questions to explore the subjective opinions of the respondents.

The first question in the second part concerned employees’ views on the need for modern, innovative, technical solutions in the mine. Figure 1 shows the answers to this question.

---

**Figure 1:** The need to introduce modern solutions in the mine – Question 1, Part 2

<table>
<thead>
<tr>
<th>Opinion</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>27%</td>
</tr>
<tr>
<td>No</td>
<td>68%</td>
</tr>
<tr>
<td>I have no opinion</td>
<td>5%</td>
</tr>
</tbody>
</table>

Source: Authors

The results show that as many as 68% of the respondents regarded introducing modern technical equipment in the mining industry negatively. Only 27% supported their introduction, and 5% had no opinion on this topic.

Such a large group of opponents of technical progress is highly disturbing and may indicate the workers’ lack of technical awareness. Another question asked the reasons for the answers given in the first question. Particularly interesting are the responses from the respondents who had a negative attitude to the changes.
The most frequently cited reason was the lack of ability to handle modern machines and equipment, as well as the lack of thorough technical knowledge about the operation and functionality of these devices. More than 70% indicated a lack of skills and knowledge needed to work with modern technology. There were also fears of being exposed to an unknown technique and of the reaction of colleagues to the situation when revealing the lack of their ability to use modern machines and devices. Figure 2 shows the detailed results of these responses.

Figure 2: The reasons for the negative attitude to technology

<table>
<thead>
<tr>
<th>Reason</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of handling skills</td>
<td>42%</td>
</tr>
<tr>
<td>Lack of technical knowledge</td>
<td>32%</td>
</tr>
<tr>
<td>Fear of the unknown</td>
<td>17%</td>
</tr>
<tr>
<td>Fear of reaction of a colleague</td>
<td>8%</td>
</tr>
<tr>
<td>Other</td>
<td>1%</td>
</tr>
</tbody>
</table>

Source: Authors

Another question required the respondent to indicate the machine that, according to staff, required the most technical knowledge. In response, 44% of respondents pointed to a shearer and 39% to a lift machine (Figure 3). These results appear to reflect the actual technical level of these machines.

Figure 3: Level of machine operation

Source: Authors

The next question was about willingness to participate in training to raise the technical knowledge of employees. In this case, the results referred to individual age groups of the respondents. The youngest individuals were the most interested in the training of new technologies. With increasing age, the number of workers interested in such training decreased. Figure 4 shows the results.
Figure 4: Influence of age on interest in training

![Figure 4: Influence of age on interest in training](image)

Source: Authors

The questionnaire also included questions about employees’ expectations and solutions to problems arising in their work. The diversity of responses revealed some problem areas that were discussed during expert interviews. Most employees recognized that the reason for ineffective work was an inadequate training program to prepare them for the required tasks. Both in-house training and vocational training programs did not contain sufficient knowledge about modern, innovative machines.

**Expert Interviews**

In-depth expert interviews with selected employee groups were conducted to better diagnose issues relating to the introduction of the modern means of production and technical awareness of employees. Results indicated that the major problem for these workers appeared to be the lack of an appropriate training system in the mines. This response indicated there was no possibility for deepening the knowledge and technical awareness of employees. The lack of promoting technical culture among the company’s crew has vital influence. The concept of technical culture may, in this case, be broadly understood. It concerns both the quality and availability of technical documentation and tools, as well as thorough knowledge of employees. Basic information on machine construction and functionality and analytical thinking enable workers to anticipate and prevent unauthorized events. This situation has a significant impact on the safety of workers in their challenging conditions. Especially, correct handling of machinery and equipment allows for failure prediction and prevention (Tomaszewski & Czekaj, 2009). Also, with a low level of technical culture more failure of machines and equipment is possible and this situation potentially increases the cost of repairs and complete overhauls.

The interviews also showed that employees who lacked sufficient technical knowledge were unaware of the consequences and costs of their actions. It is, therefore, essential that every company has a proper training policy, both in terms of safety and technical knowledge.

**Conclusion**

The abrupt pace of new technology deployment means that employees have problems handling and utilizing the full functionality of the advanced solutions. Many users seem unable to keep up with understanding how the latest machinery works and what follows is that they do not know how to operate the latest innovative machines and equipment. This predicament leads to a situation in which the machines are underutilized, and the company fails to achieve its business goals.

The surveys and expert interviews conducted among mine workers ascertained that one main cause of this state is the shortfall in educating employees. Deficiencies are mainly related to technical knowledge. The results clearly show that both the company’s in-house training system and the school education system cannot adequately prepare a technician.
This outcome is the result of the rapid introduction of new and innovative solutions that are a momentous challenge for some employees. Problems with handling and understanding the essence of these devices make these employees reluctant to introduce new machines and equipment.

Low technical awareness causes fears of using advanced technical equipment, stress, and dissatisfaction with work among the crew. Employees are often unaware of the costs generated by their misbehavior and ignorance. The lack of a proper level of technical culture makes the efficiency of using new and technologically advanced machines insignificant.

The results clearly show that mining companies should use all types of training, including technical. Raising the technical awareness of employees may prove to be a highly successful investment in the future. The training program in this area does not necessarily need to cause an additional financial burden for enterprises. Some of the training could be run by companies producing and supplying these mines.

Because of the high competition in the energy market, the presented issue is of great practical importance. The research results presented in the article may constitute an important source of information and knowledge for companies introducing modern technical measures.

References


THE ROLE AND IMPORTANCE OF TRAINING FOR IMPROVING THE SAFETY AND AWARENESS OF THE TECHNICAL STAFF IN THE MINING PLANT

Dorota Palka

Abstract: Harsh working conditions and the introduction of technologically advanced machines are placing growing demands on the qualifications of mine workers, forcing mine workers to undergo continuous training. This article presents the results of research concerning the evaluation of training and expectations of workers in a mining plant to identify further actions in this area. The results indicate that workers negatively evaluate previous training. Based on advanced expert interviews and panel discussions, the directions and recommendations regarding the necessary changes to training are set out. Employees suggest broadening the subject of occupational health and safety training. Their concerns relate to the operation and maintenance of new machines, telecommunication equipment, mining support, ventilation, and interpersonal communication. The results indicate a growing awareness among employees of the role and importance of training and the acceptance of upgrading skills as an investment in the future.

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Keywords: OHS training, technical awareness, mining, safety

Introduction

Currently, the Polish coal mining industry employs almost 171 thousand people. This number includes people employed directly in the mines as well as various mining companies. In this industry, the current, and future jobs in many cases depend on the economy of the country and condition of the mining industry. This sector is particularly important for the economy of Upper Silesia, which is a region with a huge mining tradition. Despite changes in the employment structure, the development of other sectors of the economy, and the restructuring of the mining industry, this sector continues to be one of the largest employers in the region. It has a huge impact on the region in terms of shaping the economic picture by employing thousands of residents and being a major source of income for families. At the same time, working in the mining industry, especially underground, is challenging and dangerous. The complex environmental conditions under which underground mining operates and both numerous natural (Brodny & Tutak, 2016a; 2016b) and technical hazards result in many accidents, including fatalities in the mining industry. Mining and its products, especially gas, are also a significant threat to the external environment (Brodny & Tutak, 2016a; 2016b). Together these factors coincide with a high accident rate within the industry.

Various types of activities are undertaken to improve this situation and increase the safety of the workers. One example is the widespread use of various types of sensors to monitor the condition of the atmosphere in the mine. In most cases, these sensors form large systems that automatically monitor the level of the hazard in a specific area. Their task is to detect hazards as early as possible and alert workers. In many cases, the parameters registered by these systems are used for forecasting hazardous conditions. More reliable and safer mining machines are also introduced to improve safety (Brodny, 2012). The manufacture of modern mining machinery involves the latest technologies and innovative technical solutions. The aim is to improve both the safety of people operating the machines and the efficiency of the machine (Stecula & Brodny, 2016; Brodny, Stecula & Tutak, 2016).

Another step taken by mining companies to improve safety on mining premises is the implementation of occupational safety management systems (Ochman, 2011). Despite efforts to improve safety at work in mining companies, the mining industry continues to have the highest industrial accident rates. Table 1 presents the number of accidents in the mining industry during 2012–2017, showing the serious, fatal, and overall number of accidents.

An analysis of the data in Table 1 reveals that despite the use of advanced technologies and technical solutions, the number of accidents in mining is high. A deeper analysis of the causes of this situation shows that the employees have a strong impact on the number of accidents. People in harsh environmental conditions with many dangers are the weakest link in the whole system, with an

1 Faculty of Organization and Management, Silesian University of Technology, dorota.palka@polsl.pl
analysis of the causes of the accidents confirming this theory. In practice, despite the use of modern monitoring systems for the state of the underground environment and the use of modern machines, human errors are the most common cause of all types of accident events (Matuszewski, 2009).

### Table 1: Accidents in mining industry from Jan 2012 to March 2017 based on mining office data

<table>
<thead>
<tr>
<th>Year</th>
<th>Fatal</th>
<th>Serious</th>
<th>All Types</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017 (1st of Jan to 1st of Mar)</td>
<td>3</td>
<td>3</td>
<td>123</td>
</tr>
<tr>
<td>2016</td>
<td>10</td>
<td>5</td>
<td>1575</td>
</tr>
<tr>
<td>2015</td>
<td>12</td>
<td>7</td>
<td>1695</td>
</tr>
<tr>
<td>2014</td>
<td>14</td>
<td>7</td>
<td>1788</td>
</tr>
<tr>
<td>2013</td>
<td>20</td>
<td>22</td>
<td>1908</td>
</tr>
<tr>
<td>2012</td>
<td>22</td>
<td>11</td>
<td>2199</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>81</strong></td>
<td><strong>55</strong></td>
<td><strong>9288</strong></td>
</tr>
</tbody>
</table>

Source: Author

Thus, action to improve this condition is needed. Such activities should include, in particular, the proper preparation and training of mine workers. Appropriate awareness and commitment of the employee, who has decisive influence on the effectiveness of production and level of occupational safety.

Difficult working conditions, numerous hazards, as well as the variety of technology used in mining require employees of mining companies to improve their knowledge continually. Acquisition of both practical and theoretical knowledge is possible through participation in various types of training.

The aim of this article is to indicate the importance of training for improving the safety and technical awareness of employees.

### Data and Methodology

The study entailed a survey with questionnaires and discussion panels involving coal miners. The objective of the research was to contribute towards improving work safety in the mining industry. The study was carried out with pit crew and surface mining companies and included electricians, drivers, surface mechanics, and employees involved in material processing. The audit questionnaire was open and anonymous, and information sought included age, work experience, and education of the respondents. The study was conducted over five consecutive days with each day involving a different group of employees completing the questionnaire. The survey consisted of two parts that included 15 questions overall. The first part contained five closed questions to verify details of the respondent. The second part contained both open and closed questions (10 each) on assessing the training. The questions were designed to allow employees to express themselves freely on topics of ongoing and future training.

One of the basic questions asked of the employees was to evaluate the organization of their training to date. In another, this time an open question, respondents were asked to provide suggestions for changes in their training necessary to improve their engagement. Results revealed certain areas required detailed discussion. For this purpose, panel discussions were organized and attended by representatives of particular groups of employees. The subject of the discussion covered issues about the role and importance of training. These discussions involved expanded questionnaires. The main purpose of these discussions was to understand the genuine reasons for responses and views of employees and gather proposals for change.

### Results and Discussion

The employees’ evaluation of their training regarding its organization are presented in Figure 1. The results show that most respondents regarded the organization of their current training negatively. Among the answers were the terms ‘bad’ and ‘rather bad’, which comprised over 70% of total responses to this question.
The research results regarding suggestions for changes in employee training to improve their engagement are shown in Figure 2. Almost half of the respondents showed interest in more practical activities. More than 30% suggested updating the technical knowledge provided during training on the operation of machinery and equipment introduced by the company. The other 20% recommended trainers use modern methods of transferring knowledge during training. They believed that this would result in greater diversification of training and provide more interest in the topics. The respondents also suggested lengthening the practical part of their training. The theoretical component was assessed negatively in many instances because the workers failed to see the connection between theory and practice.

The discussion panels identified a set of problems viewed by employees regarding their training. The monotony of the lectures and the way the lecturers conveyed the knowledge were two significant problems identified. Employees showed interest in new techniques of knowledge transfer, multimedia presentations, and stimulating teaching aids. Another problem identified was the incompatibility between theory and practice. Employees emphasized significant shortcomings in technical training in relation to modern machinery introduced into the company.

They believed that the development of the company depends on a well-organized training policy of the company. Respondents proposed extending the training program to include technical issues relating to operating new machinery, telecommunications equipment, mining enclosures, ventilation processes, and interpersonal communication. Thus, employees showed their willingness to participate in additional activities, and this is evidence of the growing awareness among employees of the role and importance of training.

Conclusions

As previously stated, mining is a sector characterized by a high number of accidents due to numerous hazards, difficult working conditions, and above all, the human factor. It is undisputed that the safety of the crew depends largely on the conscious and voluntary commitment of the employees. To
improve this condition, it is necessary to conduct cyclic training of a crew who may be subject to rotating shifts. New employees, in particular, require proper preparation for such a difficult job. To increase the level of their knowledge, it is therefore necessary to conduct training in terms of both occupational safety and the operation of modern equipment. Proper training improves the efficiency and safety of employees and has a significant impact on the development of the company. Therefore, special emphasis should be given to the proper organization of training and the whole of training policy pursued by the company. The results of questionnaires and discussion panels have shown that employees perceive significant mistakes in the organization of their training. The most important involved monotony and lack of training updates. An important shortcoming is the incompatibility of the presented theory with practical work in the mining industry. Employees have shown interest in modern training methods and in extending the training program. In addition, they have declared their willingness to participate in additional training on technical aspects of equipment. Proposed changes may be the key to resolving a technical barrier that arises together with the dynamic development of technology. This research and its analysis demonstrate the importance of training for the safety and awareness of the employees. It is recommended the outcomes are considered in company training policies. Breaking the technical barrier, raising awareness of the workers, and safety of the crew should have a significant impact on the development of the company. The results of this research contribute towards improving and organizing training not only in mining companies but in other types of industries.

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EVALUATION OF LACTIC ACID BACTERIA GROWTH DURING AUTOCHTHONOUS ALBANIAN KALLMET WINE PRODUCTION WITH SPONTANEOUS AND INOCULATED FERMENTATIONS

Rozeta Hasalliu1

Abstract: The grape used in wine making has many wild microorganisms like lactic acid bacteria, yeast, acetic acid bacteria. During the alcoholic fermentation, the evaluation of these microorganisms depends on their activity. There is an interaction between yeast and lactic acid bacteria during this period of wine making. In this study, we have made wine from the autochthonous Albanian grape Kallmet variety using the spontaneous fermentation and inoculated fermentation with the yeast Saccharomyces bayanus. Yeasts carry out the alcohol fermentation, and lactic acid bacteria make malolactic fermentation in wine. With this fermentation, lactic acid bacteria convert malic acid to lactic acid, reducing the acidity of the wine and create a microbiological stability. During the alcoholic fermentation, the evaluation of lactic acid bacteria is not required. The aim of our study is to evaluate the first quantity of lactic acid bacteria to Kallmet grape, their performance during the two fermentations, spontaneous and inoculated fermentations.

UDC Classification: 63; DOI: http://dx.doi.org/10.12955/cbup.v5.1096

Keywords: lactic acid bacteria, Albanian wine, Kallmet grape, spontaneous and inoculated fermentations.

Introduction
In Albania, some of wine producers produce wine with spontaneous fermentation, and others produce wine with inoculated yeasts that are Saccharomyces cerevisiae, Saccharomyces bayanus or a mix between two yeasts, Saccharomyces cerevisiae and Saccharomyces bayanus (Hasalliu, 2016).

Must has a low pH value (3.5-3.5) as well as a high sugar concentration. Therefore, it represents a very specific habitat in which the chemical and physiological conditions are changing during vinification. There are only three groups of microorganisms that are adapted to these harsh conditions: yeasts, acetic acid bacteria (AAB) and lactic acid bacteria (LAB). These microbes also influence the wine making process itself (König et al., 2009, Petri et al., 2013).

Lactic acid bacteria can already be found on grapes. However, undamaged grapes contain less than 10³ colony-forming units (CFU)/g leading to a low initial titer in must (Lafon-Laforest et al., 1983). Only a few LAB species of the genera Lactobacillus (Lb.), Leuconostoc (Le), Pediococcus (P.), Oenococcus (O.) and Weissella (W.) can grow in must, whereas carnobacteria, enterococci, lactococci, streptococci, and bifidobacteria have not been isolated from must or wine. The acetic acid bacteria Acetobacter and Gluconobacter as well as more than 90 yeast species have also been found. Yeasts convert glucose of the sugar-rich must into alcohol. Most of the yeasts will usually die out once the alcohol level reaches about 5 %, whereas more alcohol tolerant Saccharomyces species take over. Also, the CFU of LAB decreases after an initial increase from 10³ to 10⁴ - 10⁵ CFU/ml during the first days of must fermentation. During alcoholic fermentation, LAB do not multiply or even disappear, except O. oeni, which resists at low cell levels.

We studied this growth in our experiments with the Albanian grape variety Kallmet.

After alcoholic fermentation, the growth of this species is stimulated because of the released cell constituents of yeasts, which are in a stationary or death phase. At this stage, oenococci have an influence on yeast lysis by producing glycosidases and proteases (König et al., 2009)

Only some other ethanol tolerant LAB species survive in young wine or wine. Furthermore, it was found that fatty acids (hexanoic, octanoic and decanoic acid) liberated by growing yeast also have a negative effect on bacterial growth (Lonvaud-Funel et al., 1991; Hui, 1995).

Relevance of LAB in wine and malolactic fermentation by LAB
LAB plays an important role in wine quality. The malolactic fermentation carried out by these bacteria leads to de-acidification and stabilization of wines. LAB converts malate into lactate and CO₂ after alcoholic fermentation. This so called malolactic fermentation primarily leads to biological de-acidification, but also to flavor modifications and microbial stabilization. Therefore, it has a positive effect on wine quality (Liu, 2002).

1 Faculty of Biotechnology and Food, Agricultural University of Tirana, Albania, hasalliur@yahoo.com
In addition to malate, lactic acid bacteria also metabolize tartrate and citrate, which also belong to the main acids of must. Citrate is metabolized to lactate, acetic acid, CO₂, and acetoin. According to Radler and Yamnissi (1972), tartrate can be converted to lactate, acetate, and CO₂ by homofermentative LAB (e.g., Lb. plantarum) and to acetate and CO₂ or fumaric acid (succinic acid) by heterofermentative LAB (e.g., Lb. brevis) (Llauheres et al., 1990; Duenas et al., 2003).

Even though malolactic fermentation can occur spontaneously, O. oeni is often used as a bacterial starter culture. Because of its high tolerance to ethanol and acidity, this species is the preferred starter culture applied for the reduction of the malic acid content (Brandolini et al., 2002). Especially in northern countries, where must can have a high acidity, the biological reduction with such starter cultures is an important step in vinification. However, the malolactic enzyme has also been found in many other lactic acid bacteria occurring in wine (e.g., Lb. casei, Lb. brevis, Lb. buchneri, Lb. delbrueckii, Lb. hilgardii, Lb. plantarum and Lc. mesenteroides (Schiitz and Radler, 1984). The malolactic fermentation and the consumption of nutrients (hexoses and pentoses), as well as the production of antimicrobial components (De Vuyst and Vandamme, 1994), can lead to more stable wines. Lactic acid bacteria potentially produce acetic acid, higher concentrations of CO₂, H₂O₂, diacetyl, pyrogulatamic acid and bacteriocins, which inhibit the growth of other bacterial and yeast species (Rammelberg and Radler, 1990; Blom and Mortvedt, 1991). For example, it is known that the bacteriocin brevinic from Lb. brevis inhibits the growth of O. oeni and P. damnosus (Rammelberg and Radler, 1990).

**Spoilage by LAB (e.g., mousiness, ropiness)**

In Albania, we do not have studies about the growth and the effects of lactic acid bacteria in wine. Nevertheless, the role of LAB in winemaking is ambivalent as this fermentation is only occasionally desirable during vinification in some wines. Exopolysaccharide production leads to grasse of the must, which causes problems during filtration. Different strains of P. damnosus, P. parvulus or Leuconostoc mesenteroides are well known for the formation of exopolysaccharide slimes, which lead to so called ropy wines (Vincenzini et al., 2009; König et al., 2009). Viscosity, which is influenced by many factors such as the ethanol concentration and temperature, becomes apparent at 10⁷ CFU/ml. Especially P. damnosus increases the viscosity by producing a glucose homopolymer.

Lactobacilli can also cause a loss of color (up to 30 %) after malolactic fermentation. This is due to pH changes that cause a shift in the equilibrium of anthocyanins, which contribute to the stability of color in wine.

Several LAB are also involved in the generation of numerous off-flavors, because they can produce acetic acid, diacetyl, acetoin, 2,3-butanediol, ethyl lactate, diethyl succinate, acrolein, mannitol and compounds that form the geranium note or mousy-off flavor (König et al., 2009; Petri et al., 2013). Mousy-off flavor or mousiness is a smell reminiscent of mice. Lactobacilli such as Lb. brevis, Lb. hilgardii and Lb. fermentum produce acetyl-tetrahidropyridine (perception threshold: 1.6 ng/l) from ethanol and lysine. Acetyl-pyrroline and ethyl-tetrahydroxybutyridine can also contribute to this off-flavor (Vincenzini et al., 2009; Nakayama and Sonomoto, 2002). Diacetyl and acetoin can be formed by the metabolism of citrate if the excess of pyruvate is reduced to lactic acid.

Fructose is reduced to mannitol or converted to erythritol and acetate. When Lb. plantarum is grown on mannitol, oxaloacetate can also function as electron acceptor leading to the formation of succinic acid (Chen and McFeeters, 1986).

Glycerol is converted to propanediol and acrolein leading to bitterness (Schiitz and Radler, 1984).

O. oeni can also produce off-flavors due to the metabolism of cysteine and methionine. Hence, cysteine is transformed into hydrogen sulfide or sulfanyl ethanol and methionine into dimethyl disulfide, propanol, and propionic acid. The latter has an earthy, red-berry fruit flavor (Ribereau-Gayon et al., 2006).

**Health hazards due to LAB (e.g., biogenic amines, ethylcarbamate)**

Biogenic amine production (e.g., tyramine, histamine or putrescine), is also mainly caused by microbiological activities of some LAB strains during vinification. O. oeni, P. cerevisiae, and Lb.
hilgardii are examples of producers of biogenic amines (Landete et al., 2005; Mangani et al., 2005; Sebastian et al., 2011; Petri et al., 2013).

The most important biogenic amine is histamine, which is produced by decarboxylation of histidine. The COST Action 917 (2000-2001) of the EU "Biologically active amines in food" suggested prescriptive limits for histamine (e.g., France: 8 mg/l, Germany: 2 mg/l) in wines. Biogenic amines can cause health problems like migraine and headache (Coton et al., 1998) and sensory defects in wine (Lehtonen, 1996). From arginine, ammonium is liberated by heterofermentative species such as Lb. hilgardii and O. oeni, but also by facultatively heterofermentative species like Lb. plantarum.

Ethyl carbamate, which is probably carcinogenic, is produced from urea and ethanol by O. oeni and Lb. hilgardii (Uthurry et al., 2006). Alcoholic fermentation must prevail against malolactic fermentation in the first days of fermentation. The growth of lactic acid bacteria in the first days of fermentation may cause shortcomings of the wine.

The aim of our study is to evaluate the first quantity of lactic acid bacteria to Kallmet grape, their performance during the two fermentations, (spontaneous and inoculated fermentations).

**Materials and methods**

100 kg of Kallmet grape (Figure 1) were used to produce Kallmet wine with spontaneous fermentation and fermentation inoculated with Saccharomyces bayanus yeast.

For this work, the grape of variety Kallmet was harvested in the village of Kallmet (Lezhe) at 18°Brix. The quantity was divided into 2 lots of 50 kg each (K1 and K2). The analytical parameters analyzed to the grape must were: pH, total acidity, % of sugar content and chromatic characteristics. After the crushing, each lot was treated with 3 g/hL of SO₂ and the K1 lot was also added 2.5g/kg of medium toasted oak chips.

Both lots were placed to macerate in cold temperature 5°C for 72 hours. After the cold maceration, the K1 lot was inoculated with Saccharomyces bayanus BC at 20 g/hL rate, while the K2 lot was left to ferment spontaneously. Both fermentations lasted six days and after the racking of the wine from the skins both lots were treated with 3 g/hL of SO₂ and held in storage for the second fermentation to take place.

For microbiological analysis MRS medium was prepared, sterilized in an autoclave in 121°C for 15 minutes, and spread out in Petri dishes.

*Figure 1: Kallmet grape (Autochthonous Albanian grape variety)*

25 ml of wine from two fermentations was homogenized in 225 ml of peptone water. Five tubes were filled with 9 ml of peptone water, and 1 ml from the homogenized wine was placed in the first tube, 1 ml from the first tube was placed in the second tube and in the same manner until the fifth tube. Finally, five dilutions were prepared: 10⁻¹, 10⁻², 10⁻³, 10⁻⁴, 10⁻⁵. 1 ml from each tube was placed in Petri dishes with MRS medium. Petri dishes with MRS medium were incubated in a thermostat at 30°C. After 48-72 hours, Petri dishes were taken from the thermostat, and lactic acid bacteria colonies were counted.

**Results and Discussions**

The results of Kallmet wine produced in this study for total acidity were 5.5 ± 0.08 for K1 samples (inoculated fermentation with S. bayanus) and 6.1 ± 0.05 for K2 (spontaneous fermentation). The results for pH of the Kallmet wine were 4.12 ± 0.02 for K1 wine (inoculated fermentation with S.
bayanus) and 3.98 ± 0.02 for K2 wine with spontaneous fermentation). The results for the % of alcohol of Kallmet wine was 11.9 ± 0.03 for K1 wine (inoculated fermentation with S. bayanus) and 12 ± 0.02 for K2 wine (spontaneous fermentation).

Due to its tolerance against ethanol and acidic conditions, LAB (Lactic Acid Bacteria) can grow in must. During the first days of must fermentation, the CFU of LAB increased from 10^5 to 10^6-10^7 per ml (Table 1).

<p>| Table 1: The graphic of lactic acid bacteria number during two fermentations |</p>
<table>
<thead>
<tr>
<th>Days of fermentation</th>
<th>K1(Kallmet Wine inoculated with S. bayanus) cfu/ml</th>
<th>K2 (Kallmet wine with spontaneous fermentation) cfu/ml</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2 x 10^5</td>
<td>2 x 10^4</td>
</tr>
<tr>
<td>6</td>
<td>1.1 x 10^6</td>
<td>1.7 x 10^6</td>
</tr>
<tr>
<td>8</td>
<td>7 x 10^6</td>
<td>7.1 x 10^6</td>
</tr>
<tr>
<td>9</td>
<td>8 x 10^6</td>
<td>1.8 x 10^7</td>
</tr>
<tr>
<td>10</td>
<td>2.8 x 10^6</td>
<td>2.2 x 10^7</td>
</tr>
<tr>
<td>11</td>
<td>1.2 x 10^6</td>
<td>4.7 x 10^6</td>
</tr>
<tr>
<td>12</td>
<td>6.7 x 10^6</td>
<td>1.3 x 10^6</td>
</tr>
</tbody>
</table>

Source: Author

The initial quantity of lactic acid bacteria is the same for the two samples K1 and K2 because it was the first day of fermentation and yeasts were just added and they have not started their activity yet. This quantity is the first quantity that is in Kallmet grape.

With the start of fermentation the number of lactic acid bacteria in K2 samples, (wine without inoculated yeasts) was higher (1.8 x 10^7, day 9) than K1 samples (8 x 10^6, day 9) of wine with inoculated yeasts Saccharomyces bayanus.

On the 10th day of fermentation, the number of lactic acid bacteria in K2 samples, (wine without inoculated yeasts) was also higher (2.2 x 10^7) than in K1 samples (2.8 x 10^6) of wine with inoculated yeasts Saccharomyces bayanus (Figure 2). This is because inoculated yeasts inhibit the growth of lactic acid bacteria. Yeasts cells are bigger than lactic acid bacteria cells, and they are competitive against lactic acid bacteria for the nutrient. Yeasts produce secondary components like toxic components that inhibit the growth of lactic acid bacteria and others spoilage bacteria for the wine like acetic acid bacteria or spoilage yeasts.

**Conclusions**

Lactic acid bacteria influence the flavor of wine because they can produce acetic acid, diacetyl, acetoin, 2,3-butanediol, ethyl lactate, diethyl succinate and acrolein.

Lactic acid bacteria are present in grape, must and wine, but their presence during alcoholic fermentation must not influence the activity of yeast for the normal alcoholic fermentation. The
activity and the growth of the number of lactic acid bacteria is be more desirable after alcoholic fermentation to avoid a stuck of alcoholic fermentation.

From the microbiological analyses of two samples K1 (Kallmet wine with inoculated yeasts Saccharomyces bayanus) and K2 (Kallmet wine without inoculated yeasts Saccharomyces bayanus), the initial number of lactic acid bacteria was 2 x 10^5 CFU/ml but during the spontaneous fermentation the number of lactic acid bacteria is higher than in wine inoculated with S. bayanus in days 9 and 10 of fermentations.

Inoculated yeasts Saccharomyces bayanus, therefore, cause the inhibition of lactic acid bacteria during the process of fermentation, during the production of Kallmet wine with autochthonous Kallmet grape.

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Hui, Y.H (1995): “Food Biotechnology, Microorganisms”.

1203
GENETIC DYNAMICS OF CONIFEROUS INTRODUCTENS IN THE CONDITIONS OF A FOOTHILL DESERT-STEPPE ZONE IN THE SOUTH OF KAZAKHSTAN

Dani N. Sarsekova

Abstract: Forest breeding should be produced not only by the representatives of the local flora, which is not very diverse in some areas of the Republic of Kazakhstan, but by species and forms of trees growing in temperate zones of the worldwide. In particular, this refers to arboreta located in the conditions significantly different from the place of natural growth of the introduced species. One of this arboretum is the JSC "Forest nursery" of the Ministry of Science and Higher Education of the Republic of Kazakhstan which is located in the South-East of the republic.

The aim of this study was to study the ecological and genetic variability of coniferous introducants in the foothill desert-steppe zone and to determine the share of genetic and environmental factors. The variability and the relative stability of the expression of the quantitative trait in ontogenesis, which characterizes the species adaptation to the new conditions in 9 Yellow pine trunks, Crimean pine trunks and Scots pine trees, 7 Blue spruce trees and the same number of trees in European spruce, in which annual increments of the height of one morphological Location.

Beginning with the growth of 2014 and then sequentially down the trunk, so long as lateral branches of the first order in whorls were preserved or traces were observed in a good way.

Thus, the value of the mean squares differs significantly in the increments of a single morphological location and in the increments of tree groups, in the introductions species and in the periods of their life. Therefore we are allowed to conclude that there are still some parts and interference in the estimation of the ecological, genotypic and phenotypic dispersions that have different values and are manifested to a greater extent, or in the analysis of increments of tree groups, or increments of one morphological location, that is, they change the cause of their display.

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Keywords: increment, coniferous, phenotypic, variability, genetic, dispersion, introducants

Introduction

The specific harsh environmental conditions of the desert-steppe zone of the Republic of Kazakhstan which are not suitable for forestry mean that afforestation should be performed not only with local flora, which in some areas of the Republic is not very diverse, but also using species and forms of trees growing in other countries of the temperate zones of the world. The study of forestry potential of the introduced most valuable species is of great importance. Such work is under the responsibility of the botanical gardens and arboretum. This applies in particular to the Arboretum located in the conditions that differ significantly from the natural habitats of the introduced species. This kind of arboretum is the JSC "Forest nursery" of the Ministry of Science and Education of the Republic of Kazakhstan which is located in the south-east of the country. It has a concentration (according to inventory 2014) of more than 1300 species, forms and varieties of trees and shrubs, representing 58 families and 153 species, introduced from different countries of Eurasia, the Mediterranean, North America, China, Korea and Japan.

The main features of the local climate should be considered relatively high air temperature from spring to late fall, especially in the summer months, the atmospheric dryness, coinciding with a period of high temperatures, dry winds domination, and therefore intensive evaporation resulting in a clear shortage of moisture.

The plantings of the arboretum are unique in the creation of a large enough biogroup collectively resembling the likeness of a forest environment; allowing to count per unit area (per hectare), important inventory indices of their growth and productivity. For the state with low forest cover it is extremely important to obtain marketable timber for the needs of construction, paper, wood chemistry and other purposes regardless of "vagaries" of the international market.

The arboretum's introducants are reached the age of about 60 years, it is enough to demonstrate its ability to adapt to harsh environments, and yet it is not enough to complete the process of acclimatization.

It is necessary to examine the results of acclimatization of the introduced tree species in order to better understand the process and learn how to manage them during this period of transition.

1 S.Seifullin Kazakh Agro Technical University, 010011, Zhenis Ave., 62, Astana, Kazakhstan, dani999@mail.ru
The aim of the study was to evaluate the ecological and genetic variability of the introduced coniferous in the conditions of a foothill deserted-steppe zone and to determine requirements in the variability of genetic and environmental factors, as well as the relative stability of expression of quantitative traits in ontogenesis, which characterizes the features of adaptation of a species to new conditions.

**Material and methods**

The growth dynamics of Pitch pine (*Pinusrigida* Mill) Crimea pine (*P. nigra*) Scots pine (*P. sylvestris* L.), Blue spruce (*Piceaunipens* Engel.) and Fir spruce (*Piceaexelsa* Link.) was studied in the JSC “Forest nursery” Arboretum, Astana, Kazakhstan. The annual increments in height since 2014 and in earlier years have been measured down on the stem in between consecutive whorls with lateral branches or clearly distinguishable traces of them. Seven from nine trees of each tree species were measured. The phenotypic variability of quantitative traits genetically diverse populations is a complex result of the interaction of genotype and environment (Turbin, 1961; Leper&Nikoro, 1966; Dyakov & Dragavtsev, 1975; Dyakov et al., 1976), competing plants relationship (Dyakov & Dragavtsev, 1975; Dyakov et al., 1976), the degree of stability of individual physiological processes and their relative autonomy from changes in external conditions (Shmalgauzen, 1942; Shmalgauzen, 1945).

The most important feature of genetic variation of wood species is the ability of its adaptation in ontogenesis for changing environmental conditions. This property is due to genetic formulas overriding attributes that ensure survival, especially when changing the combination of factors that are limited. Overriding the genetic formula of quantitative traits of plants in ontogenesis was shown by Dragavtsev and Utemisheva (1975), Dragavtsev, Tsilke and others (Dragavtsev et al., 1984). If the wood species have a variety of systems that determine drought resistance, cold resistance, heat resistance, immunity, the adaptation to the new conditions will be successful due to their ability of genotypic dynamics in ontogenesis, unless the level override genetic formulas will not be exceeded of the change the limiting factors of the new environment.

Evaluation of phenotypic variability of annual increment in height (hereinafter - increments) for the small number of plants in biogroups (Table 1) should be performed using an analysis of variance, which allows to establish the significance of differences in growth rates between individual trees and makes it possible to determine the heritability coefficient in a broad sense (Lush, 1949). It is also possible to compare varieties of increments of one morphological address (comparison increments, measurements) for the first and second period of increment, cm.

<table>
<thead>
<tr>
<th>All kinds of trees, age of biogroups</th>
<th>Number of trees in biogroup, numbers</th>
<th>The number of measurements of average height, m</th>
<th>Average annual increment of height, cm</th>
<th>Average annual increment in height / for number of years</th>
<th>The duration of the growing season, in days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pitch pine 52 years</td>
<td>7</td>
<td>9</td>
<td>18,3</td>
<td>41,67</td>
<td>54,10 / 32 years</td>
</tr>
<tr>
<td>Scotchpine 55 years</td>
<td>22</td>
<td>9</td>
<td>16,52</td>
<td>39,34</td>
<td>59,54 / 28 years</td>
</tr>
<tr>
<td>Crimeapine 49 years</td>
<td>8</td>
<td>9</td>
<td>15,0</td>
<td>41,66</td>
<td>56,03 / 28 years</td>
</tr>
<tr>
<td>Blue spruce 49 years</td>
<td>17</td>
<td>7</td>
<td>10,2</td>
<td>28,34</td>
<td>42,53 / 26 years</td>
</tr>
<tr>
<td>Fir spruce 49 years</td>
<td>9</td>
<td>7</td>
<td>13,81</td>
<td>38,36</td>
<td>49,22 / 30 years</td>
</tr>
</tbody>
</table>

Source: Author
Phenotypic variance of increments in both constructions of dispersion systems is the same. If the assessment of the environmental variance increments of one morphological address will be different from random there is a need to assess a large number of parts of the phenotypic variability of the test number of years, in general, and for periods of growth. Random variance increments are usually taken as an ecological, but including proportion of variance determined by the interaction genotype-environment competitive genotypic and environmental interference.

Separation of the phenotypic variance of quantitative trait / $\sigma^2_{ph}$ / on genotypic / $\sigma^2_g$ / and the environmental / $\sigma^2_e$ / part is not enough if there is evidence of the dispersion increments of one morphological address and the use of normalized autocorrelation function and the spectral density of a stationary random function to assess the level of plant competition with an unknown degree of relationship (Saharov & Markovin, 1988; Saharov, 1988).

Therefore, the distinction of phenotypic variance has a different scheme (Dragavtsev, 1983): $\sigma^2_{ph} = \sigma^2_g + \sigma^2_{gcom} + \sigma^2_e \sigma^2_{ecom}$ (1).

On the right side of the equation is the allocated share of genotype variance due to competitive ($\sigma^2_{gcom}$) and dispersion, depending on the competition, determined by the environmental conditions ($\sigma^2_{ecom}$).

To the right-hand side of the equation it is necessary to include the variance determined by the interaction of the genotype environment, genotypic dispersion of adaptability, dispersion, estimating the accumulation of individual developmental differences, such as differences in the length of the growing season, which in new environmental conditions varies in each species, in accordance with its inherent features and is controlled by the limiting factors of the environment. But the evaluation of all components of phenotypic variance of quantititative traits in woody species always causes difficulties for a number of objective reasons: at first, the traditional methods of studying genotypic population structure based on known models of genetics of quantitative traits, have limited the conditions determining the validity of the method for obtaining estimates to quantify genetic parameters reflecting the structure of the population (Saharov, 1988). Failure to meet compliance requirements of limiting conditions of the used statistical method to the character of the target population will make cause a distortion in the evaluation results (Medvedev et al., 1998); secondly, distortion of the phenotypic variance components is possible because of the ambiguity and the integrity of the phenomena, when a number of effects practically do not divide and together affect the final expression trait in plants. This circumstance fully applies to introducents when it is impossible to estimate ecological consequences of the place of origin of the introduced offspring, influence of generality of the new environment on the offspring of different origin and contrast among parents on the environment of the new dwelling descendants, ontogenetic accumulation of differences due to the fluctuation of limiting factors and changing conditions of competition in the ontogeny of introducents of human origin; thirdly, there is no information about the ecological and genetic structure of populations of the original homeland of exotic species (USA, Canada, Europe, the North of the Republic of Kazakhstan); fourth, the unknown nature of the genotypic dynamics of quantitative traits at home conifer introductions.

**Results and Discussion**

The analysis of the components of phenotypic variance of increments for each tree group under Lash’s scheme with the calculation of the coefficients of heritability in a broad sense showed that the phenotypic variance of increments is almost equal to random, which in a univariate variance analysis approximately assesses the environmental share in total dispersion of variance. Therefore, heritability coefficients in a broad sense estimating variability share which are defined with hereditary factors, are equal to zero except for the first period of growth in pitch pine and the last 15 years of life of fir spruce (Table 2). Due to the significant change in the average growth in height on the periods of growth of scotch pine, a few smaller differences in average growth for the period of pitch pine and blue spruce and stable average growth for the period of Crimea pine and fir spruce was necessary to assess the significance of differences increments by the periods of growth and interaction-period gains.
The results of the analysis indicate a different character of increments variability increase in the periods of introducients growth and the interaction of the factors: Pitch pine and Scotch pine have significant differences in increments by the periods of growth at the level of 01 significance, there are no significant differences in tree increments, the interaction of factors period – increments of Pitch pine is insignificantly and it is essential in Scotch pine with a probability of 95%. There are no differences in increments in the Crimea pine neither in the factors A, B nor on their interaction. There are significant differences in both factors with a probability of 99% and 95% in Blue spruce, there is no interaction between factors, and on the contrary, there are no differences of increments by factors, but their interaction is significantly at level 01. Thus, it becomes evident the need to analyse the variability of increments by groups of trees for the entire period studied and its parts, and the presence or absence of the interaction of factors determines the need for a more detailed analysis of the ratio of the variance increments of one morphological address, by tree-groups and periods of growth (Table 3).

Table 2: The average value of the annual increments in the height of introducients for the time corresponding to the total number of measurements, by periods of growth and estimation of heritability coefficient in a broad sense

<table>
<thead>
<tr>
<th>Types of trees</th>
<th>Average growth</th>
<th>Heritability coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>for years of studying, duration of periods</td>
<td>for the first period, duration of periods</td>
</tr>
<tr>
<td>Pitch pine</td>
<td>54.10, 32</td>
<td>57.75, 16</td>
</tr>
<tr>
<td>Scotch pine</td>
<td>59.54, 28</td>
<td>72.14, 14</td>
</tr>
<tr>
<td>Crimean pine</td>
<td>56.03, 28</td>
<td>56.07, 14</td>
</tr>
<tr>
<td>Blue spruce</td>
<td>42.53, 26</td>
<td>37.31, 13</td>
</tr>
<tr>
<td>Fir spruce</td>
<td>49.22, 30</td>
<td>50.30, 15</td>
</tr>
</tbody>
</table>

Source: Author

Table 3: Changing of the size and nature of the phenotypic, environmental and genotypic variances of increments of one morphological address, groups of trees, periods of growth and the ratio of the increments dispersions

<table>
<thead>
<tr>
<th>Types of trees</th>
<th>The periods of growth, the difference in variances</th>
<th>Dispersions of annual increments in height</th>
<th>by groups of trees</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Δσ²</td>
<td>σ²_ph</td>
<td>σ²_e</td>
</tr>
<tr>
<td>Pitch pine</td>
<td>1</td>
<td>320.0</td>
<td>214.2</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>189.0</td>
<td>131.8</td>
</tr>
<tr>
<td></td>
<td>Δσ²</td>
<td>131.0</td>
<td>82.4</td>
</tr>
<tr>
<td>Scotch pine</td>
<td>1</td>
<td>488.0</td>
<td>453.1</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>328.0</td>
<td>279.8</td>
</tr>
<tr>
<td></td>
<td>Δσ²</td>
<td>160.0</td>
<td>173.3</td>
</tr>
<tr>
<td>Crimea pine</td>
<td>1</td>
<td>355.0</td>
<td>315.1</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>318.0</td>
<td>314.6</td>
</tr>
<tr>
<td></td>
<td>Δσ²</td>
<td>37.0</td>
<td>0.5</td>
</tr>
<tr>
<td>Blue spruce</td>
<td>1</td>
<td>184.0</td>
<td>152.9</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>223.0</td>
<td>219.6</td>
</tr>
<tr>
<td></td>
<td>Δσ²</td>
<td>-39.0/</td>
<td>-66.7/</td>
</tr>
<tr>
<td>Fir spruce</td>
<td>1</td>
<td>172.0</td>
<td>175.4</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>258.0</td>
<td>269.8</td>
</tr>
<tr>
<td></td>
<td>Δσ²</td>
<td>-86.0/</td>
<td>-94.4/</td>
</tr>
</tbody>
</table>

Source: Author
Increment of phenotypic, environmental and genotypic variances of increments, as well as the ratio of the increment of genotypic varies to phenotypic changes by type of introducents and by periods of growth. Dispersions signs and their increments indicate in what period this or that dispersion is more. In Pitch pine, all dispersions are more in the first period of growth and the ratio of the increment of genotypic variance to phenotypic increments are equal to a group of trees and a morphological address. In Scots pine, there are inverse values of the relationship of increment values of the phenotypic variance or increments of one morphological phenotypic address and the group of trees. There are the same values \( \sigma^2 e \) of increments of one morphological address by the periods of growth and reverse of the ratio in the Crimea pine.

In Blue spruce \( \sigma^2 \text{ph}, \sigma^2 g \) increments of one morphological address is more in the second period and \( \sigma^2 g \) in the group of spruce trees barbed all dispersion increments are more in the second period. Therefore, the increment ratio \( \Delta \sigma^2 g \Delta \sigma^2 \text{ph} \) of the group of trees is opposite to a similar ratio for the increments of the morphological address. Fir spruce shows a special relationship not only for increment dispersions, all dispersions are more in the second period, but for the excess of environmental variance increments of one morphological address of phenotypic variance and a similar excess of increments of tree groups in the first period for a second \( \sigma^2 \text{ph} \) is more than \( \sigma^2 e \). Genotypic variance of increments of one morphological address and increments the group of trees of Fir spruce is more in the second period of growth.

Change of the value and the "sign" of increment relations of genotypic proportion of increments variance of one morphological address and a group of trees to the increment of phenotypic leads to the conclusion that there are possible differences in the nature of the override genetic formulas of exotic species in ontogeny. Having obtained zero estimates of the level of genotypically determined variability in increment by tree groups and differing variance increments, it can be concluded that all species in new environmental conditions, due to a small number of measured trees or a small number of biogroups after a multistage artificial selection, do not have a genotypic variety of the trait under study. The entire phenotypic variance of increments is determined by changes in environmental conditions or genotypically caused differences are "smeared" by other shares of phenotypic variability, that is, competitive genotypic, competitive environmental, genotype-environment interaction, accumulated ontogenetic disturbances. In this regard, a change in the influence of the growth period factor on growth, the factor of the group of trees, was established. There is an interaction of these factors and a change in the average growth over the periods of spruce, pine and yellow, and especially in Scots pine. During the first period, pines have a higher average growth than in the second. Average growth of blue spruce in the first years is less and in future it will be more. Crimea pine and fir spruce differ with stability of average increment in life periods (Table 1). So, there is reason to assume the existence of the reasons determining the differences in the observed average increments and dispersions by periods of growth.

After the analysis of variance, increments of one morphological address, in which the random variance is indeed environmental and ecological competitive part of the phenotypic variance, it was possible to highlight the proportion of genotypic variance, but again not for all types and periods (Table 4).

<table>
<thead>
<tr>
<th>Types of trees</th>
<th>Heritability coefficient for the years of studying / years</th>
<th>Heritability coefficient for the first period / years</th>
<th>Heritability coefficient for the second period / years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pitch pine</td>
<td>0.352 / 32</td>
<td>0.331 / 16</td>
<td>0.303 / 16</td>
</tr>
<tr>
<td>Scotch pine</td>
<td>0.352 / 28</td>
<td>0.07 / 14</td>
<td>0.147 / 14</td>
</tr>
<tr>
<td>Crimea pine</td>
<td>0.06 / 28</td>
<td>0.112 / 14</td>
<td>0.01 / 14</td>
</tr>
<tr>
<td>Blue spruce</td>
<td>0.19 / 26</td>
<td>0.169 / 13</td>
<td>0.015 / 13</td>
</tr>
<tr>
<td>Fir spruce</td>
<td>-0.035 / 30</td>
<td>-0.02 / 15</td>
<td>-0.046 / 15</td>
</tr>
</tbody>
</table>

Source: Author
Ecological and phenotypic variance of increments of Pitch pine as by periods and for all the years of study remains at the same level.

In the first period, the phenotypic variance of Scotch pine increments is almost equal to the environmental, a small proportion of genotypic variance appeared in the second period of growth, and in general during the 28 years of recording, about a third of the phenotypic variance accounted for genotypic share. Crimea pine showed little genotype variability due to increments only in the first period of life. Blue spruce has several large hereditary variables of growth for 26 years and in the first period of life. Fir spruce in all cases has an exceeding environmental variance of increment over the phenotype that determined the negative marks of zero heritability coefficient values in the broadest sense and indicates the presence of noise, overstating the environmental variance.

The analysis of variance increments of one morphological address gives only a glimpse of the ability of introducted species to adapt.

**Conclusion**

Thus, the value of the mean squares varies considerably by the increments of morphological address and increments of tree groups, introducten species and the periods of their lives, which leads to the conclusion about the presence in the environmental, genotypic and phenotypic variances of some interference which has a different value and are developed in a greater degree or in the analysis of groups of trees, or increments of one morphological address, i.e., change in the cause of its symptoms. Therefore, the scheme of separation of dispersions of increments on the genotypic and environment is insufficient and it is necessary to use other methods of determining the components of phenotypic variation of annual increments in the height of the introduced species.

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ANALYSIS OF REASONS FOR UNPLANNED STOPPAGES OF MACHINES IN THE EXAMPLE OF THE LONGWALL SHEARER

Kinga Stecula,¹ Jarosław Brodny,² Dorota Palka³

Abstract: Production enterprises mainly focus on activities concerning tangible resources. In recent years, however, this focus has shifted increasingly towards intangible resources such as knowledge as a key resource. Knowledge plays a crucial role in building an enterprise’s competitive advantage, including that of mining entities involved in coal extraction. This article presents results of research into the causes of unplanned stoppages in the operation of longwall shearsers. An examination of the parameters of the longwall shearer operation reveals an oversight in recording the causes of many unplanned machinery stoppages. Using informatics tools, the authors determine the reasons for most stoppages. The knowledge gained in this research has practical significance in providing a basis for implementing actions to limit the number of stoppages and improve the effectiveness of the machinery.

UDC Classification: 622.2; DOI: http://dx.doi.org/10.12955/cbup.v5.1098

Keywords: unplanned stoppages, tacit knowledge, effectiveness, mining machines.

Introduction

Production companies mainly base their activities on tangible resources. Fixed assets, finances, and stores are essential elements for the industry to function and operate. In recent years, however, the role of intangible resources has increased. These resources are no longer perceived as additional elements of business and have become a key factor in achieving a competitive advantage for many organizations. The intangible resources consist of competencies, knowledge, relations, attitudes, opportunities, brands, and functional systems (Stankiewicz, 2005). In addition, these resources include internal knowledge about technology, employees’ skills and procedures of behavior (Wernerfelt, 1984).

The effective use of intangible resources also concerns the mining industry. The optimization of production costs (Loska, 2013; Loska 2017) means that intangible resources can determine the competitive advantage in this industry. In recent years, the increasing trend among varying industrial companies regarding the importance of these resources has reached the mining industry. Mining companies have started to increasingly appreciate the competencies of their employees, whose knowledge, skills, involvement, and identification with the company are among its greatest elements and thus, its influential capital (Każmierczak, 2014).

The research results presented in this paper are a positive example of the application of knowledge in the mining industry. The authors, using informatics tools, have identified the causes of breaks during the operation of mining machinery. The paper focuses on determining the causes of the breaks in the operation of a longwall shearer. However, it should be noted that the methodology developed from this research will help determine the reasons for breaks in the operation of most mining machinery. This identification refers to unplanned breaks that have been registered by the industrial automation system. Past procedures allowed for the identification of only about 25% of the causes for such breaks. The developed and applied new system identified on average about 70% of the causes. Therefore, the results have a significant practical meaning. The knowledge gained regarding the reasons for the unplanned stoppages allows for specific actions to limit the number of breaks. This remedial action then increases the effectiveness of these machines and thus, the entire enterprise. The longwall shearer was chosen for this study because it is directly involved in excavating coal from rock mass. The breaks in its operation almost always result in further stoppages affecting the transporting machines and are associated with considerable economic losses.

The System for Registration of the Reasons for the Breaks in the Machine Operation

Studies into the effectiveness of using mining machines indicate that the availability and performance of the machines are unsatisfactory (Nakajima, 1988; Brodny et al., 2016; Stecua & Brodny, 2016).

¹ Faculty of Organization and Management, Silesian University of Technology, kinga.stecula@polsl.pl
² Faculty of Organization and Management, Silesian University of Technology, jaroslaw.brodny@polsl.pl
³ Faculty of Organization and Management, Silesian University of Technology, dorota.palka@polsl.pl
This scenario is especially the case with availability. The registration of the operating times of these machines shows that there are many unplanned breaks. At the same time, the system that registers the causes of these breaks contains only a small fraction. The remainder of these breaks are not registered, and their causes are unknown. It is assumed that these breaks are caused by the difficult conditions of the underground exploitation. However, without knowing the direct causes of the downtimes, it is impossible to optimize the machines’ operation time. The low value of the availability indicator results in poor exploitation of the full potential of the mining machine.

The aim of this study is to improve the effectiveness of using mining machines by developing a system of semi-automatic registration of the causes of the breaks in the mining machinery’s operation.

**Data and Methodology**

The study involved expert interviews with mine dispatchers who had knowledge of the reasons for most unplanned downtimes but were not necessarily motivated to use the required system to register causes because of the potential consequences of using such a system. The new system for registering causes was developed to ensure an effortless, convenient and, most importantly, anonymous approach to registering the reasons. It was designed so that the information reported by dispatchers regarding a specific event was encoded and accessible only to the operator with only the Director of the mine having access to this information by written request. With the acceptance of these conditions, an IT tool was developed in the form of a system for identifying the causes of stoppages in operating the mining machinery. The system was designed to disclose the tacit knowledge of the dispatchers and for monitoring the increased use of the machinery as well as the general situation at the mine. Converting tacit knowledge into explicit knowledge was a key objective of the developed system.

The system of the registration of the causes of the breaks in the machine operation was integrated with the dispatcher’s system of the mine to allow for the use of existing infrastructure and to avoid generating additional costs. The system was developed so that the registration module intuitively registers the cause of equipment failure from reasons automatically proposed by the system, based on the most frequent causes of stoppages for that particular machine. In the case of a new event, the dispatcher manually adds a brief description of the event, which is then entered into the system after further analysis. This means that the system is open and its database is constantly updated. Figure 1 shows the online form for registering failure of equipment.

**Figure 1: The view of the online form for registering machine failure**

![Online form for registering machine failure](image)

Source: Author

**The Analysis of the Reasons for the Breaks in the Longwall Shearer’s Operation**

Registering the causes for stoppages in the longwall shearer operation took place over one week (15 operational shifts). The duration of specific breaks was determined from data of the industrial automation system. All breaks lasting more than 30 seconds were assessed. It was assumed that
downtimes less than 30 seconds would be difficult to identify, and thus, results for this group would have low credibility.

The developed system was also used to determine the types of causes for breaks in the longwall shearer operation. In this case, breaks were classified into five groups: mechanical, electrical, hydraulic, mining, and organizational causes. Interviews with experts and dispatchers provided the means of classifying the causes by the organizational group.

**Results and Discussion**

Figure 2 shows the time structure of the breaks recorded by the automation system during the operation of the longwall shearer for 15 work shifts and the number of breaks with identified causes compared to the total. Table 1 summarizes total durations of registered breaks and those with identified reasons. Additionally, the percentage of durations of breaks with an identified cause relative to the total durations is shown for each interval.

Figure 2: The total registered breaks in the longwall shearer operation compared with the number having identified causes for each duration

![Bar chart showing total registered breaks and identified causes for each duration](source: Author)

Figure 3 shows the results for before and after implementing the identification system where stoppage reasons were found for 190 of the 371 registered breaks (data from Figure 2) with a quantitative efficiency of the identification approximately 51.20%. The ‘after’ result was understated by a low level of determination for the short breaks. For the intervals lasting from 0.5–1.0 min, the efficiency was 30.6%. This low result was due to the shortness of the duration, which meant the dispatcher was not always able to register the event in the system. However, the reporting of breaks was higher in events with longer duration.

The study identified stoppage reasons for 83.94% of the total breaks registered for the longwall shearer during the study period (Table 1). This high percentage is attributed to the heightened efficiency, especially in determining the causes of the lengthy breaks. In the case of breaks lasting more than 10 minutes, this efficiency was above 93.65%, which is noteworthy.

Figure 3 compares the results of before and after implementing the new system to demonstrate the efficiency of the developed tool. The registration time was 15 operational shifts with different periods of the longwall shearer operation compared. Nevertheless, a significant change in the number of the identified causes of the breaks was observed. Thus, the application of the developed system to identify causes of breaks in the longwall shearer operation appears to improve the efficiency of the identification considerably.
<table>
<thead>
<tr>
<th>Break</th>
<th>Registered (min)</th>
<th>Breaks with Identified Causes (min)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5–1.0</td>
<td>89</td>
<td>31</td>
<td>34.83</td>
</tr>
<tr>
<td>1–2.0</td>
<td>127</td>
<td>50</td>
<td>39.37</td>
</tr>
<tr>
<td>2–5.0</td>
<td>129</td>
<td>62</td>
<td>48.06</td>
</tr>
<tr>
<td>5–10.0</td>
<td>231</td>
<td>174</td>
<td>75.32</td>
</tr>
<tr>
<td>10–20.0</td>
<td>340</td>
<td>296</td>
<td>87.06</td>
</tr>
<tr>
<td>20–30.0</td>
<td>526</td>
<td>503</td>
<td>95.63</td>
</tr>
<tr>
<td>30–60.0</td>
<td>485</td>
<td>443</td>
<td>91.34</td>
</tr>
<tr>
<td>above 60.0</td>
<td>365</td>
<td>365</td>
<td>100.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2292</strong></td>
<td><strong>1924</strong></td>
<td><strong>83.94</strong></td>
</tr>
</tbody>
</table>

Source: Author

Figure 3: The percentage of identified reasons for the breaks before and after the implementation of the identification system for 15 operational shifts

Source: Author

Figure 4: The durations of breaks in the longwall shearer operation for each type of reason

Source: Author
Figure 4 shows five groups of reasons for breaks in the longwall shearer operation according to the total durations of breaks (in minutes) and their cumulative percentage. The results reveal that the main causes of the breaks are mechanical and mining (Figure 4). Organizational, electrical, and hydraulic reasons play a smaller role. Information about the types of causes for the breaks has practical implications as it can be used to optimize the operation of individual maintenance services.

Conclusion

The issue presented in the article has practical significance. Knowledge about the reasons for recorded breaks in machinery operation can lead to actions to increase the effectiveness of operations. The results of the study indicate the low efficiency of the previous way for registering causes for operational failures and downtimes. The implementation of a new system, based on an objective registration of the duration of the breaks, and information about the causes provide a way to identify most reasons. The tacit knowledge of the dispatchers gained through expert interviews combined with the developed IT tool led to a solution to a significant problem related to the machine exploitation in the mining company. The information gained from this study is exceedingly valuable to the management of a mine as well as the producers of the machines, as it identifies the components of the machines that generate the greatest problems for the users. The results revealed that many small breaks occur in the operation of the longwall shearer. Further research is recommended to help identify the specific causes of these breaks. Although the breaks have little effect on the longwall shearer availability, they potentially create serious technical issues. Frequently, such short breaks require unproductive engine restarts of the longwall shearer. The data presented in this article are part of a larger set that includes the monitoring of all machinery in the mechanized longwall system. It is recommended that the results of this research be used as a basis for reducing downtimes, and subsequently, improving the effectiveness of mine machinery including the longwall shearer.

Acknowledgements

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INFORMATICS PLATFORM AS A TOOL SUPPORTING RESEARCH REGARDING THE EFFECTIVENESS OF THE MINING MACHINES’ WORK

Kinga Stecūla,¹ Jarosław Brodny,² Magdalena Tutak³

Abstract: One of the factors which highly affects the economic effectiveness of production enterprises is the level of the use of technical means. This factor is also significant for mining companies extracting coal. The optimal use of mining machines can impact the future of these companies. The paper presents the authors’ solution which is an informatics platform supporting an analysis of the mining machines’ effectiveness. It uses a data warehouse to archive, synchronize and analytically process the data obtained from the studied machines. The article shows an example of applying an informatics platform to investigate the effectiveness of the longwall shearer’s work. The analysis was based on the data obtained from the industrial automation system. Afterwards, the shearer’s availability and performance, and quality of the product, which is coal, were determined. The developed tool should find wide practical application in production companies across different kinds of industries.

UDC Classification: 622.2; DOI: http://dx.doi.org/10.12955/cbup.v5.1099

Keywords: informatics platform, OEE, mining machines.

Introduction

The International market of energy resources is highly competitive. It also has a significant influence on the increased competitiveness in the Polish market. For this reason, enterprises extracting natural resources are forced to take activities which will make it possible to continue to exist in the market. One of the key areas that impact about the results of mining companies is the use of the technical means. Opinions of experts, as well as the results from audits, indicate that underutilization of the mining equipment is one of the biggest problems of mining enterprises (Przybyła, 2009). Currently used mining machines and devices are characterized by the high level of reliability and the technical parameters and at the same time are very cost-intensive objects. Therefore, it is justified for mining companies seek to use the equipment in the best manner that they can. In particular, it refers to the increase in their effectiveness. Moreover, this is the subject of this paper. The goal of the research, the results of which are discussed in this article, was to develop an informatics tool which would help to increase the effectiveness of the use of the mining machines. This tool is the informatics platform supporting the process of implementation and application of the OEE model to evaluate the level of the use of mining machines. This solution uses a data warehouse for archiving, synchronizing and analytically processing data which are obtained from the studied machines. It was assumed that the main task of this platform would be to integrate the data collection system and the supporting system using the OEE model. In the first stage of application, this tool will enable the initial evaluation of the effectiveness of the studied machines. In the next stage, it will make it possible to monitor the efficiency of the use of the machines and, thanks to this, assess the implemented changes and modifications. It appears that a significant problem in mining is also the identification of the causes of the low effectiveness of the machines and devices. In the paper, an example of the application of the informatics platform to study the efficiency of the longwall shearer’s work has been presented. The basis of the analysis was the data obtained from the industrial automation system. Thanks to this, the availability and the performance of the longwall shearer and the quality of the product, which in the case of mines is coal, has been determined. The developed tool is universal and should find a broad range of practical applications in the production companies of other industries too.

Characteristics of the Studied Object

The basic exploitation system in Polish coal mine is the longwall system. In this kind of system, the coal or other useful mineral is cut out in the zone of the longwall’s face. The length of the longwall’s face usually ranges from 60 to 300 meters. The height of the longwall can be from 0.6 to 9 meters (Korski & Bednarz, 2012). Such long exploitation walls make it possible to mechanize and automate the process of coal exploitation, especially in coal cutting and transporting. In this area, the machines

¹ Faculty of Organization and Management, Silesian University of Technology, kinga.stecula@polsl.pl
² Faculty of Organization and Management, Silesian University of Technology, jaroslaw.brodny@polsl.pl
³ Faculty of Mining and Geology, Silesian University of Technology, magdalena.tutak@polsl.pl
of the mechanized longwall system have significant meaning. They are dedicated to directly cut out coal and transport the coal from the zone of the longwall face. This system includes the longwall shearer, the armored face conveyor, the beam stage loader and the crusher. Also, there is also the longwall roof support designed to protect the work place. From a reliability point of view, these machines form a serial system. It means that they play a significant role in the continuity of the exploitation process and failure of one of these machines makes the entire system stop working. The most complicated and expensive machine of this system is the longwall shearer. It is directly responsible for coal cutting. Figure 1 shows an example of the longwall shearer.

Figure 1: The view of the longwall shearer

Source: Authors

Because of the significant meaning of the longwall shearer for the exploitation process, the authors decided to conduct an analysis of this machine’s effectiveness, using the developed informatics platform.

**Determination of the Efficiency of the Longwall Shearer**

To carry out the research on the efficiency of the mining machinery, it was necessary to choose the appropriate method and tools which would make it possible to evaluate the conducted process objectively. The authors decided to use the Total Productive Maintenance (TPM) strategy in their study. Moreover, to directly assess the utilization of the studied machines they applied the Overall Equipment Effectiveness model (OEE). This model is a quantitative tool for the TPM strategy. Its measure is the OEE indicator which is determined by the three partial indicators that include availability and performance of the machine and quality of the product. By analyzing these three areas, all relevant factors, which impact the effectiveness of the machine or the set of machines, are taken into account (Nakajima, 1988, Matejczyk, 2013).

However, the application of the OEE indicator in the original version to determine the effectiveness of the mining machinery was practically impossible due to the specificity of mining. For this reason, the partial indicators of the OEE indicator have been redefined and adjusted to the specific characteristics of the mining industry (Brodny et al., 2016). The availability values were determined for each of the studied machines (in this case, the longwall shearer), while performance and product quality indicators were calculated for the entire set of machines. The most critical data, which became the basis of availability determination, was obtained from the industrial automation system. This system works continuously and independently from the operator registers machine’s parameters and thanks to this, it guarantees high reliability of the data (Stecula & Brodny, 2016). This data is completely independent of the subjective factors and mistakes resulting from human factor. The data that was used to determine the effectiveness of the shearer was the work parameters, such as the current consumed by the particular shearer’s engines, the shearer’s position in the longwall about the right section of the longwall roof support, and the feed speed. Figure 2 shows the temporal chosen parameters waveforms of the longwall shearer for one work shift.
Figure 2: Recorded parameters of the longwall shearer’s work for one work shift.

Based on the obtained data, it was possible to determine the value of the availability indicator which is defined as the ratio of the real work time to the normative work time of the shearer (in this case, 360 minutes). By the recorded waveform, the level of the shearer’s availability was determined for the studied 20 work shifts. The performance indicator was determined thanks to the planned and the real extraction. The quality indicator was calculated based on the information from the processing plant. This information related the assortment and the gangue content in the valuable mineral. Due to the method of measurement, the qualitative data was averaged for the entire studied period. After determining the values of the partial indicators, it was possible to calculate the value of the shearer’s OEE indicator for 20 work shifts. Figure 3 shows the availability and performance values and the OEE values of the longwall shearer for 20 work shifts.

The results indicate that the use of the longwall shearer should be considered as low during the studied period. Therefore, it is necessary to develop a proper methodology to identify the causes of this state and plan the precise activities to improve the effectiveness.

Figure 3: The values of the availability, performance and OEE indicator of the longwall shearer

Source: Authors
Application of the Informatics Platform

The huge amount of data obtained from the industrial automation system needed the application of the appropriate informatics tool that would allow the archiving and analyzing the data. For this purpose, an informatics platform has been built to support the analysis of the effectiveness of the mining machines. This solution uses a data warehouse for archiving, synchronizing and analytically processing the data which comes from various machines. The data warehouse is thematically oriented, chronological, coherent and unchanging in its data collection. Its task is to support decision-making processes. It will help solve the decision problem by analyzing its data (Inmon, 1992). In the research, the data in the thematic bases concerns the work parameters of each of the tested machines. The database is a set of data and objects which are related to a given topic or task (Kopertowska-Tomczak, 2009). Also, the data warehouse integrates the data and process it analytically. As a consequence, it is possible to determine the specific values.

The use of the longwall shearer's parameters to determine its availability and overall effectiveness is only the first step in the application of the developed platform. In the next stage, it is necessary to conduct an analysis of losses in the production process. In particular, it concerns the identification of the structure and the causes of all types of breaks in the longwall shearer’s work. These losses were divided into several categories. The first category includes the losses of the availability of the very machine or the entire set of machines. Such losses are most often caused by random events that generate failures and downtimes. The second layer is about performance losses. They are related to a machine’s work. The third layer includes the losses in the quality of the product, which, in this case, is coal. For each of the three layers, the value of the proper indicator is calculated. Then, the final Overall Equipment Effectiveness indicator can be determined.

In the next stage of the study, conclusions are drawn by the level of determined effectiveness indicators. To achieve it, the quantitative qualification of the negative events has to be done first. The quantitative analysis is understood as the determination of the duration of a given event and the frequency of its occurrence. Also, the losses should be analyzed in a qualitative context which means that the specific cause of the given failure or downtime has to be found. The described informatics platform using a data warehouse for archiving and analyzing the work parameters has supported the research on the effectiveness of the longwall shearer. What is more, it will be used to study the entire set of the mining machinery further. It will enable quick and profound analysis, the results of which will be used in a further study.

Conclusion

In the current economic reality, every company is forced to optimize their production costs. This also applies to mining companies. One of the areas, in which there are significant reserves, is the use of the mining machines and devices. The informatics tool in the form of the platform, which is presented in this article, is aimed at facilitating the process of assessing and improving the effectiveness of the mining machinery. In the presented example, the study of only one machine, the longwall shearer, has been described. However, in practice, thanks to the developed platform, it will be possible to analyze the work of many machines that are involved in the technological process of coal mining. It should be highlighted that the essential meaning for the credibility and the quality of the analysis has input data. Relying on the industrial automation systems while obtaining the data guarantees the high quality and the independence from human factors. The results clearly showed that the level of the use of the longwall shearer is unsatisfactory. The availability, as well as the total effectiveness, are low despite the fact that there were no major failures during the period that could reduce the value of these indicators. The results confirm the validity of the use of IT tools and the industrial automation systems for analyzing the utilization of the mining machines. The results presented in the article are only a small part of the results of the whole longwall system research. However, even this little portion of research shows the large scale of the problem regarding the effectiveness of the technical potential which mining companies face.

Acknowledgements

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operation in the coal exploitation process” realized in 2015-2017, financed by NCBiR (National Centre for Research and Development).

References


**RESEARCH OF ACETALDEHYDE QUANTITIES IN COMMERCIAL AND LABORATORY PRODUCED FERMENTED PRODUCTS**

Suzana Stojanovska,1 Aleksandar Krstanovski,2 Julijana Tomovska3

**Abstract:** The main purpose of this research study is the determination of volatile flavoring substance acetaldehyde in some fermented, industrially manufactured dairy products, offered on the Bitola’s market and the comparison with acetaldehyde quantities measured in fermented dairy products produced in laboratory conditions. Six samples of fermented dairy products (yoghurt and sour milk) were purchased from the local supermarkets and four samples were “homemade” manufactured in laboratory conditions. Results of the acetaldehyde quantities in different fermented dairy products were obtained through the observation of acetaldehyde values successively in a two week period and, in order to confirm the mutual correlation of variables, i.e. of the absorbance and concentration, calibration curve was created. The highest acetaldehyde quantities in all fermented dairy samples were measured on the first day of this research study; while after the fifteenth day of examination acetaldehyde concentration in each sample was equal to zero. Undoubtedly, certain conditions like pH, temperature, strain ratio, etc. need to be met.

**UDC classification:** 637; **DOI:** http://dx.doi.org/10.12955/cbup.v5.1100

**Keywords:** acetaldehyde, aroma, fermentation, sour milk, yoghurt.

**Introduction**

Fermented dairy products are produced by adding cultures with thermophilic and mesophilic lactic acid bacteria (LAB) into milk. Generally, these cultures consist of Lactobacillus delbrueckii subsp. bulgaricus and Streptococcus thermophilus strains, which ferment the lactose into the lactic acid (Gelinas and Lachance, 1995; Shah, 1997; Gandhi 2006; Sfikianakis and Tzia, 2014) and produce volatile aromatic compounds (acetaldehyde, diacetyl, acetic acid and esters). They are produced in minimal quantities during biochemical ripening processes and are actually aroma and flavor carriers in fermented dairy products that deliver rich, rounded and characteristic taste of the fermented dairy products (Zonji, 1971; Marshall, 1987; Berković, 1998).

Acetaldehyde is an active carbonyl compound, which can react with amino acids in order to produce aromatic combinations. Hamdan et al. (1971) reported that acetaldehyde importance for yoghurt aroma was for the first time suggested by Pette and Lolkema in 1950, and later in 1968 by Keenan and Bills, who in their review stated that “high concentrations of acetaldehyde are necessary to produce a desirable flavor in yoghurt.” In literature, a broad range of optimal acetaldehyde level exists, suggesting the characteristic aroma of the plain yoghurt. There are statements where acetaldehyde levels from 10 to 20 mg kg$^{-1}$ are necessary for optimal taste and aroma, while there are reports implying acetaldehyde values from 21 to 41 mg kg$^{-1}$, are required for typical yoghurt flavor (Senel et al. 2009).

Yoghurt flavor formation occurs in three main stages; glycolysis, lipolysis and proteolysis, and the first phase of glycolysis is in fact the transformation phase in which the key aromatic yoghurt compounds like acetaldehyde, diacetyl, acetone and ethanol, are produced (Van Hylckama Vlieg et al. 2007; Baran, 2012). On the other hand, Ledenbach and Marshall (2009) examined factors influencing the relationship of aromatic compounds in fermented dairy products and concluded that the culture disbalance, inappropriate temperature or ripening time, culture infection with bacteriophages, the presence of inhibitors and microbe contamination could lead to products with undesired characteristics. This was also confirmed by Rašic and Kurmann (1978) and Baranowska et al. (2006) who suggested that yoghurt need to be fermented from a pH of 3.8 – 4.4, and optimal yoghurt taste could be obtained at pH 4.0 – 4.4.

Considering above statements the main purpose of this research study is the determination of the volatile flavoring substance acetaldehyde in some fermented, industrially manufactured dairy products, offered on the Bitola’s market and compared with the acetaldehyde quantities measured in fermented dairy products produced in laboratory conditions.

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1 University “St. Kliment Ohridski”, Faculty of Biotechnical Sciences, Bitola, R. Macedonia, stojanovskasuzana@gmail.com
2 University “St. Kliment Ohridski”, Faculty of Biotechnical Sciences, Bitola, R. Macedonia, ace.1990@hotmail.com
3 University “St. Kliment Ohridski”, Faculty of Biotechnical Sciences, Bitola, R. Macedonia, dzulitomovska@yahoo.com
Materials and methods

Research material

Six samples of fermented dairy products (yoghurt and sour milk) were purchased from the local supermarkets and four samples were “homemade” manufactured in laboratory conditions. As a starter culture for laboratory produced samples *Lactobacillus delbrueckii* subsp. *bulgaricus* and *Streptococcus thermophilus* strains were used, as well as certain quantities of already purchased fermented products. Laboratory samples were produced from 1 liter of fresh milk, first pasteurized at 89 – 100° C for 5 minutes, then with stirring cooled to 37 – 40° C, and “inoculated” with 80 – 100 ml of previously purchased yoghurt or sour milk. To initiate the fermentation, milk samples were left at room temperature for 4 to 6 hours. When the fermentation process was finished, samples were stored in a refrigerator at 4° C.

Chemicals and reagents

All chemicals used for this examination had p.a. grade. The standard solution of acetaldehyde – C₂H₄O was prepared through dilution of the ampule quantity in dH₂O, in 1:100000 ratio. Different concentrations of working solutions, later used for the calibration curve creation, were prepared with additional dilution of the standard solution. Reagents were prepared appropriately to the instructions given in the methods.

Method and sample preparation

The determination of the acetaldehyde quantity in fermented dairy products in this paper was based on the mechanism described by Sawicki et al. (1961). This procedure, previously applied to formaldehyde quantification, includes the following steps: reaction of the aldehyde with 3-methyl-2-benzothiazolone hydrazone (A), to form the azine (B), oxidation of A to a reactive cation (C) and formation of the blue cation (D), (Figure 1).

This method underwent certain modifications by Pack et al. (1964), who have used the reaction with 3-methyl-2-benzothiazolone hydrazone to determine diacetyl, while their modification one year later was adapted for routine analysis of acetaldehyde in dairy cultures by Lindsay and Day (1965).

**Figure 1:** Aldehyde reaction with 3-methyl-2-benzothiazolone hydrazine monohydrate

Samples were prepared according to the method reported by Carić et al. (2000). 5 to 15 g of research material were measured in a reagent glass (25 x 250 mm). HCl was added into the glass in order to prevent foam formation. The next step included the addition of the following mixture to the glass content: 2.5 ml H₂O + 2.5 ml water solution of 3-methyl-2-benzothiazolone hydrazone hydrochloride acid + 0.5 ml dimethyl sulfoxide. The glass was closed with a rubber seal and placed in a water bath at 65° C for 60 minutes, with N₂ insufflation at the same time (100-125 ml per minute). After 60 minutes, insufflation was interrupted and the glass pipe was rinsed with small quantities of dH₂O, inside the glass. The content was left at room temperature for 25 minutes and then 12.5 ml solution of iron (III) chloride was added to it, thoroughly mixed and left for another 25 minutes at room temperature. In order to stop oxidation, 20 ml of acetone was added into the reagent glass, and the content was quantitatively transferred into the volumetric flask of 50 ml and filled with acetone to the mark.
flask content was centrifuged at room temperature, 3 minutes and 9000 RPM, and the supernatant was filtered (Figure 2). At the end, the filtrate was analyzed with a spectrophotometer and the color change was read at 666 nm. The result was compared with the absorbance value obtained for a blank sample (for blank sample appropriate quantity of dH₂O was used).

Figure 2: Colour changes after oxidation interruption with acetone

![Figure 2](image)

Source: Authors

**Results and discussion**

Results of acetaldehyde quantities in different fermented dairy products were obtained by observation of acetaldehyde values, successively in a two week period (Table 1), and in order to confirm the mutual correlation of variables, i.e. of the absorbance and concentration, calibration curve was created (Figure 3), indicating high positive interaction, visible from the value of coefficient square, $R^2 = 0.9578$ (the closest value to 1, the stronger the correlation among the variables). Dependence of acetaldehyde concentrations on examination period can be observed from Figure 4.

A general suggestion is that the aroma and flavor formation occur in the first 24 hours of the production process and this is supported by values collected in this research. The highest acetaldehyde quantities in all fermented dairy samples were measured on the first day of this research, after the fifteenth day of examination acetaldehyde concentration in each sample was equal to zero.

Many authors have also confirmed this suggestion, demonstrating that acetaldehyde formation during yoghurt production develops in the first 6 hours and this is probably due to the fast metabolic activity of the starter. According to Imhof et al. (1994); Samet-Bali et al. (2012) and Chandan (2014), formation of acetaldehyde in yoghurt takes place predominantly in the first 1-2 hours of incubation, and its level decreases in later phases. They also note that combined cultures produce higher quantities of acetaldehyde, due to proto-cooperative growth of yoghurt cultures.

<table>
<thead>
<tr>
<th>Period/ Days</th>
<th>1S</th>
<th>2S</th>
<th>3S</th>
<th>4S</th>
<th>5S</th>
<th>6S</th>
<th>1L</th>
<th>2L</th>
<th>3L</th>
<th>4L</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>0.70</td>
<td>2.56</td>
<td>1.53</td>
<td>1.12</td>
<td>0.92</td>
<td>2.34</td>
<td>1.37</td>
<td>1.28</td>
<td>1.62</td>
<td>1.09</td>
</tr>
<tr>
<td>II</td>
<td>0.53</td>
<td>1.28</td>
<td>0.80</td>
<td>0.79</td>
<td>0.34</td>
<td>1.33</td>
<td>0.84</td>
<td>1.06</td>
<td>1.11</td>
<td>0.79</td>
</tr>
<tr>
<td>III</td>
<td>0.34</td>
<td>1.02</td>
<td>0.34</td>
<td>0.08</td>
<td>0.15</td>
<td>1.14</td>
<td>0.24</td>
<td>0.13</td>
<td>0.65</td>
<td>0.22</td>
</tr>
<tr>
<td>VII</td>
<td>0.24</td>
<td>0.61</td>
<td>0.11</td>
<td>0.0</td>
<td>0.14</td>
<td>1.08</td>
<td>0.03</td>
<td>0.04</td>
<td>0.05</td>
<td>0.0</td>
</tr>
<tr>
<td>X</td>
<td>0.0</td>
<td>0.50</td>
<td>0.0</td>
<td>0.05</td>
<td>0.95</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
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<tr>
<td>XIII</td>
<td>0.0</td>
<td>0.27</td>
<td>0.0</td>
<td>0.0</td>
<td>0.53</td>
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<td>0.0</td>
<td>0.0</td>
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<td>0.0</td>
</tr>
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<td>XV</td>
<td>0.0</td>
<td>0.0</td>
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<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
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<td>0.0</td>
</tr>
</tbody>
</table>

Source: Authors

It is important to make a parallel comparison among the values of samples purchased from supermarkets and acetaldehyde quantities of those produced in the laboratory. It is obvious that after the seventh day of analysis no concentrations were detected in laboratory manufactured samples. This could be connected to the storage period and fermentation conditions.

Güler et al. (2009) has reported that volatile compounds found in yoghurt to a large degree depend on the storage period. Acetaldehyde levels in yoghurt samples were the highest on the first day, but decreased during the period of cold storage. Considering the prolonged term, the most meaningful
changes in all volatile compounds appeared at the end of the storage period, probably as a result of enzymatic reactions. Many authors connected (Tamime and Robinson, 2007; Güzel-Seydim et al. 2005) the lowering of acetaldehyde values during the storage period with the decrease of pH and increased oxidation of acetaldehyde to acetate. Özer et al. (2007) suggested that reduction of acetaldehyde concentrations during storage is induced by alcohol dehydrogenase, produced by yoghurt cultures, which converts acetaldehyde into ethanol during the storage.

The only concern that arose regarding the storage period of samples purchased in supermarkets was the interval between the date of production and the date of delivery to the local shops.

Furthermore, when samples were sensory tested, aroma, flavor and taste of industrially produced samples were stronger and more expressive in comparison with laboratory manufactured samples. However, it is relevant that industrially manufactured samples are produced under precise and controlled conditions, with employment of sophisticated technology, which is not the case with the samples produced in the laboratory. Undoubtedly, certain conditions like pH, temperature, strain ratio, etc. need to be met.

Proper fermentation with yoghurt culture leads to a typical aromatic compound formation and obviously acetaldehyde and other volatile aromatic compounds cannot be discussed separately,
considering the symbiosis among LAB. Xu et al. (2015) in their research indicated that acetaldehyde quantities and other flavoring compounds are connected with the fermentation time. The longer the fermentation time, the higher concentrations of acetaldehyde and other aroma compounds in the yoghurt. According to them, sustainability of *Streptococcus thermophilus* has double positive effect in flavoring compounds production; on the one hand it stimulates *Lactobacillus bulgaricus* to produce more acetaldehyde, and on the other, it produces more diacetyl itself.

**Conclusion**

Summarized the results illustrate that with further research of symbiosis among *Lactobacillus bulgaricus*, *Streptococcus thermophilus* and other bacteria strains, as well as with the investigation of the balancing ratio among acetaldehyde and other aromatic volatile compounds, new possibilities for creating fermented dairy products with desired aroma and flavor characteristics are accessible. Furthermore, this includes experimentation with factors affecting the fermentation process itself. Controlled conditions in an industrial production environment, utilization of sophisticated technology and regulated storage conditions, both in plants and supermarkets, will provide fermented dairy products with high quality, positively accepted by the consumers.

**References**


APPLICATION OF RESPONSE SURFACE METHODOLOGY (RSM) - REDUCTION OF INDUSTRIAL WASTEWATER CHEMICAL OXYGEN DEMAND

Emmanuel Kweinor Tetteh,1 Sudesh Rathilal2

Abstract: Industrial waste oil in water from oil refineries and petrochemical processing poses a major environmental concern. Environmental pollution from these wastewaters is increasing and will continue to rise due to a growing demand for petrochemical products and energy. The composition of these industrial wastes varies from location to location as well as with manufacturing processes. In terms of water quality issues, chemical oxygen demand is considered one of the most problematic in oil refinery wastewater treatment. This study applies the response surface methodology to obtain a response model for industrial wastewater treatment. Operating parameters are optimized to enhance the treatment performance. The study, focusing on the effects of input variables for chemical oxygen demand removal, was experimentally carried out using dissolved air flotation jar tests. The experimental matrix incorporated the Box-Behnken design in the response surface methodology. In addition, the procedure evaluated the effect of the input variables and their interactions to obtain the optimum condition for the extent of efficiency. The results show that the chemical oxygen demand removal was sensitive to the effect of the input variables and their interactions. The statistical analysis established that the quadratic model was highly significant with a low probability (< 0.0001), indicating that the correlated regression scattering was unlikely random. The predicted model results corresponded well to the experimental results, with a coefficient of determination close to 1.0. The response surface of the model is presented in three-dimensional plots. These study results show that the addition of a coagulant to remove chemical oxygen demand is effective under acidic conditions when response surface methodology is applied.

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Keywords: Chemical oxygen demand, COD, design of experiment, DOE, response surface methodology, RSM

Introduction

Recovery of oil from industrial wastes is increasingly needed due to the oil’s high economic and calorific value. For this purpose, a combination of different operational units is required to enhance treatment efficiency (Welz et al., 2007; Maksimov et al., 2015). Similarly, the available crude quality and demand for petroleum products, as well as strict environmental regulations, affect the processing, operation, and configuration of the refinery and wastewater treatment plants (Vasseghian, 2016).

Waste oil, which is the main pollutant in the oil refinery and in petrochemical wastewater, forms a layer on the receiving water body surface, interfering with oxygenation of the water body, as well as producing a photochemical pollution that increases the chemical oxygen demand (COD). A high COD, when related to industrial oil wastes, can lead to mortality of aquatic life forms and when in drinking water can cause increased activity of mutagenic and carcinogenic in humans (Guan et al. 2017). To protect the environment and maintain good water quality, industrial wastewaters are treated by purification, removing sediment, and separation of water from the oil. About 50–60% of the oil recovered can be used as base oil or lubricants (Tetteh et al., 2017). The conventional treatment of industrial wastewater involves processes such as membrane technology, chemical and electrochemical oxidation, filtration, adsorption, and biological and various floatation methods (Welz et al., 2007; Diya’uddeen et al., 2011). However, there are certain limitations of each technique in industrial oil wastewater treatment. Due to complexity and cost of these processes, optimization is emphasized to maximize throughput with the lowest cost (Yuan et al., 2008; Santo et al., 2012). Thus, an efficient treatment method is required. The dissolved air flotation (DAF) mechanism has attracted the attention of many researchers. For instance, Karhu et al. (2014) applied a DAF to treat a high concentration of oil wastewater using polydiallyldimethylammonium chloride (polyDADMAC) as a coagulant. The result indicated that at an optimum coagulant dosage of 200 mg/L, about 70% of the COD was removed.

Process optimization is a means to obtain optimum operating conditions applied to the process to maximize and produce the best response. In general, the traditional technique of optimization involves investigating one-factor-at-a-time (OFAT). This has some demerits: (a) lack of interactive effects among the independent/input variables on the response; (b) demands much time and resources to

1 Faculty of Engineering and the Built Environment, Durban University of Technology, ektetteh34@gmail.com
2 Faculty of Engineering and the Built Environment, Durban University of Technology, rathilals@dut.ac.za
complete an investigation of effects of parameters on the response; and (c) requires high number of experimental runs which increases experimental expenses in terms of chemical usage and analyses (Bezerra et al., 2008). Therefore, to simultaneously optimize a process with several operating variables and enhance performance, a multivariable technique is required.

The RSM consists of statistical and mathematical techniques that allow the experimental data to behave according to the experiment, which is designed to obtain the best response possible for the factors studied. The RSM is among the most relevant multivariable methods recently employed in optimizing different types of industrial wastewater treatment processes, such as textile, palm oil, paint, oil, and sugar refinery (Bezerra et al., 2008; Pambi & Musonge 2016). The removal of COD from oil refinery wastewater was studied by Vassegghian (2016) using DAF, coupled with RSM. Their results showed that 68% of the COD was removed, as estimated by the COD model and were consistent with the experimental results at an optimum polyaluminium chloride (PAC) dosage of 25 mg L⁻¹.

To develop the experimental response model as a linear or quadratic polynomial function for the optimization, the best type of RSM design is recommended. Examples of the best design options include a 3-level full factorial design, central composite design (CCD), the Doehlert design (DD), and the Box-Behken design (BBD; Bezerra et al., 2008; Vassegghian, 2016). After selecting the type of experimental design and the independent variables, the next stage is to define the experimental region of interest to be studied. This stage requires a set of different values of the independent variables, termed levels, at which the experiment must be carried out. The BBD, which is a modified form of the two-level factorial design, with three level arrangements (3ᵏ), allows the estimation of the first and second order coefficient of the empirical response model. For an effective response, all the levels must be adjusted to only three ratings (+1, 0 -1) separated by equal intervals (Bezerra et al., 2008; Pambi & Musonge 2016; Vassegghian, 2016).

This study aims to investigate the effects of input variables, such as pH, coagulant dosage, and air saturator pressure on the removal of COD from oil refinery wastewater using the DAF treatment process. The use of BBD together with RSM was used to model the experimental data.

**Materials and Methods**

**Materials and Analytical Procedure**

The sample used in this study was obtained from a wastewater treatment plant of a local South African oil refinery located in Durban in the KwaZulu Natal province. Polyaluminium chloride (PAC) with a purity of 30% was used as a coagulant supplied by Sigma-Aldrich. Sulphuric acid with a purity of 98% and sodium hydroxide was used for the adjustment of the pH. The protocols by the American Public Health Association (APHA) standard method of examining wastewater were followed (APHA 2012). The COD was analyzed with a Hanna® HI 83099 COD and multiparameter photometer.

**Jar Test**

A DAF jar tester with six 1-L rectangular jars and an 8-L recycle air saturator at a constant rapid mixing of 250 rpm for two minutes followed by slow mixing at 30 rpm for 15 minutes was used. Then, the pressure in the saturator vessel was regulated by a pressure release valve to induce the dissolved air into the floatation tank base at a predetermined value while aerated for 15 minutes until reaching steady state (Tetteh et al., 2017).

**Design of Experiment**

The software, Design-Expert® (version 10.0.5; Stat-Ease, USA), was used to design the experiment, develop a response model, and optimize the process conditions. The COD removal was the response, and the RSM was used to evaluate the interactions among the input variables of pH, coagulant dosage, and air saturator pressure, where each factor was set at three different levels (Table 1).

<table>
<thead>
<tr>
<th>Table 1: Experimental design input variables</th>
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<tbody>
<tr>
<td><strong>Input variables</strong></td>
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<tr>
<td>pH</td>
</tr>
<tr>
<td>Coagulant dosage (mg/L)</td>
</tr>
<tr>
<td>Pressure (kPa)</td>
</tr>
</tbody>
</table>

Source: Authors
Results and Discussion

The COD measured was used as an indirect measure of the soap oil and grease, and other organic compounds present in the water used. The key indicator of the process efficiency was the measurement of the COD removal. The RSM was used to develop a mathematical relationship between the input variables and the response. The BBD was used to design and identify either the simple or combined effects of the input variables ($X_1$, $X_2$, and $X_3$) to maximize the removal of the COD. Table 2 shows the results of the BBD runs.

Table 2: Box-Behnken design matrix results

<table>
<thead>
<tr>
<th>Runs</th>
<th>pH</th>
<th>Coagulant dosage (mg/L)</th>
<th>Pressure (kPa)</th>
<th>COD (% removal)</th>
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<td>1</td>
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Source: Authors

Table 3: Results of ANOVA for chemical oxygen demand removal

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<th>Responses</th>
<th>Model Source</th>
<th>Std Dev</th>
<th>Actual R^2</th>
<th>Adjusted R^2</th>
<th>Pred. R^2</th>
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<tr>
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<tr>
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</tr>
<tr>
<td>Source</td>
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<td>Standard Error</td>
<td>Sum of Squares</td>
<td>df</td>
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<td>F Value</td>
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<td>245.54</td>
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Source: Authors

Std DV: 9.01; Mean: 77.59; CV: 11.61%; Ad precision: 6.48
An analysis of variance (ANOVA) was used to select the most predictive model (Table 3). The two-factor interactions (2FI) was the preferred selected. This choice was due to the desirability to describe the relationship between the input variables for the response. It was found that the $P > F$-value was less than 0.05 with the highest value of the correlation coefficient (Actual $R^2$, Adjusted $R^2$, and Predicted $R^2$) and the lowest standard deviation showing a statistically significant result. However, the high values of the $R^2$ and the adjusted $R^2$ depicted the model having non-significant terms. In this case, the 2FI model with a low coefficient of variation (CV) of 11.61% similarly revealed the model prediction from the experimental data was reliable and precise. The signal to noise, which is a measure of adequate precision (6.48), was greater than four, which also indicated that the model was suitable to determine the optimum conditions for the removal of the COD (Wang et al., 2007; Vasseghian, 2016).

A coded equation (3) was used to identify the relative impact of the factors by comparing the factor’s coefficients. The equation regarding actual factors (Equation 4) can be used to determine the relative impact of each factor because the coefficients are scaled to accommodate the units of each factor and the intercept is not at the center of the design space.

$$Y_{coded} = 77.59 - 5.54X_1 + 4.92X_2 - 3.86X_3 + 9.69X_1X_2 + 6.27X_1X_3 + 12.99X_2X_3 \quad (3)$$

$$Y_{actual} = 628.067 - 69.367X_1 - 9.551X_2 - 0.872X_3 + 9.691X_1X_2 + 0.063X_1X_3 - 0.013X_2X_3 \quad (4)$$

Where the high F-values and the low P-values of the linear terms ($X_1$, $X_2$, and $X_3$) and the interactive terms ($X_1X_2$, $X_1X_3$, and $X_2X_3$) show the high influence they have on the removal of the COD.

Effects of Factors on COD Removal

The sensitivity of the input variables was tested for the removal of COD as a response. To establish this relationship between the input and response variables, one variable was kept constant while varying the other two variables within the specified range for the experiment. The visual representation of the interactional effects of the input variables on the COD removal was depicted using three-dimensional (3D) surface response and contour plots.

Figure 1 shows the response surface effects of pH and saturator pressure on the COD removal at a fixed coagulant dosage. It was observed that at lower pH and pressure levels, the amount of COD removed was high. Thus, at lower pH, the emulsion is destabilized for interparticle bridging, while the effect of the pressure depends on the solubility of the dissolved air induced into the flotation zone. The progressive increase of the pH and pressure to a higher level resulted in the COD removal declining. This outcome was attributed to the volume as well as the micro bubbles generated that affected the efficiency of the DAF. At higher pressures, extra gases are discharged, with vigorous bubbles formed, thus affecting the collision between the air bubbles and the contaminants present in the water that could later float to the surface of the flotation tank (Edzwald, 2010).

Figure 1: COD response surface for pH vs. pressure (kPa) at constant coagulant dosage of 40 mg L$^{-1}$

Source: Authors
Figure 2 depicts the influence of the coagulant dosage and the saturator pressure on the removal of COD at a fixed pH. The removal of the COD approached a maximum value at a high coagulant dosage and low pressure. However, at high-pressure levels, the coagulant dosage was low when the COD removal approached a maximum value. Thus, at a higher coagulant dosage, larger and heavier flocs are produced that can easily be fragmented by the vigorous bubbling, hence affecting the rising velocity.

**Figure 2: COD response surface for coagulant dosage (mg L\(^{-1}\)) vs. pressure (kPa) at constant pH 5**

Source: Authors

Figure 3 shows the effect of pH and coagulant dosage at a fixed pressure on the COD removal. It was observed that the coagulant dosage was the only factor that had a significant effect on the COD removal. The addition of the PAC for the removal of COD was effective under the acidic conditions. This result is attributed to neutralization of the negative ions of the organic compounds by the positive charge of the coagulant via the adsorption mechanism (Bezerra et al., 2008; Vasseghian, 2016). Also, an overdose of the coagulant will eventually lead to colloids re-stabilizing and producing larger flocs.

**Figure 3: COD response surface for coagulant dosage (mg L\(^{-1}\)) vs. pH at a constant pressure of 350 kPa**

Source: Authors

Process Optimization
The data obtained from the experiments were simulated into the form of a response (COD) predictive model to evaluate the effects of the input variables at different levels to enhance the process efficiency. The optimization goal was set to maximum. With this criterion, the desirable outcome was attained at 95% confidence level where over 80% COD was removed. The combination of the input factors was found to be effective, within the test ranges of pH (4.4–5.6), coagulant dosage (34–48 mg L\(^{-1}\)) and pressure (320–400 kPa), towards approaching a higher COD removal of 80 to 98%. The optimum region defined the value of the response, which is shown as the shaded portion in an overlay plot (Figure 4). This depicts the region of interest, which is the graphical representation of the two most influential factors in the response (pH and coagulant dosage) approaching the high desirable value. This provided information that serves as a landmark for optimizing the process.

![Figure 4: Coagulant dosage (mg L\(^{-1}\)) vs. (pH) overlay plot for COD removal](source: Authors)

**Conclusion**

The application of the RSM in this study depended greatly on the independent variable data obtained from the experiment and its effects on the response. Polyaluminium chloride (PAC) was used as the coagulant for the treatment of industrial wastewater. The use of the Box-Behnken design (BBD) to develop the experiment provided distribution points throughout the region of interest. In evaluating the quality of the response model in terms of the information possible for the interaction effects between the input and output variables, there were two main outcomes. First, the use of the RSM technique is considered the best technique for process modification, optimization, and experimental analysis. It generated a large amount of information from a small number of experiments and hence will reduce the cost of experimentations. Second, the coagulant dosage had a significant effect on COD removal under acidic conditions. The lower the pressure, the better the effect, as a result of the higher generation of micro bubbles for COD reduction.

**Acknowledgements**

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**References**


PERFORMANCE COMPARISON OF THE DIFFERENT STREAMS IN A TCP BOTTLENECK LINK IN THE PRESENCE OF BACKGROUND TRAFFIC IN A DATA CENTER

Vilma Tomço,1 Aleksandër Xhuvani2

Abstract: The purpose of this work is the evaluation of the performance of TCP streams when the link that causes a bottleneck is also shared by the background traffic. Standard TCP is the most used protocol which sustains the majority of Internet traffic. Nevertheless, TCP manifests some problems when using almost all of the available bandwidth. Based on these problems, there are recognized different versions of TCP. The aim of this paper is to test the conflict between TCP flows bandwidth allocation. We have implemented a network which includes FTP traffic and background traffic. The TCP flows are simulated so that they begin transmitting at different times. Background traffic is added besides the TCP flows so that we approach a real network model. Besides studying how the TCP flows compete with each other, we will evaluate if the background traffic has an impact on the behavior of TCP flows and if it influences how the available bandwidth is shared equally among flows. We compare standard TCP Tahoe and TCP Reno, which do not differ much between each other, but use different algorithms so through simulation we will evaluate the changes in the bandwidth they use, even though we expect the TCP flows to be more aggressive in getting bandwidth from other TCP flows.

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UDC Classification: 654

Keywords: components; TCP stream, FTP Traffic, TCP Tahoe, TCP Reno;

Introduction

TCP and UDP are the two protocols of the transport layer used in Internet network. TCP is a reliable connection-oriented protocol, which guarantees the sending of the packets from source to destination in the order they were sent (Chohan, 2006). UDP is an unreliable, connectionless protocol, so the best effort protocol which uses no mechanism to handle packet loss or managing out of order received packets. TCP is a congestion control protocol which controls the rate at which packets are transmitted between sender and receiver (it slows down packet sending speed when it detects that the network is overloaded). The purpose of the UDP protocol is to send data as fast as possible. Many implementations of TCP are realized, and for each of these implementations, different studies over their impact on network utilization are done. Based on this two protocols we will study the behavior of TCP flows which show an aggressive approach in getting the bandwidth, and UDP which transmits at a constant rate regardless of other traffic on the network. We have used the NS2 simulator (Issariyakul, 2009) to evaluate the differences between the TCP flows, and also to study the impact of the background traffic. In this paper, we will look through providing a Network Random Input, the analysing of Initial Conditions, the Mathematical Model (used algorithms), the realization of some Simulations (Yuvaraju et al., 2010), the Graphic Representation of Flow Comparison, the Calculation of the Confidence Interval and at the Conclusions from the finished simulations (Cho, 2006). At the end of the paper, there are included the references that we have referred to during our work.

Network random input

The network model we have used is composed of 10 nodes, based on the Dumbo-Bell typology that consists of only one bottleneck link which is shared between some streams. In the network, we have included two TCP flows, one UDP flow with CBR traffic and another UDP flow with VBR traffic where both UDP streams are in the background.

To test the network behavior, so that it approaches the real network where the traffic changes over time, we have included the different elements. First, we have involved background traffic; second, we have included VBR traffic which changes over time. We also have used the exponential method of generating the traffic, through which we do not generate traffic all the time, but there are periods of time when we generate traffic (burst time) and periods of time when we do not generate traffic (idle time). Third, to get different results each time we simulate the network we use a random number generator method which provides us random input for each simulation we do.

1 University of Tirana Computer Science & Applied Mathematics, Tiranë, Albania, vimatster@gmail.com
2 Polytechnic University, Tiranë, Albania, axhuvani@yahoo.com
Initial condition

Based on our network typology we distinguish four streams which share the bottleneck link between the nodes 4 and 5. The bottleneck link is 10 Mbps full-duplex and with a queue size of 10 packets while the other links have a queue size of 100 packets.

- We create traffic between nodes 0 and 6 (TCP Reno). For the TCP link, we use the maximum size of 100 packets for the congestion window and we take a 512 byte packet size, as we have an Ethernet link and that’s the packet size which can be transmitted in the network based on RFC 895 and it is also the standard packet size used by UDP. We use the minimum timeout of 0.2 seconds, and we set the first UDP flow’s starting time at 5.0 seconds and the ending time at 90.0 seconds.

- We create FTP traffic between nodes 3 and 9 (TCP Tahoe). We use the same parameters for this flow as the one above. In this way, we evaluate the flows under the same conditions. This flow begins to transmit later than the first one, starting at 10.0 seconds and ending at 90.0 seconds.

- We create CBR traffic between nodes 1 and 7. The CBR traffic generates packets at the speed of 100 packets/sec. The CBR traffic source starts at 15.0 seconds and ends at 60.0 seconds. CBR traffic does not transmit actual data but instead informs the UDP agent that has data to transmit, and the agent creates packets and sends the data. We use a simplex link as UDP does not have a congestion control mechanism.

- We create 1 Mbps VBR traffic between nodes 2 and 8. We use the exponential on/off method to generate traffic, and we set the “On” period to 150ms and the “Off” period to 100ms. The link which is used is a simplex one. The packet size is same as the one used in TCP and CBR. VBR traffic starts at 20.0 seconds and ends at the 70.0 seconds mark.

Network typology with 10 nodes:

- The nodes 4 and 5 create the bottleneck link
- The nodes 0 and 3 generate FTP traffic (source nodes)
- The nodes 1 and 2 generate CBR and VBR traffic (source nodes)
- The nodes 6, 7, 8, 9 are destination nodes

We set the bandwidth to 10 Mbps full-duplex for the bottleneck link to simulate a 10 BaseT Ethernet link. The queue size is 10 packets smaller than the queue size of other links to create in this way the bottleneck and the buffer should have an appropriate size as the congestion avoidance mechanism brings throughput oscillation. Over buffered routers increase latency when we have congestion, whereas under buffered routers bring more problems because packet forwarding generates throughput oscillation.
For all the other network links we set the capacity to 100 Mbps full-duplex to simulate a 100BaseTX Ethernet link, and we set the queue size to 100 packets. For most of the links, we use the DropTail algorithm for the queue (FIFO) whereas for the n2-n4 and n5-n8 links we use the SFQ algorithm to provide various network conditions.

In the simulation we will perform, a Dumb-Bell typology with 2 TCP sessions is used which shares only a bottleneck link between two routers. Dumb-Bell typology with a congested link allows us to study the network traffic and it simulates a bottleneck link where the TCP sessions are transmitted on the internet. Along with the TCP streams, we have the UDP streams which are placed in the background and cause congestion and TCP packet loss.

Mathematical model

The UDP protocol does not implement any congestion avoidance mechanism contrary to the TCP protocol which has congestion control mechanism (Cho, 2006). Standard TCP Tahoe is one of the earliest implementations which use the go-back-n model to control network congestion.

TCP Tahoe is based on the algorithms:

1) SlowStart
2) CongestionAvoidance
3) FastRetransmit

TCP Reno is similar to TCP Tahoe, but they differ because TCP Reno has an additional algorithm which is FastRecovery (Ha et al., 2011). During the slow start phase, the congestion window increases with one for each acknowledge (ACK) message received, so the congestion window grows exponentially. The slow start phase continues until the congestion window is equal to or greater than the threshold. Once this condition is true, the next phase begins which is congestion avoidance. During the congestion avoidance phase, instead of increasing the window size with one each time we receive a ACK message, and the congestion avoidance algorithm increases the window size with one for each RTT (Round-Trip delay Time), so in this way, the congestion window size has a linear growth.

In the fast retransmit phase, when we receive a certain number of duplicated ACK for the same packet, the sender retransmits the packet without waiting for the timer to expire.

Fast recovery works during those cases when a certain number of duplicated ACK (threshold usually is set to 3) is received. Just as during fast retransmit, the sender retransmits the lost packets but instead of a slow start the congestion window is decreased by half, and then it counts the duplicated ACK to determine when it should send packets again. The window used by the sender:

\[
\text{min} (\text{awin}, \text{cwin} + \text{ndup})
\]
- awin: receiver window
- cwin: sender congestion window
- ndup: the number of duplicated ACK (stays at 0 until the number of duplicated ACK reaches threshold)

Referring RFC 2581 related to TCP Congestion Control we could explain the mathematical model based on the mentioned algorithms. Specifications:

- SEGMENT: each TC/IP data or ACK packet
- SENDER MAXIMUM SEGMENT SIZE (SMSS): the maximum size of the segment that the sender can transmit
- RECIEVER MAXIMUM SEGMENT SIZE (RMSS): the maximum size of the segment that the receiver can accept
- FULL-SIZED SEGMENT: the segment which has the maximum number of data bytes that is allowed
- RECIEVER WINDOW (rwnd): the window that the receiver uses most
- CONGESTION WINDOW (cwnd):
  - The state variables that limit the amount of data that a TCP sender can transmit. At a certain time, a TCP sender may not send data with a greater sequential number than the sequential number confirmed and the minimum of cwnd and rwnd
- INITIAL WINDOW (IW): the size of cwnd after three-way-handshake has finished
• LOSS WINDOW (LW): the size of cwnd after the TCP sender detects loss of packets using a retransmission timer
• RESTART WINDOW (RW): the size of cwnd after the TCP sender again begins the transmission after an idle time (if the slow start algorithm is used)
• FLIGHT SIZE: number of data which are sent but not acknowledged yet.

The cwnd variable is a limit at the sender side, in the number of data the sender can transmit before getting the ACK. The rwnd variable is a limit at the receiver side, in the delayed number of data. Minimum size of cwnd and rwnd manage the transmission of the data; the Slow-start algorithm is used before the transmission or after the recovery of lost packets from retransmission timer, to inspect the network in determining the available bandwidth. IW, cwnd initial size, it should be smaller than or equal to 2 * SMSS byte and it should not be greater than 2 segments.

The initial value of the ssthresh (slow-start threshold) can be a random value and it can be reduced as a response to congestion. The slow-start algorithm is used when cwnd sssthresh, and the congestion avoidance algorithm is used when cwnd>ssthresh. The sender can use each of them when cwnd is equal to ssthresh. During slow-start, TCP increments cwnd with at least a SMSS byte for each received ACK that confirms the data send. During congestion avoidance, cwnd is incremented with 1 for each RTT. Slow-start ends when cwnd exceeds ssthresh or when congestion is detected. Congestion avoidance ends when congestion is detected.

cwnd += SMSS*SMSS/cwnd (1)

When a TCP sender detects segment loss using the retransmission timer, the value of ssthresh should be set to:

\[
\text{ssthresh } = \max(\text{FlightSize}/2, 2\times\text{SMSS}) (2)
\]

The TCP sender should use the fast retransmit algorithm to detect and repair the loss, based on the ACK duplicated packets. After receiving 3 duplicated ACK, the TCP performs a retransmission for the missing segment, without waiting for the retransmission timer to expire. Fast retransmit and fast recovery algorithms can be implemented together:

1. When the third duplicated ACK is received, ssthresh is set to the value given by equation (2)
2. The lost segment is retransmitted and cwnd is set to ssthresh + 3*SMSS. This affects cwnd in three segments which are away from the network and are in the receiver buffer.
3. For each duplicated ACK received, cwnd increments from SMSS. This artificially increments cwnd.
4. A segment is transmitted if it is allowed from the new value of cwnd used by the receiver.
5. When another ACK is received to confirm the new data, cwnd is set to ssthresh. This is called window deflation.

**Experimental phase**

To reach conclusions about how the TCP streams compete with each other in the utilization of the bandwidth that is being also shared from the traffic background we realize a total of 10 simulations. Given that the results obtained from each simulation differ, then for all the performed simulations, we realize superposition of graphs to see if they fall almost in the same footprint and to confirm with certainty the received outcome. By all performed simulations we will evaluate how much and what proportion of the available bandwidth occupies each stream and then we will give an overall average of bandwidth utilization from each stream. Below we provide graphical presentations obtained by NS2 to show the different results of realized simulations.

**Figure 2: Overview of NAM during the simulation and illustration of 2 different results taken from the simulations**

Source: Author
Representation of streams comparison

The purpose of this work is measuring and analysing the performance of TCP Reno and TCP Tahoe (Mo et al., 1998). The study is done in the presence of background traffic. We will conduct a comparison of TCP streams by evaluating the bandwidth that they allocate (also considering other streams). Regarding the graphics taken from simulations we see that streams which compete aggressively among themselves to exploit as much bandwidth are TCP streams. TCP Reno stream provides more bandwidth than standard TCP Tahoe stream. Meanwhile in cases when in the network appear all types of streams, such as TCP streams and those in the background like VBR or CBR, the bandwidth used by each TCP stream decreases. To give a clearer idea of graphical presentations we initially represent streams separately and then give a graphical representation of all streams that are on the network and compete for bandwidth, evaluating the bandwidth size that each stream occupies.

Figure 3: Graphic presentation for the bandwidth used by CBR (in the presence of 4 streams on the network)

Source: Author

So, as we see from the graph for CBR, the bandwidth that CBR use is very low compared with the size of the link. The maximum value that CBR can achieve in the utilization of the link’s bandwidth is 250 kbps, and the minimum value is 90 kbps. The nominal bandwidth is 170 kbps, and this relates to the fact that CBR transmits packages with constant speed and does not show any aggressiveness in obtaining bandwidth. On the other hand, this is related to the fact that UDP does not use any mechanism for congestion.

Figure 4: Graphic presentation for the bandwidth used by VBR (in the presence of 4 streams on network)

Source: Author

Compared with the case of CBR, VBR represents more fluctuations in bandwidth, and this is related to the fact that VBR transmits the packages with different speed. The size of the bandwidth that VBR allocates reaches the maximum value at 1 Mbps. Unlike CBR where we used the mechanism Drop Tail, in the case of VBR we use the GFS mechanism.

From the graph obtained for the bandwidth used by TCP Reno, we see that at the very beginning of the simulation when on the network none of the traffic sources had started any transmission, TCP Reno uses all the potential capacity of the 10Mbps bottleneck link. With the emergence of other traffic on the network, the bandwidth used by TCP Reno decreases, as TCP Reno should share the link-although at certain moments when it can find space in the link, it tends to use it aggressively. It is noted that the average of the values connected with the bandwidth used by TCP Reno is roughly 4-5 Mbps.
Figure 5: Graphic presentation of bandwidth used by TCP Reno (in presence of background traffic)

Source: Author

Figure 6: Graphic presentation of bandwidth used by TCP Tahoe (in presence of background traffic)

Source: Author

Just as we affirm theoretically that TCP Reno was an improvement on TCP Tahoe and it should be expected to have a low utilization of bandwidth, from the graph given above we confirm such a thing. TCP Tahoe does not show the same aggressiveness as TCP Reno therefore never fails to utilize the full capacity of the maximum bottleneck link. The maximum value of bandwidth that TCP Tahoe can achieve to utilize is 8 Mbps. Meanwhile the approximate average value of the average bandwidth that is being used is 2-3 Mbps, which is a result lower than the bandwidth used by TCP Reno.

In the following charts, we will provide graphical presentations of the TCP streams in the presence of background traffics. What is normally expected as a result is that in the presence of background traffic the used bandwidths by each TCP stream are expected to decrease, because the bottleneck link is shared by 4 streams. Normally TCP will remain aggressive in the link not only against the background traffic, but also against each other.

Figure 7: Graphic presentation for sharing the bandwidth of the bottleneck link among 4 streams

Source: Author
In the graphical representation of Figure 8, we note that in the presence of background traffic, the sharing of the bandwidth between streams starts to become fairer. This is due to the fact that with the increase of RTT, the delay of ranks also grows. With the increase of RTT, we see that there is also a decrease in the aggressiveness in getting the bandwidth for the TCP Reno stream, so TCP Tahoe has more opportunities to provide bandwidth even though the TCP Reno stream dominates on the network.

(Reminder: In telecommunications, the round-trip delay time (RTD) or round-trip time (RTT) is the length of time it takes for a signal to be sent plus the length of time it takes for an acknowledgment of that signal to be received. This time delay, therefore, consists of the propagation times between the two points of a signal).

**Calculation of the confidence interval**

The results of the simulation would not have any value if we don’t have any idea about their accuracy, knowing that from every simulation a different result is received. To evaluate the data from every simulator, we must build the interval of confidence. To calculate the interval of confidence we proceed as shown below:

- We simulate and obtain an evaluation $X_1$ for the measurement that we are interested
- We repeat the simulation $M$ times and get $X_2…XM$, all different from each other.
- We evaluate the average of $M$ champions

$\bar{X} = \frac{\sum_{j=1}^{M} X_j}{M}$

$\sigma_X^2 = \frac{1}{M-1} \sum_{n=1}^{M} (X_n - \bar{X})^2$

Knowing that we cannot find a right evaluation with only one value, we consider an interval $[c1, c2]$. Based on the theorem of certified limits, we assume that 95% of the values are in the same interval. For a Gaussian distribution, the interval of confidence evaluates with a derivation $\pm 1.96$. The interval of confidence was 95%

For $M=10$ we get $\bar{X} = 2.17$ and $\sigma_X^2 = 0.020005$

The interval of confidence: $[0.069; 0.075]$

We calculate the interval of confidence for the bandwidth in the CBR stream.

For $M = 10$ we get $\bar{X} = 0.073$ and $\sigma^2_x = 0.020005$

The interval of confidence is $[0.069; 0.075]$. We calculate the interval of confidence for the bandwidth for the VBR stream:

For $M=10$ we get $\bar{X} = 0.29$ and $\sigma^2_x = 0.0004$

The interval of confidence: $[0.278; 0.302]$. We calculate the interval of confidence for the bandwidth
in the TCP Reno stream: For M=10 we get \( \bar{X} = 4.14 \) and \( \sigma_x^2 = 0.021 \). The interval of confidence: [2.081; 2.259] (as we stated above from the graphical appearances, the majority of the values are between 2-3 Mbps)

**Conclusion**

In this project, we experimented how TCP streams (TCP Reno and TCP Tahoe) compete with each other in the allocation of the bandwidth in a bottleneck link and also how they compete with background traffic (CBR and VBR). Traffic in the background ensures an approach that resembles more in a real world network, and it is noticed that with this presence on the network, TCP streams become more fair in relation to each other by reducing aggression. What was observed in the graphic presentations was that TCP Reno dominated in its transmission on the network compared to the standard TCP Tahoe. This refers to the fact that TCP Reno is an improvement of the standard TCP Tahoe because besides the algorithms that it uses - slow start, congestion avoidance, fast retransmit, it also uses the fast recovery algorithm. Fast Recovery acts in those cases when a certain number of duplicate ACKs are taken (threshold generally is set at 3). The sender retransmits the lost packets, but rather than the slow start algorithm, the congestion window is halved and then counts the duplicate ACKs for defining when to send the packages.

The interval of confidence: [4.053; 4.227] (as we stated above from the graphical appearance, the majority of the values are between 4-5 Mbps)

- We calculate the interval of confidence for the bandwidth for the TCP Tahoe stream:
- Starting from the graphical presentations, we affirm that TCP Reno uses on average 62% of the link bandwidth while TCP Tahoe 32%. The rest of the link is shared between the CBR and VBR that use on average 1% and 5% of the available bandwidth of the bottleneck link.

TCP Reno performs better when the losses of packages are small. In cases where losses are great in a window, then Reno does not perform well, and its performance is almost the same as TCP Tahoe. Another problem is that if the window is very small when losses occur, then we will never get duplicate ACKs for fast retransmit and we must wait for timeouts. This method does not detect effectively the losses of packets.

**References**

RAPID MICROPROPAGATION OF VU NU ORCHID (Oncidium sp.) BY USING TISSUE CULTURE TECHNIQUE

Tran Van Minh, 1 Nguyen Van Khoa, 2 Bui Thanh Hoa 3

Abstract: The high demand of Oncidium orchids leads us to find out efficient methods of propagating them. However, the propagation rate of traditional methods are low in nature and a hybrid seed is not genetically stable. Thus, plant cell biotechnology is examined as the most effective way to resolve the barrier of elite clone production. Shoot clusters were cultured on MS medium supplemented with 2,4-D (1 mg/l) for callus induction (76.19%) before induced callus was favoured for PLBs regeneration (98 PLBs/callus cluster) on MS medium supplemented with NAA (0.75 mg/l); the combination of BA (0.5 mg/l) and NAA (0.5 mg/l) was favoured for PLBs regeneration (28.18 PLBs/shoot cluster) from shoots cultivation. The PLBs (79.21 PLBs/PLB cluster) were then proliferated on MS medium supplemented with NAA (1 mg/l) and BA (1 mg/l) for shoot regeneration (12.42 shoots/PLBs cluster). Multiple-shoots were divided to 3-4 shoots/cluster for micropropagation on the MS medium supplemented with the combination of BA (0.25 mg/l) and NAA (0.25 mg/l) to reach 11.66 shoots/cluster. Shoots were finally separated to single-shoot for rooting on the MS medium supplemented with NAA (0.75 mg/l). A scheme for Oncidium micropropagation using PLBs culture techniques was set up.

UDC Classification: 57.01; DOI: http://dx.doi.org/10.12955/cbup.v5.1103
Keywords: Oncidium, elite, callus, protocorm like bodies (PLBs), micropropagation

Introduction

Orchidaceae orchids include many of the flowers spices used in the cut flower industry. Vu Nu (Oncidium) orchid is a fragrance that is popular in the world market in the form of flower pots and cut branches (Arditti, 2008). Low natural shoots and hybrid shoots do not guarantee parental lineage. The technique of tissue culture has been successfully applied in the conservation and development of rare orchids, cut flowers, condiment and medicinal plants (Arditti, 2008).

Vu Nu orchid culture has yielded the groundwork for the construction of micropropagation technology, such as the shoot tip, root tip, inflorescence culture of O. Sweet Sugar (Chen and Chang, 2000b) culture of young leaf producing direct and callus-formed PLBs (Chen and Chang, 2000a), proliferation of PLBs of O. Gower Ramsey (Kusumoto et al, 1998), regeneration of PLBs of O. Sharry Baby OM8 (Li et al, 2005) and O. Sweet Sugar (Hong et al, 2008).

Natural regeneration of Vu Nu is low about 1-3 shoots/cluster in one year. The culture of PLB occurs primarily in monocots such as orchids, which are directly regenerated from tissue, pollen, and orchid cells cultured in vitro. PLBs were proliferated and developed into complete plants in vitro (Arditti, 2008). By this method, a large number of plantlets of the same genetic origin can be obtained in a short time. The study of callus production, PLBs production, PLBs formed shoot regeneration and rapid multiplication of shoot need to be developed in order to rapidly multiplying Oncidium sp. orchids in vitro.

Materials and Methods

Vu Nu orchids (Oncidium sp.) in Vietnam are used as research materials for conservation and development purposes. The cultured samples are in vitro shoots of Vu Nu orchid. The research was conducted in the Plant Biotechnology Laboratory, International University.

The Murashige-Skoog nutrient medium (Murashige & Skoog, 1962) was added with BA (6-benzylaminopurin), NAA (α-naphthalenacetic acid), 2,4-dichloro-phenoxyactic acid, sucrose (20 g/l), Coconut water (10%), agar (Hai Phong).

The culture medium was adjusted to pH 5.8 before autoclaving at 121 °C and 1 atm for 40 minutes. The culture condition was set up with room temperature at 26 ± 2 °C, illumination intensity in 22.2 μmol/m²/s for 12 hours per day, relative humidity RH = 65%.

The experiment was set up in randomly complete block (RCB), with 3 replications, each with 3 Erlenmeyer flask (300 ml), each with 5 explants. Experimental data were recorded after 90 days of

1 International University, Vietnam National University Ho Chi Minh City, Viet Nam, drminh.ptntd@yahoo.com
2 International University, Vietnam National University Ho Chi Minh City, Viet Nam, nguyenvankhoa_2191@yahoo.com
3 International University, Vietnam National University Ho Chi Minh City, Viet Nam, bthanhhoa@gmail.com
culture and ANOVA was analyzed together with Turkey HSD (p = 0.05) with SPSS, version 16 (http://www-01.ibm.com/). Software/analytics/spss/)

**Experiment Design**

Experiment 1: Callus culture of Vu Nu orchid: MS medium was supplemented with 2,4-D in 6 treatments from C1 to C6 (0, 0.1, 0.25, 0, 5, 0.75, 1 and 2 mg/l). The cultured explants were shoot clusters (3-5 buds/cluster). The culture time is 90 days. Observed indicators: the rate of callus formation (%) and diameter of callus are recorded (mm). The best callus in one of these six treatments will be used as a material for experiment 2.

Experiment 2: Effect of NAA on PLB formation from callus: The PLB production from the best callus in one of the six treatments of experiment 1. MS medium was supplemented with NAA in 5 treatments from A1 to A6 (0, 0.1, 0.25, 0.5, 0.75, 1 mg/l). Cultured explants were callus (5 clusters of calli/Erlen). The observed indicator was PLBs/callus. The best PLBs in one of the five treatments will be used as material experiment 4.

Experiment 3: Effect of NAA and BA on PLB formation from bud cluster: MS medium was supplemented with BA in 6 treatments from G1 to G6 (0, 0.1, 0.25, 0.5 mg/l) and NAA (0, 0.5, 1 mg/l). The cultured explants were shoot cluster (3-5 buds/cluster). Observed indicator: number of PLBs/shoot cluster. PLBs in one of six treatments will be used as a material for experiment 4.

Experiment 4: Effect of NAA on proliferation of PLB biomass: MS medium was supplemented with NAA in 5 treatments from E1 to E5 (0.10, 0.25, 0.50, 0.75, 1 mg/l). The cultured explants were PLB clusters (3-5 PLB/cluster). The observed indicator is PLB number/cluster. PLBs in one of five treatments will be used as materials for Experiment 5.

Experiment 5: Effect of BA on shoot regeneration from PLBs: PLBs were formed from treatment E5 used as culture material. MS medium was supplemented with NAA in 5 treatments from B1 to B5 (0, 0.1, 0.25, 0.5, 0.75, 1 mg/l). The cultured explants were PLB clusters (3-5 PLB/cluster). The observed indicator was the number of shoots/cluster.

Experiment 6: The combined effect of BA and NAA on bud proliferation: The PLBs was formed from treatment E5 used as the culture material. MS medium was supplemented with BA (0, 0.1, 0.25, 0.5 mg/l) and NAA (0, 0.1, 0.25 mg/l) in six treatments ranging from D1 to D6. The cultured explants were shoot clusters (3-4 buds/cluster). The observed indicator was the number of shoots/cluster.

Experiment 7: Effect of NAA on root formation: MS medium was supplemented with NAA in six treatments from F1 to F6 (0, 0.1, 0.25, 0.5, 0.75, 1 mg/l). The culture explants were single shoots (> 30 cm). Observed indicators were the number of roots/shoots and root length.

**Results and Discussion**

**Culture of Callus Formation of Vu Nu Orchid**

Callus formation was carried out on MS medium containing different concentrations of 2,4-D. The effect of 2,4-D on callus formation is shown in Table 1. Callus is formed at the base of the Vu Nu orchid bud after 90 days of culture. The incidence of callus formation varies depending on the different concentrations of 2,4-D added to the culture medium. Observations show that there are three kinds of callus: (i) cream color, fragile, and lumps; (ii) light blue, and sticky; (iii) blue and sticky.

On MS medium without 2,4-D supplement (control), callus formation did not occur. On the MS medium supplemented with 2,4-D, shoot clusters produced callus-formed response significantly. The highest incidence of callus formation was 76.19% recorded in treatment A5 supplemented with 1 mg/l 2,4-D and two kinds of callus formed were (ii) light green and (iii) blue, compact with 5.57 mm in cluster size. In A2 treatment supplemented with 0.25 mg/l 2,4-D, the diameter of the callus reached the maximum size of 8.02 mm/cluster.

Wu et al. (2004) investigated the effects of two groups of auxins and cytokinins on embryo formation from calluses obtained from the root sample, the authors noted that there was no PLB on the MS medium without 2,4-D, but they still induced callus from this medium. Our results are similar to the rate of callus formation of 76.19% on MS medium supplemented with 1 mg/l 2,4-D. Jheng et al. (2006) added with 2,4-D in the lower concentration to culture medium affected cell proliferation, which was similar to that obtained with low concentrations of 2,4-D in this study. Experimentally on
callus formation, high concentrations of 2,4-D should be not used as it was the cause of mutant formation (Arditti, 2008) and the callus appeared to mutate in long-term culture (Jheng et al, 2006).

Table 1: Effect of 2,4-D on callus formation

<table>
<thead>
<tr>
<th>Treatment</th>
<th>2,4-D (mg/l)</th>
<th>Callus formation rate (%)*</th>
<th>Diameter of callus (mm/cluster)*</th>
<th>Morphology of callus</th>
</tr>
</thead>
<tbody>
<tr>
<td>A0</td>
<td>0,00</td>
<td>0,00 ± 0,00b</td>
<td>0,00 ± 0,00b</td>
<td>No callus formation</td>
</tr>
<tr>
<td>A1</td>
<td>0,10</td>
<td>47,62 ± 20,75ab</td>
<td>3,48 ±0,63ab</td>
<td>Cream, fragile, and lumps</td>
</tr>
<tr>
<td>A2</td>
<td>0,25</td>
<td>42,86 ± 16,49ab</td>
<td>8,02 ± 2,52a</td>
<td>Light green, and sticky</td>
</tr>
<tr>
<td>A3</td>
<td>0,50</td>
<td>54,76 ± 16,67ab</td>
<td>5,14 ± 2,21ab</td>
<td>Light green, and sticky</td>
</tr>
<tr>
<td>A4</td>
<td>0,75</td>
<td>23,81 ± 12,60ab</td>
<td>1,38 ± 0,70ab</td>
<td>Green and sticky</td>
</tr>
<tr>
<td>A5</td>
<td>1,00</td>
<td>76,19 ± 4,76a</td>
<td>5,57 ± 1,86ab</td>
<td>Cream, fragile, and lumps mixed with - light blue, and sticky</td>
</tr>
<tr>
<td>A6</td>
<td>2,00</td>
<td>33,33 ± 4,76ab</td>
<td>2,05 ± 0,40ab</td>
<td>Light green, and sticky</td>
</tr>
</tbody>
</table>

Source: Author

Effect of NAA on PLB Formation from Callus

Study on PLBs formation by callus culture on MS medium supplemented with NAA was performed. In Table 2, NAA was not added to medium showed no PLB was formed. The NAA in the higher concentration favoured the greater number of PLBs produced. Addition of 0.5 mg/l and 0.75 mg/l NAA into MS medium was for formation of 67.25-98 PLB/clusters. The MS medium supplemented with 0.75 mg/l NAA was suitable for the embryo PLB culture.

Chen and Chang (2000b) reported on MS medium supplemented with appropriate concentrations of NAA and TDZ will speed up the formation of PLBs. In this study, we tested the influence of NAA on the formation and growth of PLB biomass. The results recorded that supplemented with NAA in culture medium at a concentration of 0.1-1 mg/l had a significant effect. In a few other studies by other scientists, auxin and cytokinin have also been incorporated (Juliana et al., 2010).

Table 2: Effect of NAA on PLB formation from callus tissue

<table>
<thead>
<tr>
<th>Treatment</th>
<th>NAA (mg/l)</th>
<th>Number of PLB/cluster*</th>
</tr>
</thead>
<tbody>
<tr>
<td>B0</td>
<td>0,00</td>
<td>0,00 ± 0,00d</td>
</tr>
<tr>
<td>B1</td>
<td>0,10</td>
<td>26,83 ± 9,74c</td>
</tr>
<tr>
<td>B2</td>
<td>0,25</td>
<td>28,86 ± 5,60c</td>
</tr>
<tr>
<td>B3</td>
<td>0,50</td>
<td>67,25 ± 1,76b</td>
</tr>
<tr>
<td>B4</td>
<td>0,75</td>
<td>98,00 ± 3,79a</td>
</tr>
<tr>
<td>B5</td>
<td>1,00</td>
<td>5,00 ± 5,00cd</td>
</tr>
</tbody>
</table>

Source: Author

Effect of NAA and BA on PLB Formation from Shoots

On the MS medium, the addition of a combination of NAA and BA concentrations has had some effects. After 90 days of culture, all treatments had PLB formation, except the control medium without NAA plus BA with no PLB formation. Most of the cultured shoots produced PLB and the highest number of PLB/ bud cluster were recorded in treatment C3 (with the addition of 0.5 mg/l NAA and 0.5 mg/l BA) for the formation of 28.18 PLB/ shoot cluster, PLBs are blue and well-developed. Table 3 shows that the NAA and BA in MS culture medium significantly influenced production and morphology of PLBs. When combined with NAA (1 mg/l) and BA (0.1-0.5 mg/l), the PLBs formed with a low rate. MS medium supplemented with 0.5 mg/l NAA and 0.5 mg/l BA was suitable for the production of PLBs.

Rahman et al. (2005) recorded a combination of 1 mg/l BA and 0.05 mg/l NAA obtained the highest rate of Vu Nu PLB formation (90%). Juliana et al. (2010) also recorded a combination of 0.25 μM NAA and 13.5 μM TDZ for up to 80% of the PLB formation. In the results of this study, 28,18
PLB/shoots per cluster were also obtained on MS supplemented with NAA (0.50 mg/l) and BA (0.50 mg/l). Arditti (2008) concludes that PLBs from callus and shoots have both the nature and structure of cells capable of producing the same embryos, so PLBs from callus and shoots are used as raw material for proliferation culture research.

<table>
<thead>
<tr>
<th>Table 3: Effect of NAA and BA on PLB formation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment</td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td>C0</td>
</tr>
<tr>
<td>C1</td>
</tr>
<tr>
<td>C2</td>
</tr>
<tr>
<td>C3</td>
</tr>
<tr>
<td>C4</td>
</tr>
<tr>
<td>C5</td>
</tr>
<tr>
<td>C6</td>
</tr>
</tbody>
</table>

Source: Author

**Effect of NAA on PLB Proliferation**

The objective of this study was to accelerate the multiplication of PLBs to provide the material for subsequent experiments. Results showed that NAA was added to the appropriate MS culture medium for embryos PLB. Treatments supplemented with NAA had a good response during the proliferation process. After 90 days of culture, MS medium supplemented with 1 mg/l NAA (treatment D5) produced the highest PLB with 79.21.

<table>
<thead>
<tr>
<th>Table 4: Effect of NAA on PLB proliferation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment</td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td>D0</td>
</tr>
<tr>
<td>D1</td>
</tr>
<tr>
<td>D2</td>
</tr>
<tr>
<td>D3</td>
</tr>
<tr>
<td>D4</td>
</tr>
<tr>
<td>D5</td>
</tr>
</tbody>
</table>

Source: Author

**Effect of BA on Shoot Regeneration from PLBs**

Cytokinins play an important role in the reproduction of shoots. The culture medium of MS with different BA concentrations achieved effective regeneration (Table 5). On medium MS supplemented with 1 mg/l, BA yielded highly with 12.42 shoots/cluster after 90 days of culture. Shoots are green and have strong vigor with a height of 3-5 cm and 6-9 leaves.

<table>
<thead>
<tr>
<th>Table 5: Effect of BA on shoot regeneration from PLBs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment</td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td>E0</td>
</tr>
<tr>
<td>E1</td>
</tr>
<tr>
<td>E2</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>E3</td>
</tr>
<tr>
<td>E4</td>
</tr>
<tr>
<td>E5</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

Source: Author
The Combined Effect of BA and NAA on Shoot Proliferation

The research of shoot proliferation in vitro of Vu Nu is an important determinant of multiplication. Amongst the MS medium with BA and NAA after 90 days of culture, the supplemented treatment with 0.25 mg/l BA and 0.25 mg/l NAA gave best results with 11.66 shoots/cluster (Table 6).

Table 6: The effects of BA and NAA on shoot proliferation

<table>
<thead>
<tr>
<th>Treatment</th>
<th>BA (mg/l)</th>
<th>NAA (mg/l)</th>
<th>Number of shoot/sample*</th>
<th>Morphology</th>
</tr>
</thead>
<tbody>
<tr>
<td>F0</td>
<td>0,00</td>
<td>0,00</td>
<td>4,43 ± 0,30d</td>
<td>No new shoots</td>
</tr>
<tr>
<td>F1</td>
<td>0,10</td>
<td>0,10</td>
<td>11,19 ± 0,17ab</td>
<td>Green and shoot uniform</td>
</tr>
<tr>
<td>F2</td>
<td>0,25</td>
<td>0,10</td>
<td>6,50 ± 1,28bcd</td>
<td>Blue and some dominant shoots</td>
</tr>
<tr>
<td>F3</td>
<td>0,50</td>
<td>0,10</td>
<td>10,50 ± 1,26abc</td>
<td>Green and bud uniform</td>
</tr>
<tr>
<td>F4</td>
<td>0,10</td>
<td>0,25</td>
<td>9,33 ± 0,70abcd</td>
<td>Green and bud uniform Green and some dominant shoots</td>
</tr>
<tr>
<td>F5</td>
<td>0,25</td>
<td>0,25</td>
<td>11,66 ± 1,74a</td>
<td>Dark green and uniform shoot</td>
</tr>
<tr>
<td>F6</td>
<td>0,50</td>
<td>0,25</td>
<td>6,10 ± 0,86cd</td>
<td>Blue and some dominant shoots</td>
</tr>
</tbody>
</table>

Source: Author

Effect of NAA on Rooting

MS medium was supplemented with NAA at different concentrations to study root shoots in vitro. The results of Table 7 show that there is no difference in rooting ability in the treatments. The addition of 0.75 mg/l NAA to the MS medium resulted in the highest number of roots with 2.64 roots/shoot and 1 mg/l NAA for the longest root length with 12.58 mm.

The experimental results achieved was similar to Rahman et al. (2005). The highest number of roots at 1.5 mg/l NAA of 3.2 roots and the longest root length of 25 mm on the culture medium with supplementation of 1 mg/l NAA.

Table 7: Effect of NAA on rooting

<table>
<thead>
<tr>
<th>Treatment</th>
<th>NAA (mg/l)</th>
<th>Number of root/sample*</th>
<th>Root length (mm)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>G0</td>
<td>0,00</td>
<td>0,00 ± 0,00b</td>
<td>0,00 ± 0,00b</td>
</tr>
<tr>
<td>G1</td>
<td>0,10</td>
<td>1,97 ± 0,35a</td>
<td>2,25 ± 0,14b</td>
</tr>
<tr>
<td>G2</td>
<td>0,25</td>
<td>2,23 ± 0,23a</td>
<td>9,35 ± 0,85a</td>
</tr>
<tr>
<td>G3</td>
<td>0,50</td>
<td>1,47 ± 0,37ab</td>
<td>2,85 ± 0,15b</td>
</tr>
<tr>
<td>G4</td>
<td>0,75</td>
<td>2,64 ± 0,59a</td>
<td>10,11 ± 1,49a</td>
</tr>
<tr>
<td>G5</td>
<td>1,00</td>
<td>1,83 ± 0,33a</td>
<td>12,58 ± 1,56a</td>
</tr>
</tbody>
</table>

Source: Author

Conclusion

The culture of the shoot cluster on MS medium supplemented with 1 mg/l 2,4-D gave the highest incidence of formed callus with 76.19%. The PLB culture from callus on medium supplemented with 0.75 mg/l NAA gave PLB as much as 98 PLB/callus.

The culture of the shoot cluster on MS medium supplemented with 0.5 mg/l NAA and 0.5 mg/l BA for direct generation of PLBs was 28.18 PLB/shoot cluster.

PLB proliferation was cultured on MS medium supplemented with 1 mg/l NAA reached 79.21 PLB/shoots.

On MS medium supplemented with 1 mg/l BA for shoot regeneration with 12.42 shoot/PLB cluster. Shoots were rapidly multiplicated on medium supplemented with 0.25 mg/l BA and 0.25 mg/l NAA reached 11.66 shoots/cluster. These shoots are 3-5 cm tall and have 6-9 leaves. On the MS medium supplemented with 0.75 mg/l NAA, root formation was stimulated with a maximum number of roots of 2.64 roots and supplemented at 1 mg/l NAA for the longest root length of 12.58 mm.

From the callus or the shoot cluster, we are capable of forming PLBs. The ability of the cell culture to proliferate is faster than PLBs and the ability to regenerate PLB high or low depends on the cultivar, so it is necessary to select appropriate culture techniques for each species in breeding. The process of rapid multiplication of Vu Nu orchids in vitro has been elaborated using the technique of tissue culture: from shoot cluster → callus → PLBs → PLBs multiplication → regenerate complete plants.
References


APPLICATION OF SOMATIC EMBRYOGENESIS AND BIOREACTOR TECHNIQUES IN MICROPROPAGATION OF TROPICAL LILY CONCA D’OR (ORIENT X TRUMPET)

Nguyen Thanh Quang,1 Tran Van Minh2

Abstract: The lily is considered one of the highest value cutting flowers as well as is popular to the majority. Bulbs are often imported from the Netherland with an expensive price. Thus, it is difficult to sell commercial lily flowers in the domestic market and international trade. This study focused on mass producing the source of somatic embryos with a high regeneration ability used for the lily micropropagation. Internodes were cultured on MS medium and supplemented with 0.1 mg/l BA and 0.5 mg/l NAA to induce callus, while embryogenic cells reached the highest value at 98.2% before such embryogenic callus was then multiplied on the same media within 5 weeks. The suitable media for somatic embryos regeneration was MS medium supplemented with 0.5 mg/l BA and 0.25 mg/l NAA which after 5 weeks of culture gave us a shoot number of 3.7 shoots/clusters, a shoot height of 87.3 mm, a leaf diameter of 7.7 mm. Multiple shoots regenerated from embryogenic cells were then used as materials for micropropagation. Results showed that the highest data for multiple shoot multiplication was reached in the bioreactor culture system with the maximum number of shoot height (100.25 mm), shoot number (7.1 shoot/cluster) and fresh weight of shoots (1470.94 mg/cluster). The suitable medium for rooting was MS medium supplemented with 0.5 mg/l NAA.

UDC Classification: 57.01; DOI: http://dx.doi.org/10.12955/cbup.v5.1104

Keywords: Conca D’or, bulb, somatic embryo, induction, proliferation, regeneration

Introduction

The lily flower belongs to the Liliaceae family which consists of around 200 genus and 3000 species, originates from South – West Asia and North America and were imported to Vietnam in the French colonial period (Blaney and Roberts, 1966; McRae, 1988; Lian et al, 2003; Woodcock and Stearn, 1950; Zhang et al, 2014). In Vietnam, the lily is now considered as one of the highest value cutting flower as well as being popular to the majority of people thanks to its pure beauty, passionate perfumes and long shelf life.

Lily cultivation more often than not has strong economic potential and brings with it higher profit than other flowers. However, lily cultivation in Vietnam has had many difficulties especially the lack of a source of bulb with high quality and which still hasn’t had a lily propagation system. Thus, almost all bulbs that are used today must be imported from the Netherland with an expensive price. Therefore, it is very difficult to sell commercial lily flower in the domestic and international market.

Lilies can be propagated by some traditional methods, in particular, natural divisions, stem bulblets, bulbs and scaling (Zhang et al., 2014). However, with such ways exist some disadvantages such as: a low amplification coefficient, slow growth rate, the appearance of variability in the next generations, etc…

There are many organs that can be used as starting material in lily micropropagation such as: the bulb scale, shoot tip, petal and receptacle (Bong et al., 2004; Hoshi et al., 2004, Lan et al., 2009; Pelkonen, 2005; Suzuki et al., 2002). Stem (Suzuki et al., 2002; Zhang et al., 2014), thin cell layer culture (Nhu et al., 2002) and bioreactor techniques (Lian et al., 2003) are used in somatic embryogenesis. The high concentration of auxin is really necessary to induce callus and the embryo in the starting stage (Komamine et al., 2005; Pierik, 1987). Almost all studies use 2,4-D and picloram to induce callus and embryo in the starting stage and improve the regenerative ability through using plant growth regulators belonged to the cytokinin group such as: BAP, TDZ and kin etin (Nhu et al., 2002).

Building up a lily micropropagation system by using a somatic embryo culture technique and using regenerated shoots from an embryo in the in vitro propagation is examined as the permanent solution to mass produce starting materials serving for the lily bulb production with high quality.

Materials and Methods

The bulbs of Lilium oriental hybrid ‘Conca Dor’ (Orient x Trumpet) were purchased from the De Jong Lelies Holland and bloomed in HCMC and Sa Dec (Dong Thap province, Mekong River Delta). Such

1 International University, Vietnam National University Ho Chi Minh City, Viet Nam, nguyenthanhquang1411@gmail.com
2 International University, Vietnam National University Ho Chi Minh City, Viet Nam, drminh.ptntd@yahoo.com
bulbs were put into a tray and covered by a layer of coconut fiber at 28°C, developed stems of approximately 7 cm long within two weeks.

Explant sterilization: 6 external leaves of each stem approximately 4-5 cm in length were removed. Next, the stems were submerged in detergent solution and this followed by rinsing continuously with running tap water. Under sterile conditions in a flow-cabinet, the surface of stems was sterilized in 70% ethanol in 30 seconds and then washed 3 times with sterile distilled water before they were disinfected continuously for 6 minutes in 0.1% HgCl₂ solution, to which two drops of Tween 20 (Fulika, Germany) had been added and then washed 5 times with sterile distilled water.

Cultural materials: young leaves (10-12 young leaves per stem) and nodes (5-6 nodes per stem) were excised from stems and used as cultural materials in the experiments.

Cultural medium: MS basal medium (Murashige and Skoog, 1962) supplemented with 10% coconut water, 0.1% AC, 0.8% agar, 3% sucrose and plant growth regulators such as: BA and NAA in different concentrations. The medium was adjusted to pH 5.8 before being autoclaved at 121°C, 1 atm for 20 minutes.

All cultures were incubated at 24±2°C with a photoperiod of 16 h per day at a light intensity of 11.1 µmol m⁻² s⁻¹ fluorescent light and 60±5% relative humidity.

Data was analyzed by using one way ANOVA. Each experiment had 3 replicates, each replicate had 4 bottles and each bottle had 5 explants. All analysis of the results was carried out by using MSTATC software version 2.0 of the Michigan University, USA. The level of significance in the experiments was set at 0.05 and will be classified into the LSD test.

**Experiment Design**

**Experiment 1:** The effect of explants on the embryogenic callus induction: MS basal medium supplemented with 0.1 mg/l BA and 0.5 mg/l NAA. Culture material: Areca leaf and internode. Data collection: callus induction rate, somatic embryo induction rate, callus and somatic embryo induction rate. Data was recorded 4 weeks after culture.

**Experiment 2:** The effect of NAA on the multiplication of embryogenic callus: Culture medium: MS basal medium supplemented with 0.1 mg/l BA and NAA (0, 0.1, 0.25, 0.5, 0.75 mg/l). Culture material: Friable and compact embryogenic callus (1 g embryogenic callus per cluster). Data collection: fresh weight of embryogenic callus per cluster (mgFW/cluster), proliferation rate of embryogenic callus and number of shoot (shoots/cluster). Data was recorded 5 weeks after culture.

**Experiment 3:** The effect of BA and NAA on somatic embryos regeneration: Culture medium: MS basal medium supplemented with the combination of NAA (0, 0.1, 0.25 mg/l) and various concentrations of BA (0, 0.1, 0.25, 0.5, 0.75 mg/l). Culture material: Friable and compact embryogenic callus (1 g embryogenic callus per cluster). Data collection: number of shoot per cluster, height of shoot (mm) and leaf diameter (mm). Data was recorded 5 weeks after culture.

**Experiment 4:** The effect of NAA, IAA, IBA on shoot multiplication: Culture medium: MS basal medium supplemented with the combination of 0.5 mg/l BA and different concentrations of NAA (0, 0.1, 0.2, 0.3 mg/l), IAA (0, 0.1, 0.2, 0.3 mg/l) and IBA (0, 0.1, 0.2, 0.3 mg/l). Culture material: in vitro shoots. Data collection: number of shoot per cluster, number of leaf per cluster, height of shoot (mm) and leaf diameter (mm). Data was recorded 5 weeks after culture.

**Experiment 5:** The effect of the temporary immersion bioreactor system on shoot multiplication. Culture medium: MS basal medium supplemented with 0.5 mg/l BA, 0.2 mg/l NAA and various immersion frequencies (1 minute each 4 hours, 2 minutes each 4 hours, 3 minutes each 4 hours and 4 minutes each 4 hours). Cultural materials: in vitro shoots. Data collection: number of shoot per cluster, height of shoot (mm), fresh weight of shoot per cluster (mg) and proliferation rate of shoot. Data was recorded 5 weeks after culture.

**Experiment 6:** The effect of NAA on the rooting: Culture medium: MS basal medium supplemented with 10% coconut water, 0.8% agar, 0.1% AC, 3% sucrose and difference concentrations of NAA (0, 0.1, 0.3, 0.5 mg/l). Culture material: in vitro shoots. Data collection: rooting rate, number of roots and length of root (mm). Data was recorded 4 weeks after culture.
Results and Discussion

Effect of Explants on Embryogenic Callus Induction

Effects of explants on the induction of embryogenic callus were described in Table 1 after 4 weeks of the culture. According to the result, internode was the most suitable starting material in the embryogenic callus induction with the maximum number of callus induction rate (18.7%), somatic embryo induction rate (79.5%) and callus and somatic embryo induction rate (98.2%) after 4 weeks of the culture (Table 1). The results were far higher than those using areca leaf as a starting material which only reached 14.7% in callus induction rate, 16.0% in embryo induction rate and 22.7% in callus and somatic embryo induction rate after 4 weeks of the culture.

Table 1: The effect of explants on embryogenic callus induction

<table>
<thead>
<tr>
<th>Starting material</th>
<th>Callus induction rate (%)</th>
<th>Somatic embryo induction rate (%)</th>
<th>Callus and somatic embryo induction rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Areca Leaf</td>
<td>14.7</td>
<td>16.0</td>
<td>22.7</td>
</tr>
<tr>
<td>Internode</td>
<td>18.7</td>
<td>79.5</td>
<td>98.2</td>
</tr>
<tr>
<td>M</td>
<td>16.7</td>
<td>47.7</td>
<td>60.4</td>
</tr>
<tr>
<td>CV(%)</td>
<td>18.3</td>
<td>12.7</td>
<td>11.9</td>
</tr>
</tbody>
</table>

Source: Author

Effect of NAA on Multiplication of Embryogenic Callus

The effects of NAA on the embryogenic callus multiplication were described in Table 2 after 5 weeks of culture. The results showed that on hormone – free basal MS fresh weight of embryogenic callus per cluster, proliferation rate of embryogenic callus fresh weight and number of shoot per cluster only reached at the low rate, standing at 1089.7 mg FW/cluster, 1.1 fold and 1.3 shoots/cluster respectively. However, the highest value was observed at the treatment using culture medium supplemented with 0.1 mg/l BA and 0.5 mg/l NAA with the maximum number of fresh weight of embryogenic callus per cluster (2719.7 mg FW/cluster), proliferation rate of embryogenic callus fresh weight (2.6 folds) and number of shoot per cluster (2.7 shoots/cluster). According to the analysis above, it can be concluded that NAA plays an instrumental role on the embryogenic callus multiplication (Table 2).

Table 2: The effect of NAA on multiplication of embryogenic callus

<table>
<thead>
<tr>
<th>NAA (mg/l)</th>
<th>Fresh weight of embryogenic callus per cluster (mgFW/cluster)</th>
<th>Proliferation rate of embryogenic callus</th>
<th>Number of shoot (shoots/cluster)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00</td>
<td>1089.7&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.1&lt;sup&gt;c&lt;/sup&gt;</td>
<td>1.3&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>0.10</td>
<td>1522.0&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1.5&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1.3&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>0.25</td>
<td>1573.0&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1.6&lt;sup&gt;b&lt;/sup&gt;</td>
<td>2.0&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>0.50</td>
<td>2719.7&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2.6&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2.7&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>0.75</td>
<td>2566.3&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2.6&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2.3&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>M</td>
<td>1865.7</td>
<td>1.9</td>
<td>119.0</td>
</tr>
<tr>
<td>CV(%)</td>
<td>3.5</td>
<td>5.4</td>
<td>35.3</td>
</tr>
<tr>
<td>LSD(0.05)</td>
<td>119.0</td>
<td>0.1</td>
<td>1.9</td>
</tr>
</tbody>
</table>

Source: Author

Effect of BA and NAA on Somatic Embryos Regeneration

The effects of BA and NAA on the embryogenic callus regeneration were described in Table 3 after 5 weeks of culture. The results showed that on hormone – free basal MS number of shoot per cluster, height of shoot (mm) and leaf diameter (mm) only reached at the low rate, standing at 1.0 shoot/cluster, 35.3 mm and 1.7 mm respectively. However, the highest value was observed at the treatment using culture medium supplemented with 0.5 mg/l BA and 0.25 mg/l NAA with the maximum number of shoot number (3.7 shoots/cluster), height of shoot (87.3 mm) and leaf diameter (7.7 mm). According to the analysis above, it can be concluded that the appropriate medium for the somatic embryos regeneration under in vitro condition is MS basal medium with the combined concentration of 0.5 mg/l BA and 0.25 mg/l NAA (Table 3).
Table 3: The effect of BA and NAA on somatic embryos regeneration

<table>
<thead>
<tr>
<th>BA (mg/l)</th>
<th>NAA (mg/l)</th>
<th>Number of shoot per cluster</th>
<th>Height of shoot (mm)</th>
<th>Leaf diameter (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00</td>
<td>0.00</td>
<td>1.0^d</td>
<td>35.3^f</td>
<td>1.7^c</td>
</tr>
<tr>
<td>0.10</td>
<td>0.10</td>
<td>1.3^h</td>
<td>36.7^i</td>
<td>2.7^k</td>
</tr>
<tr>
<td>0.10</td>
<td>0.25</td>
<td>1.7^j</td>
<td>44.7^d</td>
<td>3.0^ae</td>
</tr>
<tr>
<td>0.25</td>
<td>0.10</td>
<td>2.3^ac</td>
<td>51.3^de</td>
<td>3.7^d</td>
</tr>
<tr>
<td>0.25</td>
<td>0.25</td>
<td>2.7^ab</td>
<td>61.7^d</td>
<td>4.3^</td>
</tr>
<tr>
<td>0.50</td>
<td>0.10</td>
<td>3.3^a</td>
<td>74.7^c</td>
<td>7.3^d</td>
</tr>
<tr>
<td>0.50</td>
<td>0.25</td>
<td>3.7^n</td>
<td>87.3^b</td>
<td>7.7^a</td>
</tr>
<tr>
<td>0.75</td>
<td>0.10</td>
<td>2.7^ab</td>
<td>90.7^b</td>
<td>6.0^b</td>
</tr>
<tr>
<td>0.75</td>
<td>0.25</td>
<td>3.3^n</td>
<td>107.3^a</td>
<td>6.7^b</td>
</tr>
<tr>
<td>M</td>
<td></td>
<td>2.4</td>
<td>65.5</td>
<td>4.8</td>
</tr>
<tr>
<td>CV(%)</td>
<td></td>
<td>35.2</td>
<td>10.0</td>
<td>18.9</td>
</tr>
<tr>
<td>LSD(0.05)</td>
<td></td>
<td>1.5</td>
<td>11.2</td>
<td>1.5</td>
</tr>
</tbody>
</table>

Source: Author

Effect of NAA, IAA, IBA on Shoot Multiplication

The effects of the NAA/IAA/IBA on the shoot multiplication were described in Table 4 after 5 weeks of culture. The results showed that on hormone–free basal MS number of shoot per cluster, height of shoot (mm), number of leaf per cluster and leaf diameter (mm) only reached at the low rate, standing at 1.3 shoots/cluster, 60.3 mm, 3.3 leaves per cluster and 4.7 mm, respectively.

Data collections reached the highest value, accounting for 6.7 shoots per cluster, 96.7 mm in height of shoot, 7.7 leaves per cluster and 11.3 mm in leaf diameter when using culture medium supplemented with 0.5 mg/l BA and 0.2 mg/l NAA.

The combination of 0.5 mg/l BA and 0.2 mg/l IAA demonstrated 5.0 shoot/cluster, 92.7 mm height of shoot, 5.7 leaf/cluster and 10.7 mm leaf diameter.

Additionally, the combination of 0.5 mg/l BA and 0.2 mg/l IBA also reached 4.7 shoots per cluster, 91.0 mm in height of shoot, 6.0 leaves per cluster and 9.7 mm in leaf diameter.

Therefore, the appropriate medium for the shoot multiplication under in vitro conditions is MS basal medium with the combined concentration of 0.5 mg/l BA and 0.2 mg/l NAA after 5 weeks of culture (Table 4).

Table 4: The effect of NAA/IAA/IBA on shoot multiplication

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Number of shoot per cluster</th>
<th>Height of shoot (mm)</th>
<th>Number of leaf per cluster</th>
<th>Leaf diameter (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>1.3^d</td>
<td>60.3^c</td>
<td>3.3^f</td>
<td>4.7^c</td>
</tr>
<tr>
<td>NAA(0.1)</td>
<td>5.3^b</td>
<td>85.7^b</td>
<td>6.7^b</td>
<td>8.3^de</td>
</tr>
<tr>
<td>NAA(0.2)</td>
<td>6.7^a</td>
<td>96.7^a</td>
<td>7.7^a</td>
<td>11.3^c</td>
</tr>
<tr>
<td>NAA(0.3)</td>
<td>4.7^b</td>
<td>91.0^b</td>
<td>5.7^cd</td>
<td>7.3^e</td>
</tr>
<tr>
<td>IAA(0.1)</td>
<td>3.3^c</td>
<td>86.3^c</td>
<td>5.0^de</td>
<td>8.3^de</td>
</tr>
<tr>
<td>IAA(0.2)</td>
<td>5.0^b</td>
<td>92.7^b</td>
<td>5.7^cd</td>
<td>10.7^ab</td>
</tr>
<tr>
<td>IAA(0.3)</td>
<td>3.0^c</td>
<td>79.0^c</td>
<td>4.3^e</td>
<td>6.0^f</td>
</tr>
<tr>
<td>IBA(0.1)</td>
<td>3.0^c</td>
<td>84.3^c</td>
<td>4.7^e</td>
<td>8.7^cd</td>
</tr>
<tr>
<td>IBA(0.2)</td>
<td>4.7^a</td>
<td>91.0^b</td>
<td>6.0^pec</td>
<td>9.7^f</td>
</tr>
<tr>
<td>IBA(0.3)</td>
<td>3.0^c</td>
<td>78.7^f</td>
<td>4.7^e</td>
<td>5.3^f</td>
</tr>
<tr>
<td>M</td>
<td>4.0</td>
<td>84.6</td>
<td>5.4</td>
<td>8.0</td>
</tr>
<tr>
<td>CV%</td>
<td>17.9</td>
<td>2.3</td>
<td>9.6</td>
<td>8.8</td>
</tr>
<tr>
<td>LSD(0.05)</td>
<td>1.2</td>
<td>3.3</td>
<td>0.9</td>
<td>1.2</td>
</tr>
</tbody>
</table>

Source: Author

Effect of the Temporary Immersion Bioreactor System on Shoot Multiplication

The effects of the temporary immersion bioreactor system on the shoot multiplication were described in Table 5 after 5 weeks of culture. The results showed that using the temporary immersion bioreactor with the immersion frequencies (1 minute each 4 hours, 2 minutes each 4 hours, 3 minutes each 4
hours and 4 minutes each 4 hours) on the liquid culture medium had positive effects on the shoot multiplication and reached the highest value at treatment using immersion frequency (3 minutes each 4 hours) with a maximum for the height of shoots (100.25 mm), number of shoot per cluster (7.1 shoots per cluster), fresh weight of shoot per cluster (1470.94 mg/cluster) and proliferation rate of shoot (3.55 fold), compared with culturing on the semi-solid MS. Thus, immersion frequency (3 minutes each 4 hours) is the most effective treatment for shoot multiplication.

Table 5: The effect of the temporary immersion bioreactor system on shoot multiplication

<table>
<thead>
<tr>
<th>Immersion frequency (mins/each 4 hours)</th>
<th>Height of shoot (mm)</th>
<th>Number of (shoot/cluster)</th>
<th>Fresh weight of shoot (mg/cluster)</th>
<th>Proliferation rate of shoot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agar</td>
<td>92.52&lt;sup&gt;b&lt;/sup&gt;</td>
<td>6.11&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1293.52&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3.06&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>1</td>
<td>86.95&lt;sup&gt;b&lt;/sup&gt;</td>
<td>7.40&lt;sup&gt;a&lt;/sup&gt;</td>
<td>913.24&lt;sup&gt;c&lt;/sup&gt;</td>
<td>3.70&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>2</td>
<td>91.02&lt;sup&gt;b&lt;/sup&gt;</td>
<td>6.95&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1306.76&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3.47&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>3</td>
<td>100.25&lt;sup&gt;a&lt;/sup&gt;</td>
<td>7.10&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1470.94&lt;sup&gt;a&lt;/sup&gt;</td>
<td>3.55&lt;sup&gt;ab&lt;/sup&gt;</td>
</tr>
<tr>
<td>4</td>
<td>93.60&lt;sup&gt;ba&lt;/sup&gt;</td>
<td>6.34&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1269.24&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3.17&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>M</td>
<td>93.53</td>
<td>6.78</td>
<td>1250.73</td>
<td>3.4</td>
</tr>
<tr>
<td>CV%</td>
<td>5.39</td>
<td>3.31</td>
<td>4.61</td>
<td>3.2</td>
</tr>
<tr>
<td>LSD 0.05</td>
<td>9.18</td>
<td>0.58</td>
<td>149.21</td>
<td>0.2</td>
</tr>
</tbody>
</table>

Source: Author

Effect of NAA on Rooting

The effects of NAA on the rooting were described in Table 6 after 4 weeks of culture. The results showed that on hormone – free basal MS rooting rate, number of roots and length of root (mm) only reached at the low rate, standing at 3.3%, 0.3 root per shoot and 5.0 mm respectively. However, a higher concentration of NAA has greater data values and the highest value was observed at the treatment using culture medium supplemented with 0.5 mg/l NAA with the maximum number of rooting rate (78.3%), number of roots (3.7 roots per shoot) and length of root (23.3 mm).

Table 6: The effect of NAA on the rooting after 4 weeks of culture

<table>
<thead>
<tr>
<th>NAA concentration (mg/l)</th>
<th>Rooting rate (%)</th>
<th>Number of roots</th>
<th>Length of root (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>3.3&lt;sup&gt;c&lt;/sup&gt;</td>
<td>0.3&lt;sup&gt;c&lt;/sup&gt;</td>
<td>5.0&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>0.1</td>
<td>63.3&lt;sup&gt;b&lt;/sup&gt;</td>
<td>2.3&lt;sup&gt;b&lt;/sup&gt;</td>
<td>19.3&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>0.3</td>
<td>71.7&lt;sup&gt;a&lt;/sup&gt;</td>
<td>3.3&lt;sup&gt;ab&lt;/sup&gt;</td>
<td>21.3&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>0.5</td>
<td>78.3&lt;sup&gt;a&lt;/sup&gt;</td>
<td>3.7&lt;sup&gt;a&lt;/sup&gt;</td>
<td>23.3&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>M</td>
<td>54.1</td>
<td>2.4</td>
<td>17.2</td>
</tr>
<tr>
<td>CV%</td>
<td>7.0</td>
<td>23.9</td>
<td>27.5</td>
</tr>
<tr>
<td>LSD (0.05)</td>
<td>7.2</td>
<td>1.1</td>
<td>8.9</td>
</tr>
</tbody>
</table>

Source: Author

Conclusion

The suitable starting material for the induction of embryogenic callus was internodes culturing on the MS basal medium with the combined concentration of 0.1 mg/l BA and 0.5 mg/l NAA with the maximum number of callus and somatic embryo induction rate (98.2 %) after 4 weeks of culture. The appropriate medium for the multiplication of embryogenic cells was MS supplemented with 0.1 mg/l BA and 0.5 mg/l NAA giving a fresh weight of embryogenic cell 2719.7 mg/cluster, proliferation rate 2.6 fold and number of shoot per cluster 2.7 shoots/cluster after 5 weeks of culture. The suitable media for regeneration of embryogenic cells was MS supplemented with 0.5 mg/l BA and 0.25 mg/l NAA giving 3.7 shoots/cluster, shoot height 87.3 mm, leaf diameter 7.7 mm after 5 weeks of culture. Multiple shoots regenerated from embryogenic cells were used as materials for micropropagation. Results showed that the highest data for multiple shoot multiplication was on semi-solid MS supplemented with 0.2 mg/l NAA and 0.5 mg/l BA giving a proliferation rate of 6.7 shoots/cluster, shoot height 96.7 mm and leaf number 7.7. In the bioreactor culture, results reached the highest value with the maximum number of shoot height (100.25 mm), shoot number (7.1 shoot/cluster) and fresh weight of shoots (1470.94 mg/cluster). The suitable media for rooting was MS medium supplemented
with 0.5 mg/l NAA with the maximum rooting rate (78.3%), number of roots (3.7 roots per shoot) and length of root (23.3mm).

References
Abstract: Floods continue to be the most economically devastating natural disaster in the world. Worldwide, there are a lot of laws and regulations addressing this problem, as well as different models and approaches developed for flooding risk assessment at different stages of urban planning. The aim of this work is to review the existing measures for prevention of floods that threaten the security of the human population, flora and fauna. The study focuses on the necessary measures which must be implemented to tackle the problem, and early warning of population in emergency and disaster situations in order to reduce damage from floods. Existing statistical data is reviewed and analyzed and, as a consequence, recommendations are proposed.

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Keywords: floods, prevention, risk assessment, Bulgaria

Introduction

Of all environmental disasters, floods are the most studied (Mardirosyan, 2002). According to United Nations data, every year about 10,000 floods happen worldwide, having different parameters and causing various types of large-scale damage and losses.

Long-term studies have been conducted, aiming to analyze past floods throughout the country, their causes, consequences, and measures which are taken to limit their effects in urban systems.

The Ministry of Environment and Water, the Ministry of Emergency Situations, the "Civil Protection" agency, the official pages of the press and several internet sites were used as sources of information for this paper. The data is summarised by conventional methods.

The aim of this study is to examine the nature and consequences of flooding for ecosystems and urban systems in Bulgaria.

Floods are natural phenomena that are unavoidable. For Bulgaria, they are identified as the most significant type of natural disasters, which have inflicted damage reaching hundreds of thousands of euros in the last few years.

The majority of floods are natural processes, and can occur at any time and anywhere. Different types of floods create different dangers to humans and to objects of residential, industrial or critical infrastructure, and the environment. This is due to varying water level, speed and degree of occurrence, and some other hazards associated with them.

Along with the damage they cause, floods, as natural phenomenon, play an important role in maintaining the balance of nature. They are important environmental factors for the maintenance of aquatic ecosystems. Unlike other natural disasters, floods are subject to a significant degree of foresight in terms of generation and distribution, and in terms of possible consequences. Although they are natural phenomena, their appearance is largely influenced by human activity and human interference in natural processes.

The damage caused by the floods in the recent years is an indication that society is not sufficiently prepared to confront this growing risk. It has been found that the activities performed in flood protection are insufficient and need to move to a policy of comprehensive management of flood risks in terms of „coexistence“ with the floods. The aim is to achieve a reduction of future risks through research, evaluation and impact of all factors that influence the onset of the floods, and the importance of their impact on human health, business and the environment. Such a comprehensive approach to managing flood risks was introduced by the 2007/60/EU Directive – European Floods Directive.

The 2007/60/EU Directive on the assessment and management of flood risks, also known as the Floods Directive, regulates the framework for assessment and management of flood risks in the...
Member States of the European Union. It aims to create conditions for reducing the adverse impact floods have on human health and the environment.

Careful planning of the management of flood risk allows governing bodies to develop a better system for flood risk reduction stemming from all available sources, and to set the priorities for management. The main objective of the plan is to prepare and protect the public and the environment which are at risk by fulfilling the strategic aims and by the implementation of the provided measures,

**Preliminary assessment of flood risk**

In compliance with the requirements of Directive 2007/60/EU, which are fully implemented in Chapter 9, Section II of the Bulgarian Water Act, for each region of basin governance, a preliminary assessment of flood risks is made. The assessment includes:

1. Maps of the region for basin governance of water in appropriate scale, which show the topography and land use and also the boundaries of:
   a) river basins and sub-basins
   b) coastal regions
2. Description of occurrence of past floods with significant adverse effects on the human health, the environment, the cultural heritage, the infrastructure and business, and for which there are indications for future repetition.
3. Scale of the floods, their distribution, and assessment of their adverse effects
4. Assessment of eventual adverse effects of future floods on the human health, the environment, the cultural heritage, the infrastructure and business and taking into account as much as possible:
   a) Topography, the position of watercourses and their general hydrological and geomorphological characteristics, including the retention lowlands as natural water retention areas;
   b) Efficiency of man-made infrastructures (systems and equipment) for flood protection, location of populated areas, and long-term development plans;
   c) Influence of climate change on flood occurrence.

According to the Water Act, in Bulgaria there are defined spate areas called “Project units.” The methodology sets criteria for determining the boundaries of the project units with aim to optimize the work. Bases for determining the project units are major river basins, some of which are divided into two or more units. The main criteria for separation of project units are the areas of the basins (fig.1).

**Figure 1: Map of the Basin Districts in Bulgaria**

Source: Authors

The main steps according to methodology include:
  - Collection of information on past floods and processing the collected data
  - Determination of areas affected by floods - distribution of potential future floods
Determination of potential significant flood damage – based on the information of past floods and on the potential threat of future floods.

The methodology identifies possible sources of information on past floods, and also provides a standardized questionnaire for gathering information from the municipalities. Sources and recommendations regarding the requirements and use of information on damage assessment in the four categories “Human Health,” “Human Activity,” Environment” and “Cultural Heritage” are given as well (Fig.2):

Figure 2: Scheme for indicators in categories to determine significant floods

<table>
<thead>
<tr>
<th>Category</th>
<th>Human Health</th>
<th>Human activity</th>
<th>Environment</th>
<th>Cultural Heritage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Residents</td>
<td>Houses</td>
<td></td>
<td>UNESCO site</td>
</tr>
<tr>
<td></td>
<td>Houses</td>
<td>Critical</td>
<td>Source pollution</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Critical</td>
<td>infrastructure</td>
<td></td>
<td>Cultural site of national importance</td>
</tr>
<tr>
<td></td>
<td>Infrastructure</td>
<td></td>
<td>Source pollution</td>
<td></td>
</tr>
</tbody>
</table>

Source: Authors

It is assumed that the threshold is exceeded if at least one of the indicators in any of the categories determines the flood as significant. The assessment of the significance of the effects of past floods is done separately for each populated place if information for registered floods according to presented data is available.

**Past floods in Bulgaria**

European Commission’s guidelines contained in the”Draft list of flood types and stand consequence” form 16.02.2011 distinguish five types of floods according to their source:

- river – caused by rain and snowmelt
- slope-caused by rain
- lake-caused from rain water inflowing in lakes
- sea – caused by sea storms
- infrastructure – caused by insufficient conductivity of sewer and drainage systems due to rainfall, and wave transferring seawater over protective embankments in the coastal areas of cities

The collected information for floods in Bulgaria covers the period 2000-2010 and refers to 2211 past floods. The reasons for their development, distributed by major river basins, are given in figures 3-6. (Management plan for flood risk for Black Sea Basin District, Management plan for flood risk for Danube Region basin District, Management plan for flood risk for West Aegean Region Basin District, Management plan for flood risk for East Aegean Region Basin District)
Figure 3: West Aegean Region

Source: Authors

Figure 4: Information for East Aegean Region

Source: Authors

Figure 5: Black Sea Basin District

Source: Authors
Figure 6: Danube Region Basin District

![Danube Region Basin District](image)

Source: Authors

**Measures of risk management**

Measures for risk management of floods are determined on the bases of:

- the identified aims and priorities for risk management of floods
- national catalogue of measures for risk management of floods
- maps of the threatened regions, and maps of the regions with risk of floods.

In the context of national priorities and aims, the choice of one measure is determined by the effect that it is expected to render in following categories: “Human Health,” “Human activities,” “Environment” and “Cultural Heritage.” The aim is to avoid new risks, reduce existing risks, improve endurance and increase the awareness.

In the process of selecting these measures, a general approach according to the logical scheme shown in Figure 7 is followed.

Figure 7: Logical scheme of choice of measures

![Logical scheme of choice of measures](image)

Source: Authors

**Stage 1. Description of the state** - at this stage the information available for preliminary assessment of floods in the regions with significant potential risk of floods is presented:

- maps of threat and risk of floods
- aims and priorities based on water infrastructure, as well the information gathered and processed in connection with past floods conclusions which are drawn from them.

**Stage 2. Defining main problems** – at this stage, the main problems associated with flood protection are identified and put into perspective of national priorities

**Stage 3 – Formulation of possible alternatives** that present several possible solutions of the problem.

**Stage 4 – Selection of alternatives** – Criteria for selection of alternatives are chosen, and a selection of the best alternative for each problem is made. This is linked to national priorities where level of importance of each measure is determined, and on this basis the choice of alternative evaluation criteria is made.
Stage 5 – Selection of measures – based on the selected alternatives, filters and set of measures are selected.

Conclusion
Floods represent 40% of natural disasters worldwide. Natural floods are the results of heavy rainfall, intensive snow melting, stagnation of watercourses, etc.

In the preventive organizational activities, derived from experiences with the serious consequences of the floods in Bulgaria in the recent years, are included the adoption of new laws and instructions, strengthening the role of the Integrated Rescue System, and operational communication – information centers in the territories of each region are under construction. However, there is a need for the development of more measures for prevention, control and scientific prediction of possible disasters related to water storms, or floods.

References
http://www5.moew.govtment.bg/?page_id=23341
Management plan for flood risk for Black Sea Basin District
Management plan for flood risk for Danube Region basin District
Management plan for flood risk for East Aegean Region Basin District
Management plan for flood risk for West Aegean Region Basin District
REMOVAL OF As (V) BY USING BOTTOM ASH AS ADSORBENT

Meral Yıldırım,¹ Nevin Karamahmut Mermer,² Funda Demir,³ Emek Moroydor Derun⁴

Abstract: Industrial development brings waste problem which is a challenge for both human health and ecological cycle. Arsenic is a toxic and carcinogenic heavy metal that should be removed from drinking or waste water. In this study, an industrial waste of bottom ash was used as an adsorbent to remove As (V). To find an appropriate adsorption conditions, the adsorption temperatures and contact time were varied between 30 °C-50 °C and 5-180 min, respectively. The experimental results were fitted to the Langmuir and Freundlich isotherms. The highest values of n and Kf for Freundlich isotherm were obtained for 30 °C and calculated as 0.432 and 0.006, respectively. According to kinetic studies, the kinetics of these experiments could be explained by pseudo-second order kinetic model, and the pseudo-second order rate constant was calculated as 0.034 g/mg.min, 0.033 g/mg.min and 0.030 g/mg.min for 30 °C, 40 °C and 50 °C, respectively. According to experimental results, bottom ash can be used for removal of As (V) from water sources.

UDC Classification: 66.03; DOI: http://dx.doi.org/10.12955/cbup.v5.1106

Keywords: Adsorption, arsenic, bottom ash, ICP-OES.

Introduction

Heavy metal pollution is a remarkable threat for both human health and environment which is resulted by increasing in industrial activities and urbanization. The trace elements like lead (Pb), cadmium (Cd), zinc (Zn), mercury (Hg), arsenic (As), silver (Ag), chromium (Cr), copper (Cu), and iron (Fe) can accumulate unnoticed to toxic levels and cause many diseases and even death (Duruibe et al., 2007; Yang et al., 2016).

Arsenic is a hazardous, toxic and carcinogenic metalloid which can get into drinking water, underground water, etc. and causes environmental problems by soil erosion and leaching. Additionally, industrial applications such as mining, fuel combustion, using arsenic as pesticide bring about arsenic pollution. Because of its toxicity, the World Health Organization (WHO) limit the occurrence of arsenic in drinking water as 10 mg/L (Mohan et al., 2007; El-Moselhy et al., 2017; Banerji & Chaudhari, 2016). Thus, an effective removal of arsenic from aqueous solutions, as well as other heavy metals, is an important issue to investigate.

There are many approaches to remove arsenic from drinking and waste water including electrocoagulation (Banerji & Chaudhari, 2016), ion exchange, membrane separation, adsorption and precipitation (Zhou et al., 2016; Mohan & Pittman, 2007). Being a low cost, easy to operate and efficient method, adsorption process is widely studied for the removal of arsenic from aqueous solutions by use of adsorbent materials such as activated carbon and zeolites.

In recent years, studies have been focused on alternative adsorbents which are derived from industrial wastes. Industrial wastes like rice husk, peanut shells, fly ash, coconut husk, waste coffee and tea has been recycled to low-cost biosorbents (Cheraghi et al., 2015; Yang et al., 2016; Uddin et al., 2009).

Coal-fired thermal power plants have led to an increase in the occurrence of many solid wastes such as fly ash and bottom ash (Fonteboa et al., 2017; Noh & Son, 2017). When bottom ash is obtained from bottom chamber and contains mineral impurities, fly ash is collected in the electrostatic precipitators or the filters. Because of the high energy demand, the production of these industrial wastes is increasing. On the other hand, the chemical and physical properties of these materials provide their use in many different sectors. Fly ash and bottom ash are widely evaluated in the cement, ceramic, paint, plastic, agriculture, environment and construction applications (Eliche-Quesada et al., 2017). However, there are a few studies that used bottom ash as an adsorbent for removing heavy metals from water. In the study conducted by Lin & Yang (2002), the adsorption of Cu(II) was carried out by coal bottom ash and results showed that coal bottom ash could be an excellent adsorbent for the pollutant in the waste water (Lin & Yang, 2002). Orakwue (2016) compared the adsorption capacities of fly ash, bottom ash and bentonite for adsorption of Iron(II) from acid mine drainage contaminated ground

¹ Yıldız Technical University, Istanbul, Turkey, meraly@yildiz.edu.tr
² Yıldız Technical University, Istanbul, Turkey, nevinkaramahmut@hotmail.com
³ Yıldız Technical University, Istanbul, Turkey, demirfunda1@hotmail.com
⁴ Yıldız Technical University, Istanbul, Turkey, moroydor@yildiz.edu.tr
water and found out that adsorption capacity value of bottom ash was higher than other adsorbents (Orakwue et al., 2016).

The main objective of this study was to investigate the removal of As (V) from the aqueous medium through batch adsorption by bottom ash as a low-cost adsorbent. The adsorption capacity of bottom ash was determined by varying adsorption parameters of contact time and adsorption temperature.

**Experimental Studies**

**Materials**

Bottom ash was supplied from Çelikler Seyitömer Electricity Generation Plant (Kutahya, Turkey). Before use in experimental studies, the supplied bottom ash was dried in an incubator (Ecocell 111, Germany) at 105 °C for 12 hours to eliminate its moisture. After drying, the adsorbent was grounded and sieved by vibratory sieve-shaker (Fritsch, Germany) to access a particle size of below 90 µm. The elemental composition of prepared adsorbent was determined by X-ray fluorescence (XRF) (Rigaku, NEX CG, Canada) in the range of Na-U elements. The BET surface area of bottom ash was measured on a Micromeritics ASAP 2020 instrument using N₂ adsorption after degassing adsorbents at 400 °C for 12 hours. The properties of bottom ash are given in Table 1.

**Table 1: The properties of bottom ash**

<table>
<thead>
<tr>
<th>Elemental composition</th>
<th>BET Surface area (m²/g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SiO₂</td>
<td>47.5</td>
</tr>
<tr>
<td>Al₂O₃</td>
<td>15.4</td>
</tr>
<tr>
<td>Fe₂O₃</td>
<td>11.6</td>
</tr>
<tr>
<td>MgO</td>
<td>8.08</td>
</tr>
<tr>
<td>CaO</td>
<td>8.33</td>
</tr>
<tr>
<td>SO₃</td>
<td>5.10</td>
</tr>
<tr>
<td>K₂O</td>
<td>2.05</td>
</tr>
<tr>
<td>N₂O₅</td>
<td>1.79</td>
</tr>
<tr>
<td>P₂O₅</td>
<td>0.221</td>
</tr>
</tbody>
</table>

Source: Authors

50 ppm synthetic As (V) solution was prepared from standard arsenic solution (Merck KGaA, Darmstadt, Germany) with double deionized water.

**Batch Adsorption Experiments**

The batch adsorption experiments were conducted to decide optimum adsorption parameters by changing experimental parameters. The amount adsorbent was set to 0.5 g after preliminary studies and temperature had controlled magnetic stirrer was used during studies. When initial As (V) concentration (50 ppm), adsorbent weight (0.5 g), pH (2) and the stirring speed were kept constant, the contact time and adsorption temperature were varied between 5-180 min and 30-50 °C, respectively. After determined adsorption time, the residual As (V) concentration was determined by Inductively Coupled Plasma - Optical Emission Spectrometer (ICP-OES) (Optima DV 2100, Perkin Elmer, USA). The concentration of As (V) remained in the adsorbent phase (qₑ, mg/g) was calculated by the equation (1) (Qiu et al., 2015):

$$q_e = \frac{C_i - C_f}{m} \times V$$

(1)

where V is the volume of solution (mL), m is the weight of adsorbent (g), Cᵢ and Cᶠ are the initial and final concentration of As (V) (mg/L), respectively (Qiu et al., 2015). The As (V) removal efficiency of bottom ash (R %) was calculated by following equation (2) (Cheraghi et al., 2015):

$$R(\%) = \frac{C_i - C_f}{C_i} \times 100$$

(2)
Adsorption Isotherms

Adsorption isotherms give information about the interaction between solute and adsorbent surface at a constant temperature. Langmuir and Freundlich’s isotherms were used to analyze equilibrium data. According to Langmuir isotherm theory, adsorption takes place by monolayer coverage of adsorbate onto the homogenous adsorbent surface (Hameed, 2009). Langmuir isotherm is given as:

\[ q_e = \frac{q_{max} K_L C_e}{1 + K_L C_e} xV \]  

(3)

where \( q_{max} \) is maximum adsorption capacity of adsorbent (mg/g), \( C_e \) is the concentration of As (V) in the solution at equilibrium (mg/L) and \( K_L \) is Langmuir constant related to the affinity of the binding sites (Bhattacharya et al., 2008; Hameed, 2009). In Langmuir isotherms, the separation factor of RL is used to indicate the essential characteristics of the isotherm. When RL is between 0 and 1, it expresses that the adsorption is favorable (Hameed, 2009).

\[ R_L = \frac{1}{1 + K_L C_i} \]  

(4)

Freundlich’s isotherm is expressed as equation (5),

\[ \ln q_e = \ln K_F + \frac{1}{n} \ln C_e \]  

(5)

where \( K_F \) is Freundlich constant related adsorption capacity of adsorbents, \( n \) is constant about the intensity of adsorption. The values of \( K_F \) and \( n \) can be determined from the plot of \( \ln q_e \) versus \( \ln C_e \) (Qui et al., 2015; Uddin et al., 2009).

Adsorption Kinetics

The experimental results were fitted to the two common kinetic models, namely Lagergren pseudo-first order kinetic model, pseudo-second order kinetic model, to investigate kinetic parameters and mechanism of As (V) adsorption onto the bottom ash. Lagergren pseudo-first order kinetic model is represented as following form (6),

\[ \frac{dq_t}{dt} = k_1 (q_e - q_t) \]  

(6)

where \( k_1 \) is the pseudo-first order rate constant (min\(^{-1}\)), \( q_t \) and \( q_e \) are amounts of adsorbed As (V) per unit mass of adsorbent at time \( t \) and equilibrium time (mg/g), respectively. Pseudo-second order kinetic model can be expressed as given in the equation (7),

\[ \frac{dq_t}{dt} = k_2 (q_e - q_t)^2 \]  

(7)

and \( k_2 \) is the pseudo-second order rate constant (g/mg.min).

The appropriate kinetic model which explains kinetics and mechanisms of As (V) adsorption onto the bottom ash can be determined by drawing linear plots for each kinetic models and calculation correlation coefficient of \( R^2 \).
Results and Discussions

Adsorption results

The effects of contact time and adsorption temperature on the As (V) adsorption and removal percentage of As (V) are shown in Figure 1 and Figure 2, respectively. It can be seen that the amount of adsorbed As (V) per unit mass of adsorbent increased by increasing contact time. In the initial stages, the removal of As (V) was rapid. However, after 60 minutes of contact time, the system reached the equilibrium, and the adsorbed amount did not show a significant difference. This phenomenon can be explained by the higher amounts of the available adsorbent surface for As (V) at the initial adsorption times.

The adsorption capacity of bottom ash showed similarity for each adsorption temperatures. On the other hand, the values of $q_e$ at 30 °C were bigger than those at higher temperatures, from which it can be deduced that the adsorption behavior of As (V) is more efficient at low temperature.
Adsorption Isotherms

The calculated isotherm parameters and correlation coefficients ($R^2$) are given in Table 2. The equilibrium data were better fitted by the Freundlich isotherm model than done by Langmuir isotherm equation. For all studied temperatures, high $R^2$ values were indicating that the obtained data were in good agreement with the Freundlich model, which implies that the surface of adsorption is heterogeneous and there are many types of active adsorption sites on the adsorbent. The obtained $n$ values were smaller than one which means the adsorption carried out by a chemical process which is associated with a higher adsorption enthalpy and slower kinetics of adsorption than physical adsorption (Orakwue et al., 2016).

<table>
<thead>
<tr>
<th>Isotherm</th>
<th>Temperature (°C)</th>
<th>Parameters</th>
<th>$R^2$</th>
<th>$n$</th>
<th>$K_F$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freundlich</td>
<td>50</td>
<td>0.998</td>
<td>0.408</td>
<td>0.004</td>
<td></td>
</tr>
<tr>
<td></td>
<td>40</td>
<td>0.998</td>
<td>0.390</td>
<td>0.002</td>
<td></td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>0.998</td>
<td>0.432</td>
<td>0.006</td>
<td></td>
</tr>
</tbody>
</table>

Source: Authors

Adsorption Kinetics

Table 3 represents the summary of data calculated for pseudo first-order and pseudo-second order model. Also, Figure 3 and Figure 4 show the pseudo-first order and pseudo second order plots for different adsorption temperatures ranging from 30 to 50 °C. According to the correlation coefficients ($R^2= 0.998$), it could be concluded that the pseudo-second order kinetic model can be used to describe the adsorption process of As (V). It shows that the chemisorption of As(V) ions was the rate-determining step of the adsorption process. This process contains the chemical interaction between As(V) ions and polar groups on the adsorbent, such as ion exchange and chelating reaction (Zhou et al., 2016; Yang et al., 2016). For 50 °C, 40 °C, 30 °C the pseudo second order rate constant $k_2$ were calculated as 0.034 g/mg.min, 0.033 g/mg.min and 0.030 g/mg.min.

<table>
<thead>
<tr>
<th>Kinetic model</th>
<th>Temperature (°C)</th>
<th>Parameters</th>
<th>$R^2$</th>
<th>$k_1$ (min$^{-1}$)</th>
<th>$k_2$ (g/mg.min)</th>
<th>$q_e$ (mg/g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pseudo-first order</td>
<td>50</td>
<td>0.922</td>
<td>0.018</td>
<td>-</td>
<td>1.052</td>
<td></td>
</tr>
<tr>
<td></td>
<td>40</td>
<td>0.983</td>
<td>0.013</td>
<td>-</td>
<td>0.913</td>
<td></td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>0.857</td>
<td>0.008</td>
<td>-</td>
<td>0.788</td>
<td></td>
</tr>
<tr>
<td>Pseudo-second order</td>
<td>50</td>
<td>0.995</td>
<td>-</td>
<td>0.034</td>
<td>2.385</td>
<td></td>
</tr>
<tr>
<td></td>
<td>40</td>
<td>0.995</td>
<td>-</td>
<td>0.033</td>
<td>2.322</td>
<td></td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>0.984</td>
<td>-</td>
<td>0.030</td>
<td>2.487</td>
<td></td>
</tr>
</tbody>
</table>

Source: Authors

According to the pseudo-second order kinetic model, the predicted adsorption density $q_e$ at equilibrium values were close to the experimental $q_e$ values. The good agreement between the predicted and experimental values of $q_e$ shows that the pseudo-second order kinetic model represents the adsorption kinetics of As (V) onto the bottom ash.
Figure 3: The fitting of pseudo-first-order model for As (V) adsorption onto the bottom ash

Source: Authors

Figure 4: The fitting of pseudo-second-order model for As (V) adsorption onto the bottom ash

Source: Authors
Conclusion

The present investigation showed that bottom ash could be an effective adsorbent for the removal of As (V) ions from the aqueous solution. The experimental study with different parameters showed that adsorption temperature did not have a significant effect on the removal of As (V) onto the bottom ash when increasing contact time increased the adsorbed amount of As (V) up to 60 minutes. The equilibrium data were fitted to the different isotherm models, and the equilibrium data were best described by Freundlich’s isotherm. Kinetics for the removal of As (V) were obtained and fitted to various kinetics models. The pseudo-second order kinetic model provided a good correlation for the adsorption process, and the result showed that this process is suggesting that chemisorption controlled the adsorption process.

References


STABILITY EVALUATION OF CAFFEINE-8-THIOGLICOLIC ACID AMIDES, WITH DETERMINED ANTIHYPOXIC EFFECTS

Javor Mitkov,¹ Maya Georgieva,² Alexander Zlatkov³

Abstract: This study evaluates a series of caffeine-8-thioglycolic acid amides that were synthesized in the study, for signs of possible degradation. The chemical stability of the test compounds was examined under different conditions of pH and temperature over time. A modified reversed phase-high-performance liquid chromatography method was applied to determine stability and identify possible degradation products. The study identified a new product from oxidative destruction of the test compound through controlled synthesis.

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Keywords: caffeine-8-thioglycolic acid amides, stability, RP-HPLC

Introduction
Substituted xanthine derivatives are a class of biologically active substances that are well-defined and widely studied in terms of their pharmacological activity as adenosine receptor antagonists, phosphodiesterase inhibitors, and inducers of histone deacetylase activity (Kalla et al., 2006; Lin et al., 2006; Ito et al., 2002). Due to these and several other known factors, this group have become broadly used in medicine not only as agents affecting the central nervous system, but also as active substances in the field of asthma, bronchitis, and chronic obstructive pulmonary diseases and as diuretics, cardiac stimulants, and renal protective agents (Caramori et al., 2003; Dal Piaz & Giavannoni, 2000; Kiesman et al., 2006).

In developing pharmacologically active substances, the stability of an agent is highly relevant because it relates to the duration in which the product maintains its physical, chemical, microbiological, and toxicological properties within previously established limits (Almeida et al., 2013). To evaluate stability, samples of the designed structures are subjected to conditions of temperature, humidity, and light that are known to accelerate the rate of chemical degradation and thus interfere with the microbiological and toxicological quality of the substances (Baby et al., 2004). A preliminary stability study provides information on the behavior of the synthesized molecules for a given period while subjected to different environmental conditions (Almeida et al., 2013).

The subject of our study is to evaluate the chemical stability of caffeine-8-thioglycolic acid amides (that were synthesized in the study) under certain conditions of temperature, pH, and presence and absence of air.

Materials and Methods
Chemistry
Melting points were determined in Celsius (°C) using an electrothermal apparatus (B-535, BUCHI Switzerland) in an open capillary tube and uncorrected values recorded. Using Fourier transform infrared spectroscopy (FTIR), the spectra 400 – 4000 cm⁻¹ were recorded using a Nicolet™ iS™10 FT-IR spectrometer (Thermo Fisher Scientific) with an attenuated total reflectance (ATR). The ¹H- and ¹³C-Nuclear Magnetic Resonance (NMR) spectra were recorded at ambient temperatures, with dimethyl sulfoxide-d₆ (DMSO-d₆) as the solvent, using a Bruker-250 WM (250 MHz) spectrometer (Germany). The ¹H-NMR spectra were measured with solutions of approximately 0.03 M and the ¹³C-NMR spectra with solutions of approximately 0.05 M, both using DMSO-d₆ as solvent, and chemical shifts were expressed as δ values in parts per million (ppm) against tetramethylsilane (TMS) as an internal standard. Splitting patterns were designed as follows: s, singlet; d, doublet; t, triplet; and m, multiplet. Mass spectra were recorded using a liquid chromatography-mass spectrometry (LC-MS)/MS Thermo Scientific Q Exactive Plus - Dionex 3000 Rapid Separation liquid chromatography (RSLC) system. Preparative thin layer chromatography (TLC) was performed using a DC-Alufolien

¹ Medical University, Faculty of Pharmacy, Department of Pharmaceutical Chemistry, Bulgaria, javor.mitkov@abv.bg
² Medical University, Faculty of Pharmacy, Department of Pharmaceutical Chemistry, Bulgaria, georgm@mail.bg
³ Medical University, Faculty of Pharmacy, Department of Pharmaceutical Chemistry, Bulgaria, alex.zlatkov@gmail.com
Kieselgel 60 F254, with 0.20 mm (Merck, Germany) sheets in the mobile phase: chloroform–acetone–ethanol (3:3:4; v/v). The spots were detected at UV 254 nm. Elemental analyses were performed by the microanalytical laboratory of the Faculty of Pharmacy (Medical University-Sofia) using a EuroEA3000-Single analyzer (EuroVector S.p.A, Milan). Synthetic grade chemicals procured from Merck, Germany, were used for the synthesis of the target compounds, as received. All solutions were dried over anhydrous sodium sulfate and evaporated on a BUCHI rotary evaporator at reduced pressure. The given yields were for the analytically pure product. No efforts were made to optimize the yields. „Nomenclature” was generated by using structure-to-name and name-to-structure algorithms of the software, ChemBioDraw Ultra 11.0 (CambridgeSoft).

**Synthesis of N-(2-phenylethyl-2-((1,3,7-trimethyl-2,6-dioxo-2,3,6,7-tetrahydro-1H-purine-8-yl)-sulfanyl)-acetamide, 3**

A solution of 3.87 g (0.01 mol) of a caffeine-8-thioglycolic acid amide 2b, (Figure 1) in 50 ml of methylene chloride was placed in a three-necked reaction flask equipped with a thermometer and a reflux condenser. The reaction flask was placed in a water bath (at 10 °C) with 1.9 g (0.011 mol) m-Chloroperoxybenzoic acid (m-CPBA), dissolved in 20 ml of methylene chloride, which was added slowly while stirring the solution. The temperature of the reaction mixture was kept within the range 10–15 °C, with ice pieces added to the bath when necessary to maintain this range. After complete addition of m-CPBA, the reaction mixture was stirred at room temperature for one hour (controlled using the TLC in system 2). Then, the solvent was removed under reduced pressure, and the crude product was recrystallized from methanol. Yield 3.06 g (76%) m.p. 187 - 189 °C; FT-IR (ATR) 3275 (νNH), 3102 (νCH - aromatic), 1704 (νCO - xanthine), 1668 with shoulders at 1601 and 1627 (νCO - xanthine, νCO – amide I, νC= –NH, νC=–C - aromatic), 1552 and 1534 (νC= – xanthine, νC=– aromatic, νNH – amide II), 1062 (νSO), 754 and 746 (νCH - aromatic). The ¹H–NMR: 7.28–7.10 (m, 5H, aromatic); 4.81 (s, 2H, CH₂); 3.80 (s, 3H, CH₃); 3.49 (s, 3H, CH₃); 3.32 (s, 3H, CH₃); 3.27(d, 2H, CH₂, J = 6.7 Hz); 2.82 (d, 2H, CH₂, J = 6.7 Hz); ¹³C–NMR: 163.9 (CO–NH)160.4 (C₈ₓanth CO); 151.4 (C₂ₓanth CO); 139.1, 128.5, 128.7, 129.9 (6 × C aromatic ring); 148.8 (Cₓanth); 107.1 (Cₓanth); 59.7 (SO–CH₂), 41.4 (NH–CH₂); 35.75 (CHₓPh side chain), 32.5 (N₇ₓanth CH₂), 29.8 (N³ₓanth CH₃), 27.9 (N¹ₓanth CH₂); MS m/z: 167 (100), 445 (M+1). Microanalysis: Calc. C 53.59%, H 5.25%, N 17.36%, S 7.95%; Found C 53.55%, H 5.25%, N 17.39%, S 7.98%.

**Instrumentation and Chromatographic Conditions**

The chromatographic analysis was performed on a liquid chromatography (LC) system (LC-10ADvp, Shimadzu, Kyoto, Japan), equipped with temperature control unit (CTO-10ASvp, Shimadzu, Kyoto, Japan), an isocratic pump, and a UV-VIS detector (SPD-10AVp, Shimadzu, Kyoto, Japan). The following chromatographic columns: TRACER EXCEL™ (Teknokroma, Spain) Reverse-Phase (RP) 18 (ODS 250 mm × 4.6 mm, 5.5 μm) and Luna® (Phenomenex, California) 5 μC18(2) 100A (4.6 i.d. × 250 mm), were chosen for method validation and stability testing. The UV-VIS detector was set to wavelengths of 240 and 254 nm. Isocratic elution with a flow rate of 2.0 ml min⁻¹ was used. A column oven was conditioned at 20 °C. The injection volume was 20 μl with an analysis time of 15 minutes. The following chromatographic procedure was developed for obtaining best separation for the analyzed model compound from its degradation products, based on the application of a polar mobile phase for isocratic flow with no additional buffering (Table 1).

<table>
<thead>
<tr>
<th>Mobile phase</th>
<th>acetonitrile / water = 98/2 v/v</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow rate (ml min⁻¹)</td>
<td>2</td>
</tr>
<tr>
<td>Temperature (°C)</td>
<td>20</td>
</tr>
<tr>
<td>Wavelength (nm)</td>
<td>254</td>
</tr>
<tr>
<td>Injection volume (μl)</td>
<td>20</td>
</tr>
</tbody>
</table>

**Table 1: Chromatographic conditions for the experiment**

**Source: Authors**

**Preparation of the Mobile Phase**

In a 1-litre volumetric flask, a 98/2 v/v solvent mixture of acetonitrile/water was prepared. The obtained solution was degassed through a 45-μm membrane filter.
Preparation of Buffer pH 1.0
A 0.01 mol l⁻¹ HCl solution was prepared with a pH of 1.0.

Preparation of Buffer pH 12.0
A 0.01 mol l⁻¹ NaOH solution was prepared with a pH of 12.0.

Results and Discussion
The test products were synthesized according to a procedure described elsewhere (Mitkov et al., 2007, 2010; Figure 1).

![Diagram showing synthesis of caffeine-8-thioglycolic acid amides](https://www.example.com/diagram.png)

**Figure 1:** The general procedure for synthesis of the test caffeine-8-thioglycolic acid amides 2a-p.

<table>
<thead>
<tr>
<th>Compound</th>
<th>Structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>2a</td>
<td>R¹ = H, R = CH₃</td>
</tr>
<tr>
<td>2b</td>
<td>R¹ = H, R = CH₂</td>
</tr>
<tr>
<td>2c</td>
<td>R¹ = H, R = CH₃</td>
</tr>
<tr>
<td>2d</td>
<td>R¹ = H, R = CH₂</td>
</tr>
<tr>
<td>2e</td>
<td>R¹ = H, R = CH₂</td>
</tr>
<tr>
<td>2f</td>
<td>R¹ = CH₂CH₂OH, R = CH₂CH₂OH</td>
</tr>
<tr>
<td>2g</td>
<td>R¹ = CH₂CH₂OH, R = CH₃</td>
</tr>
<tr>
<td>2h</td>
<td>R¹ = CH₂CH₂OH, R = i-C₄H₉</td>
</tr>
<tr>
<td>2i</td>
<td>R¹ = CH₂CH₂OH, R = CH₂</td>
</tr>
</tbody>
</table>

Source: Authors

Evaluation of the Stability of the Synthesized Caffeine-8-Thioglycolic Acid Amides
To study the properties of the resulting amide derivatives, the behavior of the structures was followed for degradation processes at different values of pH over time.

For this purpose, compound 2b (Figure 1) was selected as a model structure, since it was the least spatially hindered amide. The lack of shielding substituents indicated that this amide would be the most susceptible to hydrolysis.

Based on the synthesis approach for obtaining the desired caffeine-8-thioglycolic acid amides and the chemical properties of the amide group, a hydrolytic cleavage of the amide bond and formation of the first caffeine-8-thioglycolic acid was expected.

The analyzed product, 2b, and the expected caffeine-8-thioglycolic acid, were chromatographically analyzed, individually as well as in a model mixture, to validate the applicability of the RP-HPLC method modified by this study.

Validation of the Modified RP-HPLC Analytical Procedure
The method was validated according to guidelines of the International Conil for Harmonisation (ICH) of Technical Requirements for Pharmaceuticals for Human Use (ICH, Q2(R1), Harmonised Tripartite Guideline, 2005). The system suitability (i.e., repeatability of retention times and areas, the number of theoretical plates, and resolution), precision, linearity, accuracy, and selectivity were evaluated during
the method validation (Table 2). The test products were evaluated for accuracy, precision, and selectivity.

<table>
<thead>
<tr>
<th>Test Products</th>
<th>Repeatability ( t_b (% \text{ RSD}) ) *</th>
<th>No. of Theoretical plates</th>
<th>Resolution( ^* )</th>
<th>Precision ( (% \text{ RSD}) ) *</th>
<th>Linearity (correlation coefficient)( ^{\dagger} )</th>
<th>Accuracy ( (%) ) *</th>
<th>Selectivity factor (( \alpha ))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caffeine-8-thioglycolic acid</td>
<td>0</td>
<td>830</td>
<td>7.3</td>
<td>1</td>
<td>0.9997</td>
<td>100.1</td>
<td>1.54</td>
</tr>
<tr>
<td>2b</td>
<td>0</td>
<td>2189</td>
<td>7.3</td>
<td>1</td>
<td>0.9997</td>
<td>100.1</td>
<td>1.54</td>
</tr>
<tr>
<td>Criterion</td>
<td>( X &lt; 1% )</td>
<td>-</td>
<td>( R_{ij} &gt; 1.5 )</td>
<td>( X &lt; 5% )</td>
<td>( R &gt; 0.9990 )</td>
<td>( X = 100 \pm 5% )</td>
<td>( \alpha &gt; 1 )</td>
</tr>
</tbody>
</table>

*Six injections per product.

\( ^{\dagger} \)Two samples of each product, three injections of each sample.

\( ^{\dagger} \)At 50, 100, 150, 200 and 250 % concentration level.

% RSD: Relative standard deviation in %

**Source:** Authors

**Precision**

Six sample solutions (three of Caffeine-8-thioglycolic acid and three of 2b) were prepared and each sample was injected three times. The final results were reported as relative standard deviation (% RSD) of the ratios of the peak area of the tested compound.

**Linearity**

A 5-point calibration curve was created, covering the concentration range of 2b, from 0.02 mg ml\(^{-1}\) to 0.1 mg ml\(^{-1}\). A linear regression of the calibration data was performed. The correlation coefficient of linearity was 0.998 (Figure 2), which indicated a high correlation between the peak areas and the range of concentrations studied.

**Accuracy**

A solution of Caffeine-8-thioglycolic acid and a stock solution of compound 2b were prepared. From these, six subsamples (three of the Caffeine-8-thioglycolic acid and three of the stock solution), allowed each solution to be injected onto the column three times. Accuracy is reported as a parameter recovery with relative standard deviations.
Selectivity
The selectivity was determined by the corresponding selectivity factor \((\alpha)\), measured as a ratio of the retention factors \((k)\) of the two peaks in question and visualized as the distance between the apices of the two peaks.

Determination of Stability at Different pH
Chemical Stability
By definition, chemical stability is the tendency of a substance to sustain changes or decay caused by internal reactions or effects of air, humidity, heat, light, pressure, or other external factors. The compound presented in this paper had been stored for six months at room temperature with access to air and light. The physical and chemical properties of the compound were determined to be unchanged under these conditions. Hence, the test compound was considered chemically stable.

An important factor influencing the performance of the molecules in an organism is the hydrolytic stability of the molecules under the following conditions: temperature of 38 °C and pH of 1.0 and 12.0 (ICH Guidance for industry, Q2A (R2), 2003).

Hydrolytic Stability Study at a Temperature of 38 °C, pH of 1.0 and 12.0, and in Oxygen-Free Media

For evaluating stability, corresponding buffer solutions of the test compound, 2b, were prepared to obtain the desired pH values. A 10-mg sample of the model compound was weighed and dissolved under oxygen-free conditions in corresponding buffers of pH 1.0 and 12.0, respectively. The obtained solutions were stirred while being maintained at 38 °C for a total of 1440 min (24 hours) using liquid nitrogen to assure the absence of air. Aliquots of 20 \(\mu\)l of the analyzed solutions were drawn at 30-minute intervals and injected into the apparatus. The corresponding chromatograms were obtained (Figures 3–4).

Stability Determination of Compound 2b at pH 1.0

A 10-mg sample of the model compound was weighed and dissolved in 100 ml of 0.01 mol \(\text{HCl}\) (pH 1.0). This solution was stirred at 38 °C for a total time of 1440 min using liquid nitrogen to assure the absence of air. Aliquots of 20 \(\mu\)l samples were drawn at 30-minute intervals and injected into the RP-HPLC system. Figure 3 presents a representative chromatogram.

As presented, no additional peaks were visible for the total 1440 min evaluation period under these conditions.
Stability Determination of Compound 2b at pH 12.0

A 10-mg sample of the model compound was weighed and dissolved in 100 ml of 0.01 mol l⁻¹ NaOH (pH 12.0). The obtained solution was stirred at 38 °C for a total time of 1440 min using liquid nitrogen to assure the absence of air. Aliquots of 20 μl samples were drawn at 30-min intervals and injected into the RP-HPLC system. Figure 4 displays a representative chromatogram.

![Representative chromatogram](image)

Source: Authors

As presented, no additional peaks were visible for the total 1440 min evaluation period under these conditions. These results lead to the conclusion that in both media no hydrolysis occurred within 24 hours. These evaluations were conducted in oxygen-free media.

To identify the influence of oxygen on the stability of the target product, evaluations were performed in oxygenated media. The chosen model compound was incubated in both acid and alkali media for 1440 min using the above-discussed conditions, as follows: A 10-mg sample of the model compound was weighed and dissolved in corresponding buffers of pH 1.0 and 12.0, respectively. The obtained solutions were temperature-controlled and stirred in oxygenated media at 38 °C for a total time of 1440 min (24 hours). Aliquot samples of 20 μl of the analyzed solutions were drawn at 30-minute intervals and injected into the apparatus. The corresponding chromatograms were obtained (Fig. 5 & 6).

Stability Determination of Compound 2b at pH 1.0 in the Presence of Air

Fig. 5 shows the effects of incubating the test compound in acid media, pH 1.0, in the presence of air. An unidentified peak with a retention time close to that of the analyzed structure was observed under the test conditions. The calculated relative retention of the unidentified peak and that of 2b were close to 1. This showed that no separation was achieved under the applied chromatographic conditions.

Stability Determination of Compound 2b at pH 12.0 in the Presence of Air

After a 16-hour incubation of the test compound in alkali media, pH 12.0, in the presence of air, the same results to those for the acid media presented. Again, no separation was achieved.

In an attempt to separate and identify the new product, the chromatographic procedure was modified, by changing the mobile phase as shown in Table 3.
**Figure 5:** A representative chromatogram of 2b in acid media (pH 1.0) after 10 hours in the presence of oxygen

![Chromatogram](image)

Source: Authors

**Table 3:** Modified chromatographic conditions to separate and identify a new product in the study

<table>
<thead>
<tr>
<th>Mobile Phase</th>
<th>Flow rate (ml min⁻¹)</th>
<th>Temperature (°C)</th>
<th>Wavelength (nm)</th>
<th>Injection volume (μL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>acetonitrile / water (98/2 v/v)</td>
<td>2</td>
<td>20</td>
<td>254</td>
<td>20</td>
</tr>
<tr>
<td>methanol / water (75/25 v/v)</td>
<td>2</td>
<td>20</td>
<td>254</td>
<td>20</td>
</tr>
</tbody>
</table>

Source: Authors

In applying the new conditions, a good separation was achieved, as shown in Figure 6.

**Fig.6:** A representative chromatogram of 2b in acid media (pH 1.0) after 10 hours in the presence of oxygen

![Chromatogram](image)

Source: Authors
Based on the identified degradation product having a similar chromatographic behavior to that found for 2b, it appears the targeted amides are oxidized through exposure to air into corresponding sulfines. This process is similar to the derivation of corresponding esters from caffeine-8-thioglycolic acid (Mitkov et al., 2007).

To demonstrate this, we synthesized the probable sulfine product, according to the procedure, summarized in Figure 7.

### Figure 7: Synthesis of the sulfoxide via oxidation of 2b with m-CPBA

The synthesized compound was found to be freely soluble in chloroform, dichloromethane, Dimethylformamide (DMF), and DMSO, but insoluble in non-polar solvents, such as n-hexane. The structure of the synthesized S-oxide was confirmed by FTIR, ¹H– and ¹³C–NMR, MS spectra, and elemental analysis. The results were consistent with the assigned structure. The ¹H–NMR spectrum of the compound revealed the signals of the respective protons, which were verified by chemical shifts, multiplicities, and coupling constants.

The chemical shifts of the protons and carbon atoms, registered by ¹H– and ¹³C–NMR spectra, were compared with simulated values (Banfi et al., 2008, Andrés et al., 2011, Aires-de-Sousa et al., 2002). A strong correlation between the registered and computed values was observed.

The obtained product was analyzed individually and in a model mixture with the initial 2b. Figure 8 shows the result of the analysis.

### Figure 8: A chromatogram of 2b (A), its sulfine 3 (B) and a model mixture of these (C)

An unidentified peak as a result of the degradation under acid (pH 1.0) and alkali (pH 12.0) media in the presence of oxygen is shown at the same retention time as that for the sulfine product (B; Fig.8).

### Conclusion

The stability of an amide derivative of caffeine-8-thioglycolic acid, 2b, was determined under acid (pH 1.0) and alkali (pH 12.0) conditions, at a temperature of 38 °C and in the presence and absence of oxygen. A sulfine degradation product resulted in both pH condition, in the presence of oxygen only.
The structure of the degradation product was determined through controlled synthesis. The findings lead to the conclusion that the only possible degradation process for the test structure is via oxidation at 38 °C in strong acid and alkali media with exposure to air. We propose this to be the most probable metabolic process of the target compound.

References


Almeida, Mariana Mandelli; Bou-Chacra, Nádia A; Conte, Juliana Denise; Kaneko, Telma Mary; Baby, André Rolim; Velasco, Maria Valéria Robles. Evaluation of Physical and Chemical Stability of Nanostructured Lipid Carries Containing Ursolic Acid in Cosmetic Formulation. (2013). Journal of Applied Pharmaceutical Science. 3 (1), 5-8


Sources of Air Pollution, Environmental Impacts and Exploitation of Natural Resources in Kosovo

Adem Dreshaj,1 Bedri Millaku,2 Sabiha Shala,3 Afrim Selimaj,4 Halit Shabanë5

Abstract: Concerns and uncertainty about the life on Earth are constantly growing, today greater than ever before, as a result of human activity. In this regard, the major dangers that threaten our planet include uncontrolled utilization of natural resources, environmental deterioration and environmental pollution over Earth's regenerating possibilities. Whereas, the main causes of pollution are deforestation, erosion, greenhouse gas emissions, poor urban and industrial waste control and uncontrolled mining activities. All of these lead to serious consequences for life on Earth, because of the natural resources of the soil and its capacity to absorb waste gases (CH₄), and the release of heavy metals such as Pb, Zn, Cd, Cu, Fe and As, which are the biggest soil pollutants. The Earth is being cemented, and its regenerating capacities are being diminished every day.

UDC Classification: 502/504; DOI: http://dx.doi.org/10.12955/cbup.v5.1111

Keywords: Emission, pollution, tourism, sustainability

Introduction

As Shehu (2006) claims, the non-regenerating natural resources are the ones that when used cannot be replaced. This is the case with fuels and mineral exploitation. But in practice, it has been stated that even renewable resources, such as forests, waters, etc., when used irrationally might have consequences on the environment.

Certain human activities might lead to significant environmental damage, irreversible, to the disorder of natural balances (Law No. 03/1-233 on nature protection, 2013). Additionally, the rapid growth of the global population, followed by the desire for a higher standard of material living has led to the environmental damages on a global scale (Qullaj, 2010).

On the one hand, industrialized countries that comprise only ¼ of the world's population consume about 82% of natural resources. On the other hand, the capacities of Earth to keep people and other living things safe have been considerably diminished (Lajci & Kalaj, 1998). In less than 180 years, our planet has lost about 6.2 million km² of forests, while the extraction of water has been increased from 100 to 3600 km³ per year (Daci, 1978).

Therefore, air and soil pollution and the shortage of drinking water and natural waters have become a serious and persistent threat to the health of human beings and the living world in general.

Environmental Pollution with Heavy Metals

According to the UN report (2005), about ½ of the global population of 6.3 billion people live in cities, and this number might increase to 5 billion or 61% of the population by 2030 (Law Nr. 04/ L-147 on Water, 2013).

In addition, a dramatic rise in population marked a number of cities. Today, there are more than 22 cities with populations of over 11 million (Lajci & Kalaj, 1998). It is estimated that three-quarters of the population in developed countries live in cities. Our civilization is endangered today because people abuse natural resources and damage the natural systems of the Earth while pushing the limits of the earth’s capacity (Shehu, 2006). This situation has concerned not only scientists and politicians but also citizens, wherever they are on the globe (Dreshaj, 2013).

In general, nowadays, atmospheric air pollution has become a great concern (Daci, 1978). The main causes are economic and industrial development, and also living conditions (Qullaj, 2010).

Also, the pollution of air has been affected by the undeveloped industry, the introduction of obsolete technologies, the growth of cities, the unplanned and illegal construction, the approach of residential

1 “Haxhi Zeka” University, Peja, Kosovo, adem.dreshaj@unhz.eu
2 “Haxhi Zeka” University, Peja, Kosovo, bedri.millaku@unhz.eu
3 “Haxhi Zeka” University, Peja, Kosovo, sabiha.shala@unhz.eu
4 “Haxhi Zeka” University, Peja, Kosovo, afrim.selimaj@unhz.eu
5 “Haxhi Zeka” University, Peja, Kosovo, halit.shabanë@unhz.eu
areas near industrial sites, the reduction of green areas (parks and gardens), increased vehicle traffic, and use of high-content lead fuels (Dreshaj, 2013).

**Geographical position and the development of tourism in Kosovo**

According to Qullaj (2010), Kosovo is characterized by a suitable geographic position. It lies in the southeast Europe and in the central part of the Balkan Peninsula, thus being an important crossroad of transitional roads connecting various parts of Europe and beyond it since the ancient times to the present day.

The geographic position gained particular importance after the construction of the Thessaloniki-Skopje-Kosovo Polje-Mitrovica railroad in 1874, which connected the southern and northern parts of the Balkans and Europe (Besa, 2015).

The transit function increased further with the construction of the Ferizaj - Pristina - Mitrovica road which continued along the valley of Iber by creating links with central and western Europe, whereas, through Kacanik connected to the south and - Corridor 8, Durres-Skopje-Sofia-Varna (Besa, 2015). Construction of the Adriatic highway (1971) increased the transitory links of Kosovo with the Adriatic coast and widened the Dalmatian corridor turning Kosovo into an important regional crossroad (Shehu, 2006).

The Relief

The most important forms of relief are hollows (Kosovo, Dukagjin, etc.), and mountains (Sharri, Albanian Alps – Rugova Mountains, Koponik), etc. Mountains account for 64%, while the hollows account for 36% of Kosovo's territory (Law on waste, 2012). The average altitude of Kosovo is 810 m with the extremes between 270 m, the lowest point in Vermica, and 2656 m, the highest point in Gjeravica (Besa, 2015).

In terms of hypsometric aspect, areas under 700 m comprise more than half of the territory of Kosovo (52.6%), 700-1000 m areas comprise more than a quarter (26.6%), while surfaces over 1000 m account over 1/5 (20.8%), of the territory of Kosovo (Law No. 03/L-160 on air protection from pollution, 2010). The relief represents a very important influential element of the climate, hydrograph, the establishment, and development of dwelling places or settlements, etc. (Qullaj, 2010).

The climate of Kosovo is under the influence of macro-climate factors: geographic latitude, land position, water, based on the macro – climate factors. Thus, Kosovo is characterized by a moderate continental climate, but local factors also affect the situation of other climate types (Shehu, 2006). Depending on these factors, the eastern part (Kosovo Plain) is characterized by a continental climate, whereas, the western part (Dukagjin Plain) is characterized by an average continental climate with a significant influence of the Mediterranean climate of the Adriatic Sea through the Drini Valley.

Hilly mountainous areas (750-1000 m), as transitional areas are characterized by subalpine climate and mountainous areas (over 1000 m), are characterized by alpine climate (Besa, 2015). Kosovo’s average temperatures are around 11 °C with the minimum temperature - 25.2 °C and the maximum up to 39.2 °C. Maximum average annual rainfall is 591 mm. Due to the impact of local factors, the western part of Kosovo is characterized by a higher temperature (average for 1 °C higher), and a higher average amount of precipitation (by around 100 mm) than the eastern part of Kosovo.

**Air pollution**

The air is an important environmental factor and a necessity for life. Its pollution is caused by mixed substances that come in the natural or artificial ways and become the main reason of deterioration of its quality, causing a series of illnesses, and degradation of other environmental elements (Lajči & Kalaj, 1998).

Air pollution poses a great danger to the population, particularly to high-risk groups, such as children and the elderly (Shehu, 2006). Air quality deterioration is caused by the presence of pollutants such as SO₂, NOx, and particulate matter in abeyance (PMA), troposphere ozone, carbon monoxide, volatile organic compounds and heavy metals (Daci, 1978). Also, transport growth is accompanied by increased pollution from NOx, PM, O₃, carbon monoxide, and hydrocarbons.
Cycles of air pollution

Three cycles are considered as the most important regarding the air pollutants on the environment:

- The first cycle is the process of emission, that is characterized by parameters such as the type of pollutants, the quantity of pollutants, the scale of the source of discharge, the temperature of the material emitted, the speed and time of the emitted material;
- The second cycle is the atmospheric transport of pollutants. It includes possible physical or chemical factors, for example, photochemical reactions and the spatial distance between the source of the discharged pollutant and the area which the pollutant affects.
- The deposition process is the third cycle. The deposition means the local impact of pollutants on the environment. It depends on the weather conditions or climate change, such as the inversion of temperature or precipitation and their duration (Lajçi & Kalaj, 1998).

Air pollution modeling

Modelling techniques are some of the most important instruments dealing with air quality. The models are useful for predicting the behavior of systems, which are too complex for accurate analysis of the subject. Likewise, models are used to predict the worst cases of pollution (Qullaj, 2010).

Factors in the spread of polluting particles are:

- Wind, which is dependent on the shape (roughness) of the surface of the Earth;
- The effect of friction between the air and the earth's surface, wind speed, and turbulence;
- Wind speed decreases significantly closer to ground level, if the surface is relatively rough, for example. With trees and buildings, airflow tends to turn into turbulence, and increasing wind speed with height from ground level is relatively small (Davis & Mc Entire, 2006).

Sources of air pollution in the Republic of Kosovo

Resources of mining and energy in Kosovo are used in an uncontrolled manner, neglecting the condition of the environment, without adequate environmental projects and adequate professional treatment of the case. Hence, this situation is causing major damage to human health and the environment in general (air, water, soil and natural landscapes). In 1988/99, energy, non-ferrous metals and processing of metals comprised about 65% of the industrial production in Kosovo (Law No. 04/L-06 on waste, 2012).

According to reports, the concentration of lead in the air in 1980/91 was increased from 22.9 to 25.2 micrograms for m³. Except for SO₂, NOₓ, the organic substances that were emitted in the air in 1990 and further on, are as follows:

- Dust 4910 t/year;
- Lead 1120 t/year.

Great potential pollutants are found from other metals such as Ag, As, Cd, Cu, Fe, Pb, Zn, etc.

Whereas, a particular problem derives from the following indicators:

- Slag of smelters in million tonnes;
- Wastes from electrolysis of approximately 560,000 tones Zn;
- Waste of frying concentrates nearly 760 000 tonnes;
- Trash flotation;
- Old landfill near the smelter in Zvecan about 6.47 million t / pyrite, 3.31 million t / Pirot and 566 000 t / oligo.

Heavy metal pollution from road traffic

The main processes through which vehicles emit pollutants into the environment are combustion processes of fuel, vehicle depreciation (engine, tires, and brakes), and oil leakage or anti-freeze, and also corrosion (Lajçi & Kalaj, 1998). While emission control regulations have led to a substantial reduction in emissions coming from road traffic, it has recently been noticed that emissions from other vehicles were not affected (Damek-Poprawa & Sawicka-Kapusta, 2003). Accordingly, lead is released during fuel combustion processes, zinc dust is derived from tires (zinc catalyst used in the manufacture of tires), and copper is derived from the corrosion of the radiator and brakes; other heavy metals are
from mixed backgrounds (Ferguson, 1989). Then origin of Zn of road traffic is from corrosion of ABS braking system (Dakonta, 2009). Today, most important heavy metals related to road traffic are: Cu, Pb, and Zn. Historically, lead has been related to road traffic. Other metals coming from road traffic include, Cd, Cr, Cu, Ni, Sb and Zn from amortization of brakes, Zn and traces of Cd, Co, Cr, Cu, Hg, Mn, Mo, Ni and Pb from tires and Cd, Cr, Cu, Ni, lead and V, from gases released by burning fossil fuels (Qullaj, 2010).

The effects of pollution on health are of particular concern for the population of Kosovo. These effects are often significant and lead to major public debates. Therefore, the effects of pollution vary depending on the pollutants and include:

- Acute respiratory diseases;
- Worsening of patients condition who suffers from heart diseases, respiratory diseases, and asthma;
- Cancer caused directly by pollutants;
- Impacts on the eye or nose irritation and stress or loss of general welfare.

While in most cases, the effects are small, in some cases, the impact may be bigger and in extreme cases, the consequences are life-threatening. In 2016, 1045 people have been diagnosed with cancer, and half of them died. The government of Kosovo is paying 5 million for the chemotherapy chemicals treatment of persons diagnosed with CA.

Table 1. Dust emissions, SO$_2$, NOx

<table>
<thead>
<tr>
<th>Months</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
<th>V</th>
<th>VI</th>
<th>VII</th>
<th>VIII</th>
<th>IX</th>
<th>X</th>
<th>XI</th>
<th>XII</th>
</tr>
</thead>
<tbody>
<tr>
<td>SO$_2$ emissions measured in 2015</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>mg/m$^3$</td>
<td>170</td>
<td>150</td>
<td>152</td>
<td>161</td>
<td>102</td>
<td>117</td>
<td>90</td>
<td>132</td>
<td>117</td>
<td>89</td>
<td>90</td>
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<td></td>
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</tr>
<tr>
<td>Months</td>
<td>I</td>
<td>II</td>
<td>III</td>
<td>IV</td>
<td>V</td>
<td>VI</td>
<td>VII</td>
<td>VIII</td>
<td>IX</td>
<td>X</td>
<td>XI</td>
<td>XII</td>
</tr>
<tr>
<td>SO$_2$ emissions measured in 2016</td>
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<td>mg/m$^3$</td>
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<td>152</td>
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<td>117</td>
<td>82.75</td>
<td>92.1</td>
<td>112</td>
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<tr>
<td>AAV</td>
<td>50 mg/Nm$^3$</td>
<td></td>
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<td></td>
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<tr>
<td>Months</td>
<td>I</td>
<td>II</td>
<td>III</td>
<td>IV</td>
<td>V</td>
<td>VI</td>
<td>VII</td>
<td>VIII</td>
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<td>SO$_2$ emissions measured in 2015</td>
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<td></td>
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<td></td>
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<tr>
<td>mg/m$^3$</td>
<td>258</td>
<td>293</td>
<td>573</td>
<td>519</td>
<td>200</td>
<td>210</td>
<td>244</td>
<td>390</td>
<td>977</td>
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<td>Months</td>
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<td>III</td>
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<td>VII</td>
<td>VIII</td>
<td>IX</td>
<td>X</td>
<td>XI</td>
<td>XII</td>
</tr>
<tr>
<td>NOx emissions measured in 2016</td>
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</tr>
<tr>
<td>mg/m$^3$</td>
<td>244</td>
<td>594</td>
<td>490</td>
<td>284</td>
<td>790</td>
<td>810</td>
<td>828</td>
<td>777</td>
<td>668</td>
<td>790</td>
<td>820</td>
<td>720</td>
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<tr>
<td>AAV</td>
<td>800 mg/Nm$^3$</td>
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<td>Months</td>
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<td>VI</td>
<td>VII</td>
<td>VIII</td>
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<tr>
<td>mg/m$^3$</td>
<td>237</td>
<td>212</td>
<td>178</td>
<td>252</td>
<td>130</td>
<td>144</td>
<td>147</td>
<td>149</td>
<td>301</td>
<td>109</td>
<td>111</td>
<td>114</td>
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<tr>
<td>AAV</td>
<td>400 mg/Nm$^3$</td>
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<td>Months</td>
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<td>VIII</td>
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<td>XI</td>
<td>XII</td>
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<tr>
<td>NOx emissions measured in 2016</td>
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<td></td>
</tr>
<tr>
<td>mg/m$^3$</td>
<td>230</td>
<td>210</td>
<td>168</td>
<td>242</td>
<td>120</td>
<td>140</td>
<td>145</td>
<td>140</td>
<td>311</td>
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<td>119</td>
</tr>
<tr>
<td>AAV</td>
<td>400 mg/Nm$^3$</td>
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</tbody>
</table>

Source: Author *(Allowed Average Value – AAV)*

**Short and long term exposure to PM particles**

According to (Dreshaj, 2014) exposure to PM particles always refers to a respiratory disease, cardiovascular disease, and other consequences. PM10 particles are smaller than 10 micrometers in diameter, so they easily infiltrate into the respiratory tract (Law No. 04/L-197 on chemicals, 2014). It was found that an exposure to very small fractions of particles PM2.5, which account for about two-thirds of PM10 emissions, results in an even stronger association of the observed effects on disease, but also warn that there are fractions between PM10 and PM2.5 which may have some influence on health (Qullaj, 2010).
Research Methodology and Materials

The samples for the research have been taken at various stations in the center of Pristina, and in Kosovo Polje near the roadway.

After transporting the samples to the laboratory, the instruments used to measure the analysis were: Turnkey’s - equipment for the measurement of particles. The photometry used in the Turnkey’ instruments as Tapas, Osiris and the Dust mate provides a continuous and simultaneous overview of mass fractions PM 2.5, PM 10 and GPM (Dreshaj, 2013).

The dust mate portable monitor is a monitor laser detector and is ideal for sampling in the field. This device analyses the total particulate matter (TPM), the particulate matter with a diameter of 10 μm (PM10), subject particles 2.5 μm in diameter (PM 2.5), and the PM10 in a simultaneous way (Dreshaj, 2014). The monitor is equipped with software which is used for reading, receiving, management and interpretation of the data based on the relevant assessment criteria.

These results have been shown in Table 1.

The dynamics of the particles in the air-air measurements for indicators in Pristina are focused on two important stations representative to assess the impact of pollution sources in this city (Dreshaj, 2013).

Table 2. Particulate matter with an aerodynamic diameter <10μm (PM10)

<table>
<thead>
<tr>
<th>Stations</th>
<th>Concentration μg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2015</td>
</tr>
<tr>
<td></td>
<td>January</td>
</tr>
<tr>
<td>PM10 Pristina Center</td>
<td>75.74</td>
</tr>
<tr>
<td>PM10 Kosovo Polje</td>
<td>48.75</td>
</tr>
<tr>
<td>Source: Author</td>
<td></td>
</tr>
</tbody>
</table>

Table 3. Average monthly values of PM10, PM 2.5 at the station, field and centre of Pristina Kosovo

<table>
<thead>
<tr>
<th>Average values of PM10 in 2016</th>
<th>Average monthly values of PM 2.5 in 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concentrating on site-sampling</td>
<td>Concentration PM10 (μg/m³)</td>
</tr>
<tr>
<td>Months</td>
<td>Kosovo Polje</td>
</tr>
<tr>
<td>January</td>
<td>73</td>
</tr>
<tr>
<td>February</td>
<td>64</td>
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<tr>
<td>March</td>
<td>47</td>
</tr>
<tr>
<td>April</td>
<td>65</td>
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<tr>
<td>May</td>
<td>55</td>
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<tr>
<td>June</td>
<td>71</td>
</tr>
<tr>
<td>July</td>
<td>45</td>
</tr>
<tr>
<td>August</td>
<td>72</td>
</tr>
<tr>
<td>September</td>
<td>63</td>
</tr>
<tr>
<td>October</td>
<td>51</td>
</tr>
<tr>
<td>November</td>
<td>112</td>
</tr>
<tr>
<td>December</td>
<td>114</td>
</tr>
<tr>
<td>Average</td>
<td>69.333</td>
</tr>
<tr>
<td>Source: Author</td>
<td></td>
</tr>
</tbody>
</table>

Conclusions

The main goal of this research has been to provide the necessary information in order to make correct decisions regarding the management and improvement of air quality. Based on the findings presented above, it can be concluded that the three polluting sources are characterized by differentiated emissions of air pollutants with particulate matters: PM10, PM 2.5, as well as SO₂, NOₓ, and CO.

The power plants/stations, Kosovo A and Kosovo B are powerful emitters into the air as well as of particulate material emissions. Emission of particulates on the annual average is about 9-16 times higher than AAV, while NOx emissions are 34-62% higher than AAV. Pristina is characterized by a high load of particulate material. As for PM10 particulates and PM2.5 particulates, their annual average is 50-60% higher than the critical limits.
Despite the fact that the Kosovo authorities have passed laws protecting air, water, forest and other environmental related areas, the management and improvement of air quality remain a serious concern for the life of people. Thus, the fundamental right of Kosovo citizens such as the right to healthy life continues to be at risk.

Recommendations

As a starting point, citizens should be aware that environmental protection protects health and well-being. In this regard, it should be initiated as soon as possible, since tomorrow it might be late. In order to improve the conditions, we recommend providing of funds for the maintenance of monitoring equipment. Also, based on the findings, we recommend increasing the number of monitoring parameters as required by the guidelines laid down by laws which regulate issues of air pollution. Moreover, to take concrete steps on the part of institutions in reducing pollution from PK 10 and PM 2.5. As regulated by legislation, to conduct control of fuels derivatives that enter Kosovo and become certified companies which deal with this business, to carry out technical inspection of vehicles and issuing gases and to adopt standards set by the European legislation level, discard vehicles that do not meet requirements, establishment of electrostatic filters in the chimneys of power plants/stations, and increase green areas inside and outside the cities.

Finally, Kosovo authorities might concentrate and orient their actions on controlling the enforcement of already passed legislation that regulates all the above mentioned aspects.

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