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## The Economic Performance of Logistical Processes in Polish Production Companies

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**Abstract:**

**Purpose:** The main aim of the article is to present the issue of the economic performance of logistical processes and the results of own research on their calculation in Polish manufacturing companies.

**Approach/Methodology/Design:** The undertaken research issues and the set goal determined the choice of research methods, such as critical literature review, questionnaire research of Polish production companies, analysis and synthesis methods.

**Findings:** A reliable system for measuring the economic performance of the company's logistical processes and the valuation of individual types of resources is undoubtedly a condition for the success of a manufacturing company's policy.

**Practical Implications:** It was established that for each type of resource (logistics infrastructure, material and financial resources and human capital) there is a significant dependence of its valuation depending on the calculation of the economic performance of logistical processes. The results can be used to develop a long-term strategy on the development of Polish production companies.

**Originality/Value:** The proposed solutions are to contribute to the development of Polish production companies.

**Keywords:** Economic performance, management of logistical processes, logistics in production companies.

**JEL classification:** D1, L6, M2.

**Paper Type:** Research article.

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## **1. Introduction**

Dynamically progressing changes in the world economy are forcing production companies to constantly improve their functioning, both in terms of management and in the field of production (Pacana, Czerwińska, and Grebski, 2021). Therefore, enterprises are looking for new management tools (including logistics management) and methods of measuring effectiveness (Hajduk-Stelmachowicz, 2001; Piętowska-Laska, 2012; Hajduk-Stelmachowicz, 2018; Szydełko and Szydełko, 2013). Inquiries related to the nature, measurement and assessment of economic efficiency in the context of enterprise management are very intense (March and Sutton, 1997).

One of the goals of the proper management of a production company is to constantly increase the level of economic efficiency in the area of logistics. Efficiency is the basic parameter used to define and assess the state of functioning of an economic entity and its development opportunities. It can be analyzed according to various points of reference, depending on the specifics and needs of a given enterprise.

The effectiveness of the entire enterprise depends on the effectiveness of individual processes and activities. The main aim of the article is to present the issue of economic efficiency of logistical processes and the results of our own research on their calculation in manufacturing companies. The results presented in the study constitute a fragment of a broader scope of research, also including: conditions of controlling logistical processes and cost measures in the assessment of logistical processes in production companies (Belch and Belch 2020; Belch, 2021).

## **2. Economic Efficiency of Logistical Processes**

In the literature on the subject, the concepts of efficiency and effectiveness have very broad meanings and are not clearly defined (Milewski, 2013). According to Helms (2006) the difference in understanding these concepts is that efficiency refers to doing things the right way and effectiveness refers to doing the right things. Economic efficiency can be defined as the ability of processes and systems to effectively implement the adopted plans, while ensuring their cost-effectiveness, as well as the relationship between the achieved result and the resources used (Łunarski, 2014).

Economic efficiency is a quantitative category. It characterizes the technical and economic side of the undertaken undertakings. Therefore, natural or valuable units are used for its measurement, which correctly reflect the technical and operational properties of inputs (Nowak, 1998). The logistics system and logistical processes are already described in detail in literature on the subject (Malindzak, 2015; Ghianii, 2013). The economic efficiency of the logistical process is a measure that determines the relation between the achieved results of the logistical process (goals defined, e.g., as profit, sales results, warehouse turnover, transport performance of means of transport) and the resources used in this process. Measurement of the effectiveness of logistical processes should relate to such aspects as: reductions in process costs,

including appropriate management of the organization's resources, increases in the quality of processes and final products, and reduction of the time of the process, including improvement of the process flexibility (Ryńca, 2009).

To measure the effectiveness of logistical processes, quantitative index methods are used, which are based on indicators or synthetic measures and partial, and enable the identification, measurement and evaluation of economic and / or non-economic effects (Lichtarski, 1997).

Measurement and evaluation of the efficiency of logistical processes is a source of knowledge for the company about solutions that generate costs, lead to deviations, an information flow in individual logistical processes, as well as the profitability of individual processes, products and customers (Gębczyńska, 2012).

All logistical phenomena and processes must be subject to economic and efficiency verification and evaluation both in relation to the past and the future. The appropriate tools in this regard are the methods of economic analysis which make them possible (Skowronek and Sarjusz-Wolski, 2012):

- assessment of the actual state of logistical phenomena and processes,
- identifying and explaining the sources and causes of any irregularities,
- defining a short-term forecast of the development of particular phenomena and processes, formulation of conclusions and projects, the implementation of which will allow to eliminate irregularities and ensure progress in management efficiency.

For the purposes of the article, it was assumed that economic efficiency at the level of logistical processes can be presented using the formula:

$$P_{elp} = \frac{\text{the effects of logistical processes}}{\text{logistical process costs}}, P_{elp} > 1 \quad (1)$$

Assuming that:

$P_{elp}$  – Economic performance of logistical processes

*The effects of logistical processes* - include, among others parameters such as profit, sales results, service levels, warehouse turnover, transport performance of means of transport);

*Logistical process costs* - include all costs related with the performance of all activities that make up a specific process.

### **3. Research Methodology**

The project of goal-oriented empirical research required the use of research instruments. Therefore, a questionnaire (in electronic or postal form) was used.

The first stage was a pilot study conducted on the basis of a questionnaire survey on a sample of 4 companies. Thanks to the implementation of this study, the research tool was verified and methodological information was obtained, which undoubtedly improved the course of the research process. The next stage included questionnaire research, essential for identifying the research areas of the author's interest.

The questionnaires were filled in by the person responsible in the company for the functioning of controlling (logistics), and if this was not possible, then by the head of the financial department, logistics manager or a representative of the general management. These are people who have the greatest knowledge of finance and logistics in the surveyed business units. The researched companies were characterized on the basis of the following criteria:

- the size of the enterprise measured by the number of employees,
- organizational and legal form,
- degree of internationalization of economic activity.

The research sample consisted of production companies with an implemented quality management system compliant with the PN-EN ISO 9001: 2015 and PN-EN ISO 9001: 2009 standards, whose headquarters or branches are located in the Podkarpackie Province. The group was selected in a non-random, purposeful manner.

The research tool was sent to companies that have a valid quality certificate. This assumption was aimed at reaching those enterprises which should, in accordance with the requirements of ISO 9001, adhere to the rules of the process approach. According to this standard, enterprises should "establish, implement, maintain and continuously improve a quality management system including the necessary processes and their interactions".

Questionnaires with cover letters were sent to 128 companies. The data collection stage was carried out from November 19, 2018 to January 19, 2019. Finally, completed questionnaires were obtained from 44 companies, which gives a response rate of 34.38%. After initial verification of the completed questionnaires, it turned out that not all of them were complete. Consequently, 42 questionnaires completed by the companies were ultimately accepted for the analysis of the results, representing 32.81%.

Taking into account the criterion of the size of the studied entities, it should be pointed out that the majority (54.8%) of the participants of the conducted research were large enterprises. This fact results from the non-random, deliberate sample selection. The structure of the respondents, taking into account their size, is presented in Table 1.

Another criterion was the organizational and legal form of the enterprise. In this case, the majority were limited liability companies (73.8%) and joint-stock companies

(19%). The distribution of research participants according to their organizational and legal form is presented in Table 2.

**Table 1.** Structure of the surveyed enterprises in terms of size

The size of the enterprise	Number of enterprises	% of enterprises
Large enterprises (over 250 employees)	23	54.8
Medium-sized enterprises (51-250 employees)	18	42.9
Small enterprises (10-50 employees)	1	2.4
Micro enterprises (1-9 employees)	0	0.0

*Source:* Own research based on the results of research in enterprises.

**Table 2.** Structure of the surveyed enterprises according to their organizational and legal form

Organizational and legal form	Number of enterprises	% of enterprises
Limited liability company	31	73.8
Joint-stock company	8	19
General partnership	1	2.4
A partnership	1	2.4
A sole proprietorship	1	2.4

*Source:* Own research based on the results of research in enterprises.

As part of the research, participants were also divided according to the degree of internationalization of economic activity. In this way, four categories of entities were distinguished: domestic, international, multinational and global enterprises. The distribution of the surveyed enterprises according to the degree of internationalization is presented in Table 3.

**Table 3.** Structure of the surveyed enterprises according to the degree of internationalization of economic activity

The degree of internationalization of economic activity	Number of enterprises	% of enterprises
International enterprise	19	45.2
National enterprise	16	38.1
Global enterprise	5	11.9
Multinational enterprise	2	4.8

*Source:* Own research based on the results of research in enterprises.

The research participants were dominated by international (45.2%) and domestic (38.1%) enterprises. Global enterprises accounted for 11.9% of respondents, and multinational enterprises for 4.8%.

Summarizing the characteristics of the surveyed production companies, it can be stated that, most often in the surveyed sample, there are large or medium-sized enterprises,

which are limited liability companies or joint stock companies. They were most often represented by top management or the middle management level.

#### 4. Research and Findings

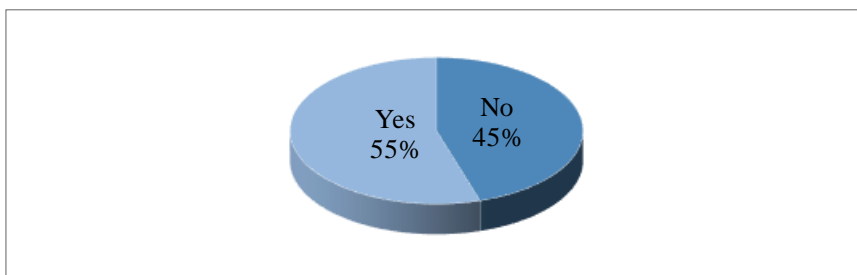
Among all respondents, as many as 32 companies, i.e., 76.2%, confirmed that they have separate processes in the area of logistics. Among them, as many as 25, i.e., 78.1% declared that they were separated in a formal (documented) manner, and 21.9% - informally. In turn, 10 participating enterprises stated that there are no separate logistic processes in the study. As part of the supply logistics processes in production companies, the following were most often indicated:

- internal transport - 90.6%,
- storage - 78.1%,
- external transport - 65.6%.

The leading process within the production logistics subsystem was the organization of production - 90.6%. Other processes include: storage and internal transport - 37.5%. An additional process indicated by the respondents was quality management - 3.1%. Within the distribution logistics subsystem, the following were distinguished: customer service - 65.6%, waste management - 59.4%, external transport - 59.4%. In the category of storage and internal transport - 50% were indicated.

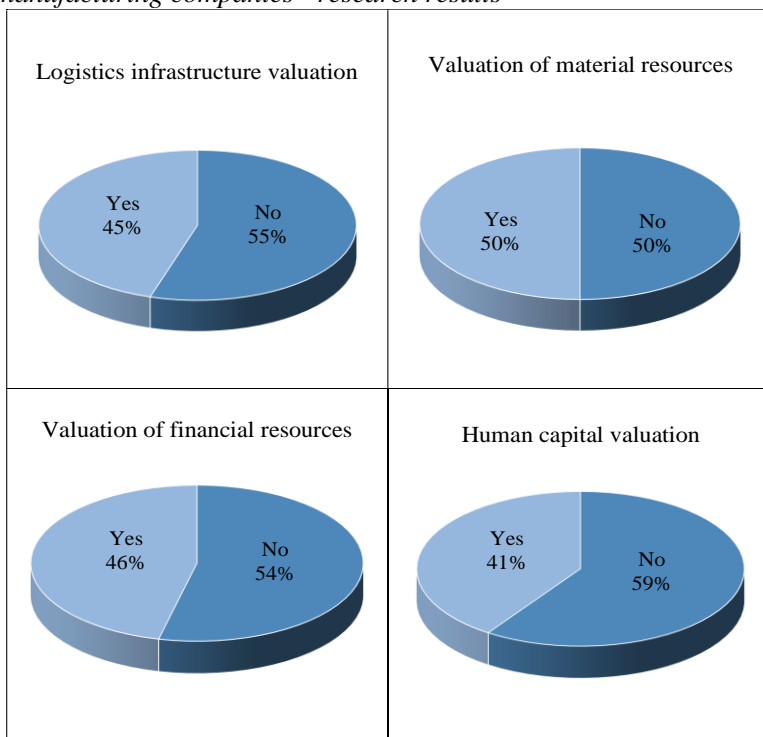
The mere possession of resources does not guarantee the achievement of the appropriate economic efficiency of the enterprise. The way of managing these resources and their valuation are important. Therefore, another aspect of the survey was the calculation of the effectiveness of the logistical processes in enterprises - Figure 1, and the valuation of individual types of resources related to logistical processes - Figure 2. More than half of the respondents (55%) indicated that their companies calculate economic efficiency logistics processes.

**Figure 1.** Calculation of the economic efficiency of logistical processes in enterprises - research results



**Source:** Own research.

**Figure 2.** Valuation of individual types of resources related to logistical processes in manufacturing companies - research results



Source: Own research.

In order to determine whether there is a difference in the valuation of individual types of resources related to logistical processes in enterprises that make or do not calculate the economic efficiency of logistical processes, an independence test was carried out. Its results in this respect are presented in Table 4.

**Table 4.** Results of the independence test for the valuation of individual types of resources depending on the calculation of the economic efficiency of logistics processes in enterprises

	Statistical analysis results				Dependency assessment
	Chi <sup>2</sup>	df	Chi <sup>0,05</sup>	p-value	
Logistics infrastructure valuation	22.38	1	3.84	0,0001	It depends
Valuation of material resources	21.62	1	3.84	0.0001	It depends
Valuation of financial resources	21.27	1	3.84	0.0001	It depends
Human capital valuation	8.78	1	3.84	0.030	It depends

Source: Own research.

It was established that for each type of resource (logistics infrastructure, material and financial resources and human capital) there is a significant dependence of its valuation depending on the calculation of the economic efficiency of logistical processes.

## 5. Conclusions

In production companies, various decision problems arise that appear during the operation of subsystems such as production logistics, supply logistics, distribution logistics (Siwiec and Pacana, 2019). A reliable system for measuring the economic efficiency of the company's logistical processes and the valuation of individual types of resources is undoubtedly a condition for the success of a manufacturing company's policy. It is also worth considering innovations, including innovations at the level of logistical processes. "Process innovations usually do not bring an immediate competitive advantage but the basis for obtaining the company's long term position. In principle, it is the optimization of all defined business processes of strategic and operational importance in order to increase efficiency using systematic improving of the activities aimed at cost avoidance or increasing performance" (Havlicek, Thalassinou, and Berezkinova, 2013).

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