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Monitoring and Improvement of Logistic Processes in Enterprises of the Slovak Republic

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Abstract: The article focuses on the analysis of the regular monitoring of logistics processes in enterprises of various sectors of the economy of the Slovak Republic such as engineering, automotive and electrical engineering, woodworking industry, building industry, agriculture, other industry, trade and services. The first part of the research is the assessment of the basic characteristics of enterprises that focus on logistics processes when managing change. The subject of the survey was the characteristics of the size of the enterprises, the subject of business, the industry and the level of return on equity (ROE). The main objective of the research was to find out the use of new concepts and methods for improving logistics processes and their impact on ROE. The research used methods of questionnaire research, descriptive statistics, pivot table and Chi-quadrat test. The result of the research was to determine the dependence of ROE height on the use of new concepts and methods in improving logistics processes.

Keywords: Logistics process, monitoring, improving, methods, enterprises

1. Introduction

The current period is characterized by the creation of a functional logistic system, regular monitoring and improvement of logistics processes, which gives prerequisites for achieving higher productivity, efficiency of resource utilization as well as performance of the company as a whole. The definition of logistics and the associated logistical processes is countless. The authors try to express their own definition of the logistics definition, which are in essence identical and differ according to the environment and what logistic processes characterize. In general, and based on the theoretical sources study, according to the authors [1-7] define logistics as an interdisciplinary science dealing with the coordination, harmonization, interconnection and optimization of raw material, material, semi-fabric, products and services, but also flows of information and finance in

terms of customer satisfaction for the least cost, with the greatest flexibility and accuracy. The logistics process describes the synergy of production, transport and storage processes. According to the Council of Supply Chain Management Professionals, the definition of the logistics essence is to plan, implement and control the efficiency of efficient direct and return flow of goods, services and related information between the place of origin and the place of consumption, in order to meet customer requirements under optimal conditions. Improving processes is done by applying different concepts and methods [8]. The theoretical aspects of selected concepts and methods are presented in the following text.

Balanced scorecard BSC helps to strike a balance between financial and non-financial performance measures, and build up causal links between the leading and lagging performance measures, the short-term and long-term performance measures, and the internal and external performance measures. As a result, desirable performance outcomes can be generated through BSC application [9]. BSC, as a management innovation integrating financial and non-financial performance measures in light of organizational strategy, has been widely adopted by various organizations since the early 1990s. Over the last ten years, the BSC has become a popular performance measurement instrument. It has been widely adopted in practice and much of the research on performance measurement has been preoccupied with it [10]. The balanced scorecard allows managers to look at the business from four important perspectives: customer perspective, internal perspective, innovation and learning perspective, and financial perspective [11].

Six Sigma is a methodology focused on the improvement of manufacturing processes, where product quality is the response variable for all activities. The aim of Six Sigma is to produce no more than 3.4 defects per million opportunities, making it an appealing proposition for production managers [12]. This is perhaps the most important definition of SS as a methodology, since it implies that processes must be appropriately standardized [7]. However, as a procedure, Six Sigma is also treated as an integrated methodology consisting of two sub-methodologies: defining, measuring, analysing, improving, and controlling (DMAIC), used when products or processes are in existence; and defining, measuring, analysing, designing and verifying (DMADV), used when products or processes are not in existence and the company needs to develop them [13]. Author [14] conduct a literature review that links lean manufacturing, Six Sigma and sustainability, and argue the need to generate models that support those relationships. There are now many companies established in Europe and America reporting Economic benefits following the implementation of Six Sigma. While benefits had already been seen by Japanese companies, the American companies were the first to disseminate their results, resulting in a rapid uptake of Six Sigma by other companies It is widely considered that Motorola was the first company to report the successful implementation of Six Sigma, and this was followed by other industries, such as IBM, AlliedSignal,

General Electric, Ford, General Motors and Chrysler. A list of other companies reporting successful implementation of Six Sigma can be found in the work of the authors [15].

Process controlling - the terms controller and controlling were introduced to western European countries only in the second half of the last century by local subsidiaries of American companies. In contrast to Anglo-Saxon countries, in German-speaking countries controlling is commonly regarded as a discipline on its own, rather than simply synonym for management accounting [16]. According to [17], the process of controlling was triggered by an increase in the share of overheads in total company costs, which led to a growing need for their management. For the main tasks of controlling process costs, the author considers the Process Optimization and Process Calculation (ABC), which is considered to be the basic tool of all process controlling. The advantage of process calculations is the ability to associate the product with the main processes to which they relate, enabling them to match overheads to products that is to customers of these processes.

TQM - Total Quality management can be defined as a strategy that aims to generate and transfer more efficient and superior services, through achieving cooperation between organisational members [18]. Total quality management also engages all organisation staff members in the process of covering customers' expectation through utilising problem solving methods to enhance the quality of all organisational products and services. The main focus of total quality management philosophy is to achieve a comprehensive integration among organisational staff and their functions in order to gain better enhancement, progress and preservation of products and services quality to achieve customer satisfaction [19]. Measurement of performance is considered as an essential element at all managerial approaches. Cost and quality are the two main measurements of organisational performance which directly affected by the total quality management practices. Author [20] agreed that applying various TQM practices such as training, process management, customer management, etc. influence employees performance which then directly affect the whole organisation performance. TQM greatly influence the organisational performance especially in their financial performance [21].

Kaizen uses visual management tools to display the process visually, allowing employees to easily view the process, there by facilitating participation [22]. Kaizen means continuous process of improvement which engages top management of a company, management staff and all employees. It requires relevant changes in people's behaviour and authority based on experience, authority of leader. Kaizen is based on assumption that all employees possess skills which can be used in a better way [23]. According to Stanford**,** a benchmarking process is described as the process of identifying leaders in the field so that the practice of these leaders may be understood and emulated. The benchmark is considered as the point of comparison. Another important point in benchmarking is to understand the processes by which performance can be enhanced, rather than simply to copy

another process, as what is best for one organisation may be disastrous for another [24]. Currently, the use of the term is often compromised by limiting it to a simple comparison of outcomes, whereas it should really be taken further, to promote discussions among front-line professionals on their practices in order to stimulate cultural and organizational change within the organizations being compared [25].

2. Data and Methods

The selection of enterprises for questionnaire research was carried out in various sectors of the Slovak economy such as the engineering, automotive and electrical industries, which were rated as one category, the woodworking industry (cellulose-paper, wood and furniture industry), the building industry, agriculture, other industry, trade and services. In addition to managing change, research was also geared to regular monitoring of logistics processes, to the use of selected new concepts and methods for their improvement in enterprises in different industries. General questions of questionnaire research were evaluated by descriptive statistics and were focused on the survey of the average number of employees, the subject of business, the share of domestic and foreign capital, the membership of the sector and the return on equity (ROE).

The data was obtained through an on-line research questionnaire and a direct managed interview with managers of randomly selected businesses. The first database of enterprises was data from the Statistical Office of the Slovak Republic, which was subsequently verified by Internet databases for the purpose of selecting existing enterprises. In total, 2,555 enterprises in selected industrial branches of the SR were contacted after the mentioned modifications and an on-line questionnaire was sent to them. The questionnaire was completed by 524 companies, which were a relevant research sample with sufficient explanatory power. The questionnaire was completed by 524 companies, which were a relevant research sample with sufficient explanatory power. According to the calculation of the minimum statistical research sample through the online application at www.raosoft.com, this is a representative sample at 99% confidence level and 4% standard deviation. The questionnaire was published on-line and data collection took place in November 2016 - March 2017.

A total of 524 enterprises were evaluated, including 159 enterprises that regularly monitor and improve logistics processes. In connection with the monitoring of logistics processes and the use of selected new concepts and methods for their improvement, we investigated the dependence on the achieved ROE value. Selected answers from the questionnaire have been processed and evaluated by chosen statistical method: descriptive statistics, contingent method, and Chi-quadrat test. The Pivot Table is a method of organization and analysis data by groups, categories, or classes that allows you to compare them. It combines the division of the two variables and represents the

extension of a simple frequency table [26]. To determine statistical dependencies, the Pearson Chi-quadrat test was used as the most common test of relevance of the relationship between qualitative variables. The data were processed using STATISTICA (data analysis software system), version 12th [27,28].

Description of the Basic Data Sample

Table 1 shows the results of questionnaire research in absolute and relative numbers, which are focused on finding the average number of employees, subject of activity, ownership of companies, return on equity (ROE), as well as sectoral characteristics of enterprises in terms of logistics processes.

The largest percentage of enterprises that regularly monitor and improve logistics processes, with 37.70% employing between 0 and 10 employees, then 18.87% of enterprises with more than 250 employees. Enterprises in size from 51 to 250 employees regularly monitor and improve logistics processes in the relative number of 18:24% and enterprises employing 11 to 20 and 21 to 50 employees 15.9

Table 1 Basic characteristics of rated enterprises in terms of regular monitoring of logistics processes Source: authors

The number of employees	Absolute frequency	Relative frequency %
0 - 10 employees	52	37.70
11 – 20 employees	24	15.09
21 – 50 employees	24	15.09
51 -250 employees	29	18.24
Over 250 employees	30	18.87
Subject of activity		
Production	63	39.62
Business activity	40	25.16
Provision of services	46	28.93
Distribution and transport	10	6.29
The ownership of enterprises		
Net domestic capital	101	63.52
Prevailing domestic capital	17	10.69
Prevailing foreign capital	26	16.35
Net foreign capital	15	9.43
ROE – Return of Equity		
ROE < 0	10	6.29
0 % - 2%	32	20.13
2 % - 4 %	29	18.24
4 % - 7 %	41	25.79
7 % - 10 %	21	13.21
Over 10 %	26	16.35

%. Regarding the main subject of the enterprise's activity, we found out from the research results that the most participating companies, which regularly monitor and improve the logistics processes, are manufacturing enterprises 39.62%, enterprises providing services 28.93%, then enterprises engaged in business activities with 25.16 %. The lowest percentage was recorded in distribution activities and transport of 6.29%. Regarding enterprise ownership, 63.52% of enterprises with net domestic capital regularly monitor and improve logistics processes, 16.35% of enterprises with predominantly foreign capital, mostly domestic 10.69% and net foreign 9.43%. Based on the ROE - Return on Equity research results, 6.29% of enterprises that regularly monitor and improve logistics processes have a negative ROE value. Positive ROE ranges from 7 to 10% to 13.21% of enterprises monitoring and improving logistics processes, followed by groups above 10% ROE with 16.35%, from 2% to 4% ROE with 18.24%. The largest share of 25.79% of enterprises that monitor and improve logistics processes has reached a group of enterprises with a ROE of 4-7%.

3. Results

Based on research results, besides manufacturing, non-productive service processes, purchasing and procurement processes, business and distribution processes, marketing and CRM processes, regularly monitors and improves logistics processes 159 enterprises, accounting for 30.34% of the total surveyed enterprises 524. On this issue, companies have more options for response.

3.1 Results of Research into the Basic Characteristics of the Evaluated Enterprises

As can be seen in Figure 1, the smallest percentage of enterprises that monitor and improve logistics processes were in the agricultural sector 1.89%, 8.81% and 13.21% were recorded in the other industry and engineering, automotive and electrical industries. Enterprises of wood-processing industry as a whole reached 18.24%. Regular monitoring and improving logistics processes are the most dedicated companies to trade with 20.13% share and business services with 25.16% share.

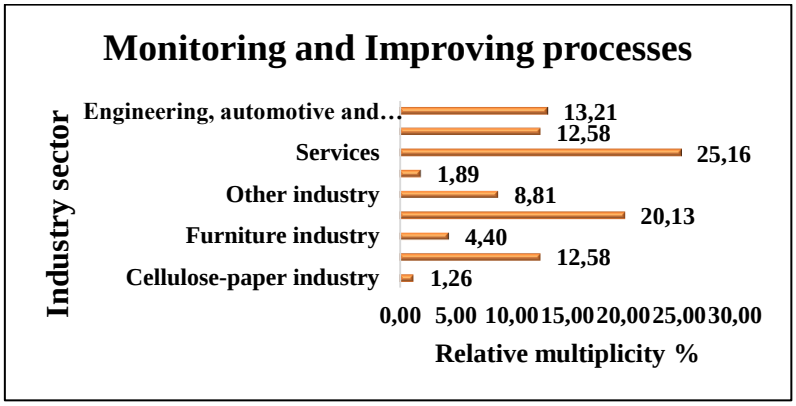

Fig. 1 Regular monitoring and improvement of logistics processes. Source: authors

3.2 Results of Research on Regular Monitoring of Logistics Processes, Sse of Concepts and Methods of Improving Logistic Processes Relative to ROE

Table 2 is a contingency table showing the use of selected concepts and methods for improving logistics processes in relation to the ROE indicator for 159 enterprises that regularly monitor logistics processes. It contains 215 answers, including the answer that enterprises do not use any of the above concepts and methods.

Table 2 The contingency of use of concepts and methods and the amount of ROE. Source: authors

New concepts and methods	Value ROE					
	< 0%	**0% - 2%**	**2% - 4%**	**4% - 7%**	**7% - 10%**	**> 10%**
BSC	0	3	2	2	2	4
Six Sigma	2	4	1	3	4	2
Process Controlling	3	4	6	7	7	10
TQM	3	3	4	7	4	5
Kaizen	3	4	2	9	4	4
Benchmarking	0	1	2	7	5	5
No*	5	20	17	17	6	12
SUM	16	39	34	52	32	42

*Enterprises do not use any of these concepts and methods

Based on the results of the contingency intensity through the Chi-quadrate test, we can conclude that the coefficient is 0 when both characters are independent. This means that the dependence of the ROE indicator and the use of selected concepts and methods to improve logistics processes has not been confirmed. In the sample under review, 48.43% of businesses replied that they did not use any concepts and methods to improve logistics processes. The ratio of businesses using and not using new concepts and methods can be seen in Figure 2.

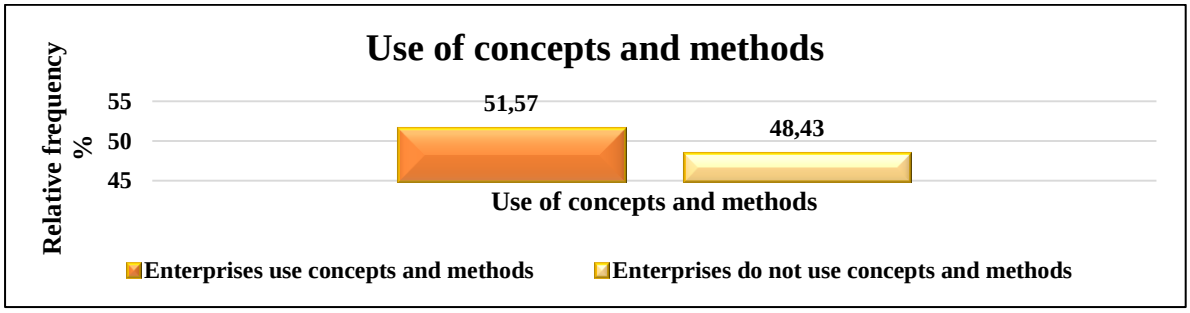

Fig. 2 Relative frequency of enterprises using and not using selected new concepts and methods to improve logistics processes. Source: authors

4. Discussion

Figure 2 shows that 51.57% of enterprises use new concepts and methods to improve logistics processes. From a sample of 159 enterprises, 82 enterprises replied that they used the selected

concepts and methods to improve logistics processes, and 77 enterprises that answered that they did not use any of these concepts and methods were excluded from the assessment and focused only on companies using concepts and methods process improvement. Enterprises had multiple responses. There was 1.68 responses per enterprise. This means that some businesses use more than one concept or method to improve their logistics processes. Figure 3 presents the relative frequency of use of concepts and methods in relation to the value of the ROE indicator.

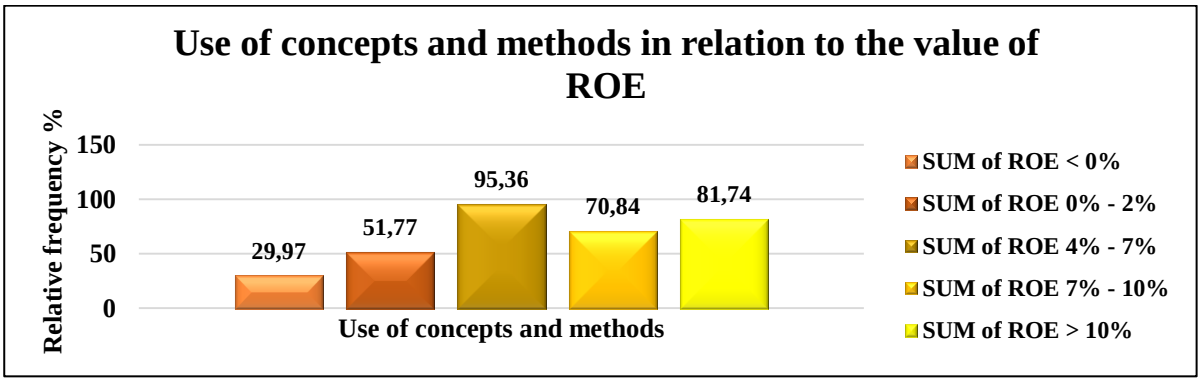

Fig. 3 Relative frequency new concepts and methods to improve logistics processes in relation to the value of ROE. Source: authors

As shown in Figure 3, the level of the indicator ROE is not directly proportional to the relative frequency of use of new concepts and methods to improve the logistical processes as anticipated. Up to 29.97% achieved answers on the use of new concepts and methods in the ROE group of less than 0% and in the ROE group of 0 - 2%. In these groups, concepts and methods for improving logistics processes are either inappropriately selected or used incorrectly. Based on the analysis of the research results, we can conclude that the research results were also influenced by the short time period for which the ROE indicator was monitored. It was only monitored in one year. In further research, it would be appropriate to focus on the ROEs achieved in relation to the use of concepts and methods over a broader timeframe in order to unambiguously confirm the ROE impact and dependence on the use of new concepts and methods for improving logistics processes. The categories ROE of 4% moves the use of concepts and methods for improving logistics processes from 70.84% to 95.36%, which also does not confirm the assumption proportional increase ROE by the relative frequency of use of concepts and methods for improving logistics processes.

5. Conclusion

The use of new concepts and methods to improve not only logistics processes has, according to long-term experience, a positive impact on process performance as well as on enterprises. The research results presented in the article have shown that when enterprises use new knowledge, concepts, methods and tools, they reach higher ROE values. On the other hand, we cannot confirm

that the frequency of their application directly increases the efficiency of processes and enterprises. As mentioned above, this could be due to improper selection of concepts and methods, their incorrect implementation and application in processes, as well as the level of process optimization and improvement.

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