

## THE SET OF PERFORMANCE INDICATORS IN TRANSPORT AND FORWARDING SERVICES – CASE STUDY

Aneta Kucińska-Landwójtowicz,<sup>1</sup> Marcin Lorenc<sup>2</sup>

**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.

**UDC Classification:** 658.6; **DOI:** <http://dx.doi.org/10.12955/cbup.v5.934>

**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

<sup>1</sup> Faculty of Production and Logistics Engineering, Opole University of Technology, a.kucinska@po.opole.pl

<sup>2</sup> Faculty of Production and Logistics Engineering, Opole University of Technology, m.lorenc@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. Kapuge 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.

<b>Evaluation criteria</b>	<b>Indicators</b>
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

	<b>Evaluation criteria</b>	<b>Indicators</b>
Acquisition of orders	Effectiveness in acquisition of orders	Number of received orders/ Number of inquiries Number of executed orders Sell value/Number of employees acquiring orders
	Effectiveness in gaining new clients	Number of new clients/Total number of clients
Service execution	Operation effectiveness	Number of executed orders /Number of received orders Extent of means of transport utilization Extent of load capacity utilization
	Equities input	Transportation costs/Sell value Depreciation costs of means of transport/Sell value People costs/Sell value
	Delivery quality	Number of damages in transport
	Shipment documentation quality	Number of mistakes occurring in the carrier documentation
	Driver's performance	Breakdown and repair costs depending on the drivers
	Timeliness of service provision	Number of timely deliveries/Total number of the deliveries Average delivery delay Average time span between registration and order execution Timeliness of vehicle provision
Service after sell	Timeliness of handling complaints	Time of processing a complaint
	Effectiveness in testing client satisfaction	Number of completed questionnaires /Number of sent questionnaires

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 timely deliveries 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.

Process	Evaluation criteria	Indicators
Marketing and market research	Efficiency of marketing operations	Marketing costs/Sell value
	Customer Acquisition Cost	Marketing costs/Number of acquired customers
	Effectiveness of marketing operations	Number of acquired customers due to marketing actions/Number of new clients
	Customer loyalty	Number of regular clients/Total number of clients
Infrastructure management	Depreciation quality	Amount of vehicle breakdowns in the country Amount of vehicle breakdowns abroad Amount of executed repairs/Amount of scheduled repairs
	Depreciation costs	Repairs costs/Sell value Vehicle maintenance costs/ Sell value Vehicle breakdown costs/ Sell value
	Vehicle exhausts emissions	Emissions level : carbon dioxide, carbon monoxide, nitro gen oxides, hydrocarbons, sulphur dioxide and particulate pollutants
Purchase and suppliers management	Timeliness of suppliers	Amount of timely deliveries/Total number of deliveries
	Suppliers quality	Amount of non-compliant deliveries/Total number of deliveries Number of filed claims Complaints costs/Purchase value Suppliers assessment
Human resources management and work environment management	Employee development	Employee number taking part in training courses/Total employee number Cost of employee improving qualifications/Total employee number
	Employee satisfaction	Employee turnover Employee absenteeism
	Work safety	Amount of accidents at work*1000/Number of working people Absentee rate caused by accidents/Number of accidents at work

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**

- Agami, N., Saleh, M., & Rasmy, M. (2012). Supply chain performance measurement approaches: Review and classification. *Journal of Organizational Management Studies*, 2012, 1. DOI:10.5171/2012.872753
- Bitkowska A., Kolterman K., Wójcik G., Wójcik K., *Zarządzanie procesami w przedsiębiorstwie*. Difin, Warszawa 2011.
- Bromley, P. (2001). A measure of logistics success. *Logistics Quarterly*, 7(3), 17-18.

- Central Statistical Office (2015). Activity Result in 2015, CSO Trade and Services Department, Warsaw, 2016. Retrieved from <http://www.stat.gov.pl>
- Crum, M. R., & Morrow, P. C. (2002). The influence of carrier scheduling practices on truck driver fatigue. *Transportation Journal*, 20-41.
- Harter, D. E., Krishnan, M. S., & Slaughter, S. A. (2000). Effects of process maturity on quality, cycle time, and effort in software product development. *Management Science*, 46(4), 451-466.
- Jochem, R., Menrath, M., & Landgraf, K. (2010). Implementing a quality-based performance measurement system: a case study approach. *The TQM Journal*, 22(4), 410-422.
- Kaplan, R. S., & Norton, D. P. (1996). Using the balanced scorecard as a strategic management system.
- Kapuge, A. M., & Smith, M. (2007). Management practices and performance reporting in the Sri Lankan apparel sector. *Managerial Auditing Journal*, 22(3), 303-318.
- Kettinger, R. C. (2001). Accounting for quality with non-financial measures: a simple no-cost program for the small company. *Management Accounting Quarterly*, 2(3), 14-19.
- Knemeyer, A. M., Corsi, T. M., & Murphy, P. R. (2003). Logistics outsourcing relationships: customer perspectives. *Journal of Business Logistics*, 24(1), 77-109.
- Kohlbacher, M., & Gruenwald, S. (2011). Process orientation: conceptualization and measurement. *Business Process Management Journal*, 17(2), 267-283.
- Krauth, E., Moonen, H., Popova, V., & Schut, M. (2005, June). Performance indicators in logistics service provision and warehouse management—a literature review and framework. In *Euroma International Conference* (pp. 19-22).
- Morgan, C. (2004). Structure, speed and salience: performance measurement in the supply chain. *Business process management journal*, 10(5), 522-536.
- Najmi, M., & F. Kehoe, D. (2001). The role of performance measurement systems in promoting quality development beyond ISO 9000. *International Journal of Operations & Production Management*, 21(1/2), 159-172.
- Neely, A. (2005). The evolution of performance measurement research: developments in the last decade and a research agenda for the next. *International Journal of Operations & Production Management*, 25(12), 1264-1277.
- Neely, A., Adams, C., & Kennerley, M. (2002). The performance prism: the scorecard for measuring and managing stakeholder relationship. *Financial Times Prentice Hall, London*.
- Reijers, H. A. (2006). Implementing BPM systems: the role of process orientation. *Business Process Management Journal*, 12(4), 389-409.
- Sabherwal, R., Hirschheim, R., & Goles, T. (2001). The dynamics of alignment: Insights from a punctuated equilibrium model. *Organization Science*, 12(2), 179-197.
- Sharma, M. K., Bhagwat, R., & Dangayach, G. S. (2005). Practice of performance measurement: experience from Indian SMEs. *International Journal of Globalisation and Small Business*, 1(2), 183-213.
- Stank, T. P., Goldsby, T. J., Vickery, S. K., & Savitskie, K. (2003). Logistics service performance: estimating its influence on market share. *Journal of Business Logistics*, 24(1), 27-55.
- Stewart, G. (1995). Supply chain performance benchmarking study reveals keys to supply chain excellence. *Logistics Information Management*, 8(2), 38-44.
- Syamil, A., Doll, W. J., & Apigian, C. H. (2004). Process performance in product development: measures and impacts. *European Journal of Innovation Management*, 7(3), 205-217.
- Taticchi, P., Tonelli, F., & Cagnazzo, L. (2010). Performance measurement and management: a literature review and a research agenda. *Measuring business excellence*, 14(1), 4-18.
- Twaróg, J. (2005). Mierniki i wskaźniki logistyczne. Instytut Logistyki i Magazynowania.
- Van Donselaar, K., Kokke, K., & Allesie, M. (1998). Performance measurement in the transportation and distribution sector. *International Journal of Physical Distribution & Logistics Management*, 28(6), 434-450.
- Zeglat, D., AlRawabdeh, W., AlMadi, F., & Shrafat, F. (2012). Performance Measurements Systems: Stages of Development Leading to Success. *Interdisciplinary Journal of Contemporary Research in Business*, 4(7), 440-448.