# THE SLOVAK CITIZEN'S AND UNIVERSITY STUDENT'S PERSPECTIVE ON THE BENEFITS OF ROBOTIZATION

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**Abstract:** We live in a time which is determined by rapid technological development, increasing automation, creating electronic services and implementing robots. The current Fourth Industrial Revolution is not just about technology or business, it is also about society, the quality of life and the integration of new technologies where humans and robots interact. New technologies create space for job opportunities that will require specific kinds of skills. Today, computers and machines can do a high level of work involving routine and manual work, but they cannot replace some analytical, creative and, most importantly, social skills. An education and employment policy is needed to transform the trends and challenges of the digital economy. The aim of the contribution is point to the theoretical background of the digital transformation of society and define the level of robot skills acquisition. Moreover, it identifies the life situations and sectors where respondents from Slovakia would accept the presence of robots and the article compares data with a survey conducted by 168 students of Zilina university. The contribution also focuses attention on the approach to the relationship between human and the robot and the perceived benefits of using robots from the point of view of citizens.

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## Introduction

Advancing automation and digitization on the labor market is the subject of many studies that discuss risks such as the loss of jobs through automation, cyber threats and the replacement of human labor with robots and other technologies. These technological advances result in new opportunities such as: the creation of new types of jobs, accuracy, drive for flexibility or considerable savings with regard to the cost of labor (Arntz et al., 2016). The phenomenon of digitization and changes in the society that affect the economy are described by Tapscott in the context of a new economy based on the integration of human intelligence with the innovation and transformation of society into a digital world. He also points out that the new era is not just the age of smart devices, but above all it is an era of networking of humans who can now combine their intelligence, knowledge and creativity for the social development of countries and for wealth creation (Tapscott, 1999). The new economy is not merely the age of computers, but it is based on cross-sectoral collaboration and coordination, thus inhibiting economic growth and mutual symbiosis between new technologies and the quality of life (Maffey et al., 2015). At the same time, there are concerns that increased automation will result in the replacement of human workers by smart machines and the welfare of citizens will significantly decrease as a result of unemployment (McClure, 2018). For this reason, the aim of the paper is to highlight the development of society in the sense of digital transformation with a closer focus on the level of skills acquisition by robots. It also includes a survey comparing the perception of positive attributes of automation by citizens of the Slovak Republic and Zilina university students. The survey is supplemented by life situations in which the presence of a robot would be perceived as an obstruction. The dynamic development and diffusion of information technology, global integration and the growing specialization of businesses, the changing demands of the labor market and, last but not least, the direction of society, have a significant impact on quality of life factors in the context of sophisticated technology penetrating into everyday routines (European Union, 2018).

### Transformation of society from the perspective of automation and robotization

According to Charlesworth, the term revolution can be understood as a situation in which there are major changes in the world that fundamentally affect every individual. These changes change the whole society suddenly and revolutionary with everything that belongs to it (Charlesworth, 2009). New technologies and their implementation represent a revolution in various fields (Cejnarova, 2015). With the gradual integration of information technology into processes, the building of the Internet infrastructure by the emergence of cyber-physical systems, the interaction of production facilities through the Internet of Things, collaborative robots, and artificial and expanded intelligence, is associated with the fourth

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industrial revolution in which society is today (Deloitte, 2015). However, Schwab adds that the overlap is much larger (Schwab, 2016). It is a completely new philosophy that brings about changes in society and affects areas from industry, through technical standards, security, education systems, legislation to the labor market and the social system (Kovacikova & Stofkova-Repkova, 2018).

The main ideas of every industrial revolution were influenced by the increase in productivity, production efficiency, the reduction of energy and raw material intensity, the optimization of logistics routes, and the construction of intelligent infrastructure. These changes are related to increasing competition and the pressure to reduce production consumption, providing personalized products and services with the implementation and use of new technologies (Baller et al., 2016).

Automation gradually penetrates to the non-routine tasks of working life, based on both manual work and psychic. Today, these are mainly techniques and methods using machine learning and mobile robotics. Mobile robotics allows machines to perform activities that only humans have done before - e.g. fine motor skills and work in a less structured environment. Thanks to the machine learning, computers learn to perform cognitive and non-routine tasks, i.e. learning without explicit preprogramming (Arntz et al., 2016). Examples include autonomous vehicles, speech recognition, diagnosis of disease based on available data. Activities that cannot be left to robots in the near future are tacit knowledge. The problem is the content of tasks because we do not explicitly understand them and thus we cannot define them. Creativity, personal and value beliefs, intuition and social interaction belong to the group of tacit knowledge (Berger & Frey, 2016).

Looking at the main barriers to automation, it is possible to talk about economic and technical problems (Schwab, 2016). In particular, the economic barriers focus on the cost of human labor, which is more profitable in some workflows than the cost of procuring, implementing and operating machinery. Technical features include limited machine capabilities determined mainly by mobility, mastering pre-defined and non-programmable tasks. On the other hand, it should be noted that, in addition to the increasing performance of equipment, there is also a decrease in acquisition costs. These factors are constantly increasing the cost of human labor (Cedefob, 2015). The past years among residents mainly resonate concerns about rising unemployment due to the replacement of human labor by automation and robots. However, according to McKinsey, there is no need to worry about rising unemployment due to new technologies. It is possible to assume that some professions will disappear, but new ones will be created. For this reason, lifelong learning is of great importance, as many employees, in particular, recurrent actions, will have to learn to work more closely with new technologies (McKinsey, 2018).

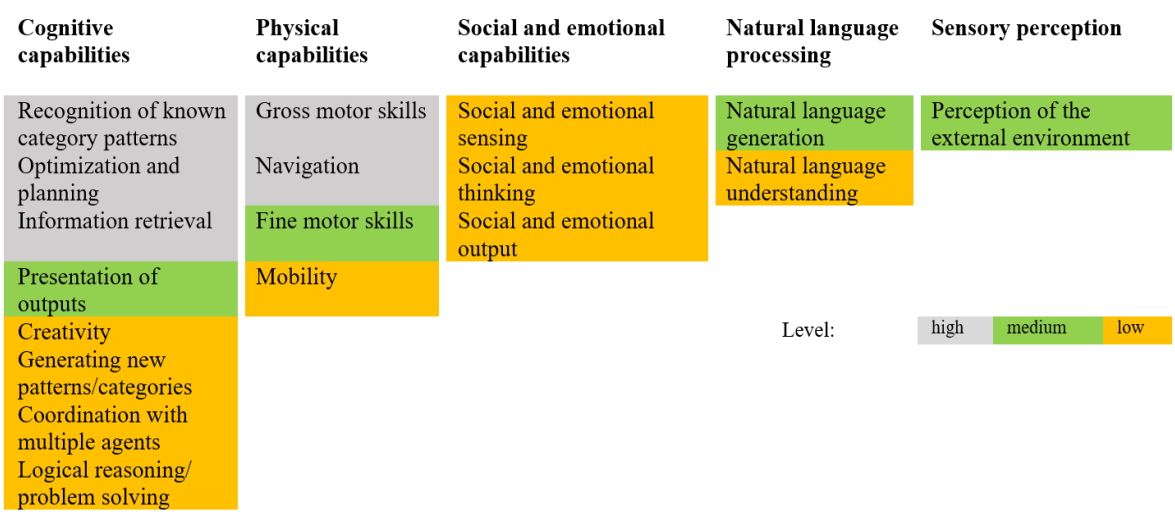
People at work perform a wide range of activities requiring a combination of innate and acquired skills, manual skills as well as social and sensory perception (Berger & Frey, 2016). Figure 1 shows the capabilities that serve to assess the potential of automation and robotics compared to humans and are divided into five categories. The cognitive capabilities category encompasses a variety of ways to recognize known patterns and categories that differ from sensory perceptions to logical problem-solving through context searches between increasingly complex input variables, and to optimize how to achieve specific goals despite predicted constraints. Automated outputs such as graphs, diagrams, and presentations are provided in relation to the information obtained. It is also important to create new diverse ideas, creativity, coordination and interaction with subjects - be it people or other machines. Physical capabilities are assessed through gross motor skills, navigation in different environments and terrain, and fine motor skills needed to perform natural movements. The issue of natural language processing consists of two parts - generation, i.e. providing information with gestures and its understanding. The last part is the least adopted area of social capabilities. This category consists of the social and emotional side of the perceived person. Furthermore, he or she notices the thinking and, last but not least, the expression of emotions with the help of body language (McKinsey, 2017).

Today's robots are now able to gather information, recognize patterns, optimize or schedule activities at a relatively high level. Robots also do not have problems with motorics and orientation. Significant progress is being made through the use of artificial intelligence, which allows not only a higher technological level but also the ability to learn (Schwab, 2016).

According to Majernik, digital interconnection not only improves efficiency, but also accelerates innovation, changing business models, and how to interact to improve the quality of life of the population (Majerník et al. 2017). The European Union's support for innovation, research and discovery

is supported by a number of investment incentives and projects. Horizon 2020 is one of the most important tools to support research, development and innovation. The implementation period is between 2014-2020 and it has allocated 78 billion EUR into it (European Union, 2014).

Figure 1: The level of acquisition capabilities by robots compared to people




Source: Own processing based on McKinsey (2017)

On the other hand, there is a response that the massive implementation of ICT in the lives of Europeans by 2020 may face a shortage of almost 825000 experts. Confirming these concerns can jeopardize the potential for competitiveness and growth (Hraskova & Stofkova, 2017). The digital transformation of businesses and society affects traditional professions. The European Union's stronger call for strengthening digital skills, updating curricula, training, retraining is also directed at sectors that are not primarily based on the use of ICT (Stofkova & Stricek, 2014; Soltes et al., 2016). The response is to support and mobilize experts, organizations and associations that focus on educating and expanding digital skills by creating digital coalitions across the Member States of the European Union (European Commission, 2018).

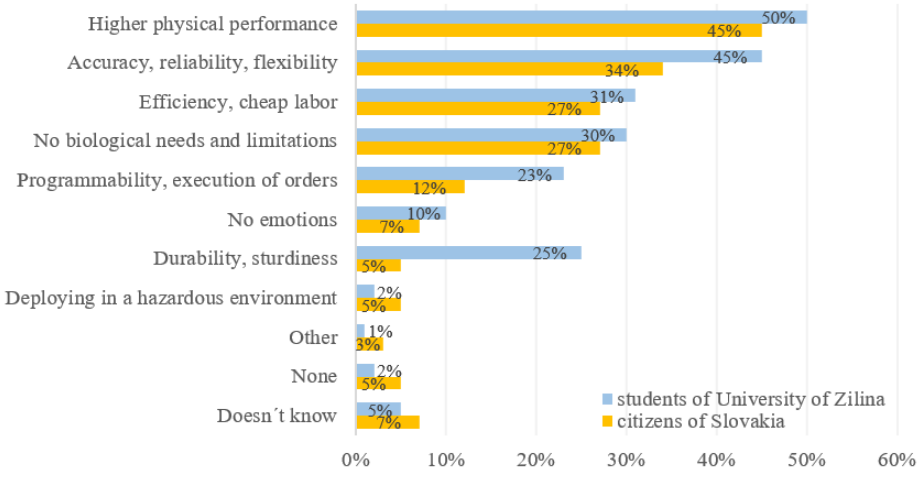
## Methodology

The framework part of the paper used excerptive and compilation methods focused mainly on the study of professional literature. The specialized literature on digital era and technological developments in society has been complemented by an analysis of electronic documents and studies of the European Union and consulting companies (European Commission, 2018; McKinsey, 2017). Next, we used the method of collecting and processing information in the analysis of the current state from the perspective of supporting research and innovation in the digital era. To compare, we used a representative secondary qualitative survey conducted in March 2018 using the direct inquiry method conducted by IVO. The representative sample consisted of 1029 respondents over the age of 17 from the Slovak Republic (IVO, 2018). The aim of the primary research was to compare the perception of the benefits of robots between Slovak citizens and Zilina university students. The education process helps students to adapt to the use of modern technologies in order to improve the quality of life and the efficiency of production and services. The survey was conducted on a sample of 168 respondents aged 18 to 28, and responses were recorded electronically. The results of the research focused on the human – robot coexistence in today's society. In addition, the IVO survey identifies areas in which the presence of a robot interferes with people and the extent to which they are willing to interact with them. Induction and deduction methods were used to present the results and conclusions. It should be added that the primary research carried out in terms of quota selection does not copy the compared basic set as the sample consisted of students. Further distortion could have occurred in the way of collecting responses, while despite the unambiguous formulation in the electronic questionnaire, the respondents could have made a mistake in categorizing the perceived advantage. The questionnaire survey compared to a face to face method does not bring such precise and detailed information.

## Results

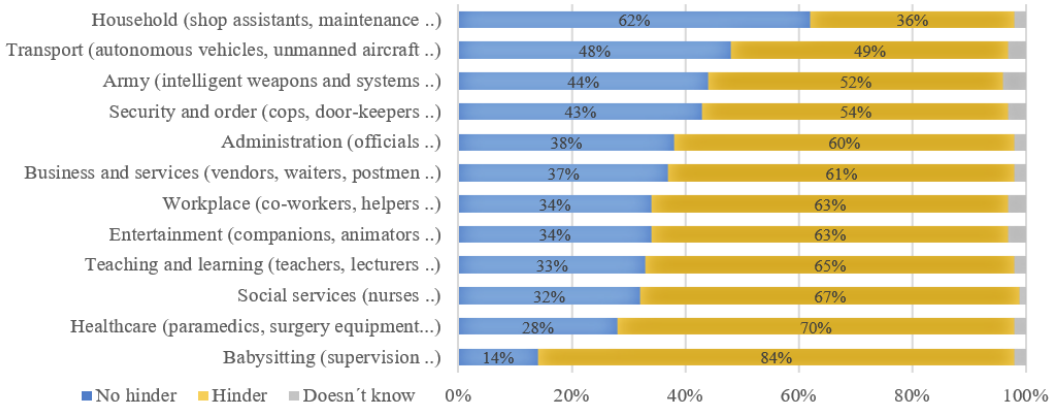
The research results in Figure 2 show that respondents and students perceive robot´s higher physical performance, speed, endurance and strength as the main advantage of robots. Above all, they are influenced by their commitment to manual and stereotypical work. A significant proportion of respondents said their strength is their fine motor skills, reliability and flexibility. As part of this answer, it is possible to broaden considerations about better work done, multitasking, or lower error rates than humans. More than a quarter of the respondents point to the effectiveness of lower costs, shorter time, acceleration of processes and at the same time freeing people from monotonous activities. Interesting is the different perception of resilience between Zilina university students and the national average. The difference is 20%, while there are no significant variations in answers for other attributes. This different view may be mainly due to the focus of the study and in highlighting the new trends in the fields of robotics and automation – their use and maintenance. A vast difference of opinion occurred regarding the programming and in the execution of command attributes Students have basic programming skills and therefore know - despite artificial intelligence and machine learning – that robots are still only machines. While the average Slovakian citizen can perceive programming as a threat, future graduates see the possibility of reprogramming robotic software as an advantage. The perceived positive is also the independence of work performance from wages, the possibility of working without the need for a time fund and biological needs, or the right to medical treatment. In connection with the fulfillment of requirements, the absence of emotions is positively evaluated, which represents an added value for 7% of respondents. Robots fulfill orders, do not gossip, do not complain, and at the same time do not create conflicts, thus not undermining work ethic. 5% of respondents do not see any robot advantages compared to humans.

Figure 2: Perceived advantages of robots from the perspective of the population and students




Source: Own processing

Figure 3: The measure of how robots hinder Slovak people in selected situations




Source: Own processing based on (IVO, 2018)

The massive development of digital technologies faces the acceptance of progress by a broad society. Figure 3 shows people´s attitudes towards robots in selected situations. From this, it can be stated that people are sceptic of coexistence with robots in situations where emotions or confidential information arises and exchanges. The Slovak society is not yet fully prepared to make robots part of everyday life in all areas. Almost two-thirds have no problem if the robot carries out household-related activities such as shopping, routine maintenance or cleaning. Another area is transport, where 48% of respondents do not see an obstacle to managing a means of transport by artificial intelligence. The more it concerns the replacement of the human workforce by robots, the respondents respond more negatively. More than 60% of respondents would have difficulty accepting a robot in the business and service sectors as a work colleague or companion. Only a third of respondents can imagine a robot as a trainer or teacher. Negative attitudes are closely related to the society´s value setting, where life, health and family come first.

## Discussion and Conclusion

The dynamics of changes in society over the past few years has been reached mainly due to the implementation of information and communication technologies. The process of change, which was related to informatization and the perceptible importance for the citizen, lasted several decades (European Commission, 2018). Schwab declares that while the three industrial revolutions needed 120 years to spread outside of Europe, the Internet, as a prerequisite of the fourth industrial revolution, achieved the same in less than a decade (Schwab, 2016).

A similar scenario is also expected for robots in different variations. Continuous improvement and progress show humanoid robots that are additionally capable of self-learning (Arntz et al., 2018). Although we are experiencing a period of economic prosperity, there are still many limits to growth through traditional sources. It is important to realize that technologies, especially automatization, will significantly change the economy as well as the labor market and not only in Slovakia (Maffey et al., 2015). Based on the results we can conclude the young Slovak population is very well aware of the issues associated with automation even though there are some very sophisticated devices. We evaluated positively the fact that students - as future graduates in the labor market - are aware of the advantages of automation. The students identified some main advantages of automation: higher physical performance, flexibility, efficiency, no biological needs, durability and programmability. It is necessary to add that human-robot coexistence is acceptable for Slovak society especially in areas that do not require human interaction, or in confidential situations such as babysitting, healthcare, social services.

Despite the labor deficit, particularly in health, social services and custody, humanism and ethics still play an important role. The use of robots, despite the lack of social skills, is in favor of the younger generation, which is more liberal than the older generation choosing a conservative approach (Hraskova & Stofkova, 2017).

It is also necessary to add that for a functioning ecosystem of a digital economy, it is essential that there be cooperation between the private sector, the academic community and the state (Tapscott, 1999). The fast-paced trend of innovation requires continuing education and awareness, and not panic and fear that may arise because people believe automation will result in human workers losing their jobs or that they will be replaced by robots, as reported by Arnts and colleagues (Arntz et al., 2018). However, effective cooperation requires clear rules that will be implemented and accepted. Digital transformation is not only a prerequisite for the future success of any company in any industry but also a stimulating path that brings greater comfort to the entire modern society.

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