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CONTROLLING OF LOGISTICS IN PRODUCTION ENTERPRISES WITH SEPARATED PROCESSES OF LOGISTICS IN THE CONTEXT OF EMPIRICAL RESEARCH

CONTROLLING LOGISTYKI W PRZEDSIĘBIORSTWACH PRODUKCYJNYCH Z WYODRĘBNIONYMI PROCESAMI LOGISTYCZNYMI W KONTEKŚCIE BADAŃ EMPIRYCZNYCH

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Summary: The article presents selected research results regarding the conditions for controlling of logistics processes in manufacturing enterprises. The research goal was to determine the relationship between the occurrence of such controlling and the separation of logistics processes in enterprises. The research issues undertaken determined the choice of research methods, such as literature review and survey research. The implementation of logistics controlling is associated with the isolation of logistics processes, as evidenced by the result of the Chi² independence test. This means that in process-oriented enterprises there is logistic process controlling. Logistics controlling is a broader concept, covering logistics in functional terms at every level of the institutional criterion, both micrological, metalogistic and macrollogical.

Keywords: controlling of logistics processes, controlling of logistics, controlling of processes, manufacturing company, logistics processes.

Streszczenie: W artykule zaprezentowano wybrane wyniki badań dotyczące uwarunkowań funkcjonowania controllingu procesów logistycznych w przedsiębiorstwach produkcyjnych. Celem badawczym było ustalenie zależności między występowaniem controllingu logistyki a wyodrębnieniem procesów logistycznych w przedsiębiorstwach. Podjęta problematyka badawcza zdeterminowała wybór metod badawczych takich jak przegląd literatury oraz

badania ankietowe. Wdrożenie controllingu logistyki jest powiązane z wyodrębnieniem procesów logistycznych, na co wskazuje wynik przeprowadzonego testu niezależności χ^2 . Oznacza to, że w przedsiębiorstwach zorientowanych procesowo występuje controlling procesów logistycznych. Controlling logistyki jest pojęciem szerszym, obejmującym logistykę w ujęciu funkcjonalnym na każdym poziomie kryterium instytucjonalnego, zarówno mikrologistycznym, metalogistycznym i makrologistycznym.

Słowa kluczowe: controlling procesów logistycznych, controlling logistyki, controlling procesów, przedsiębiorstwo produkcyjne, procesy logistyczne.

1. Introduction

Controlling is an important element of supporting business management. Unfortunately, it is not a tool used in all enterprises. It combines all areas related to decision-making at strategic and operational level. It also integrates individual areas of business operations, focusing on the right flow of information.

There are many opinions on what exactly is controlling. Its understanding and definitions are different both in literature and in practice, and is also described in detail in both Polish and foreign literature. Despite many publications on this subject and constant interest in the topic of controlling by practitioners and theorists, issues in the field of controlling are still to be put in order.

Global economic development and changes in the functioning of products for processing, dynamic changes in the approach to process management, as well as various diversified products, increased customer service requirements, and shortening the life cycle of products carry the functions of performance management and efficiency of the flow of ingredients, finished products and information. Such expectations can undoubtedly be met through organized and efficiently managed logistics taking into account the requirements for production companies in various unpredictable services, whose role does not include functionality. Therefore, logistics should be evaluated in terms of processes.

2. Controlling of logistics processes – a theoretical study

A review of the definitions and types of controlling presented in the literature allows to recognize that controlling implements the process of collecting, developing and providing information necessary for the decision-making process in an enterprise. Depending on the tasks and functions performed, various criteria for the division of controlling in the enterprise can be distinguished.

Controlling of logistics is part of the control of a company, which provides the necessary tool in achieving its objectives. In the literature many definitions of controlling of logistics can be found¹, as presented in Table 1.

¹ The authors mostly used in this study the term “controlling” for the issue under discussion, although in the international scope the term “management accounting” is used (see Szychta, 2009, p. 82).

Table 1. Summary of controlling of logistics definitions in chronological order

Author	Year	Definition
G.B. Ihde	2001	Takes over the task-oriented coordination of planning, command and control chain of services and to provide information.
H.F. Binner	2002	Collection of elements of management takes into account all levels and processes that are used in the planning, control and monitoring activities and logistics costs revenue. The main goal is to provide information at all levels of the organization so that logistics decisions are correct.
H. Ehrmann	2003	Any measures and instruments resulting from the purpose of the enterprise needed to obtain the optimal product flow within the processes which translates into the results. These tools are included from the time of delivery elements of productive asset and information, followed by processing and management to distribution.
J. Piontek	2003	Logistics management support by preparing and providing information as part of planning, coordination and control.
H. Pfohl	2004	Application of controlling tasks in the area of enterprise logistics. Controlling of logistics is a functional controlling subsystem that supports logistics management.
P. Ceniga, V. Sukalova	2011	All activities in the area of enterprise logistics whose aim is to optimize logistics costs.
R. Kowalak	2011	Controlling of logistics is a part of controlling which is responsible for planning and controlling the effective flow and storage of raw materials, goods and finished products, as well as ensuring appropriate information related to their delivery and collection in order to meet the clients' requirements.
Y. Wu, X. Wang	2020	Uses methods applied in the broadly understood logistics. Plans, controls, among others, order volume and optimization, analyzes sales areas.

Source: own study based on (Binner, 2002, p. 253; Ehrmann, 2003, p. 25; Ihde, 2001, p. 331; Pfohl, 2004, p. 201; Kowalak, 2011, p. 80; Ceniga and Sukalova, 2011, pp. 409-418; Piontek, 2003, p. 165; Wu, and Wang, 2020; cf. Belch, 2016, pp. 32-41).

A review of the definition of controlling of logistics indicates problems in its characteristics. The heterogeneity of approaches results from the lack of a universal definition of both logistics and controlling. In this regard, each author highlights different, in his/her opinion, important aspects. A common feature of the definitions of controlling of logistics presented in the literature is decision support for people and a tool to improve processes.

For the purpose of achieving the assumed goal, an original definition of controlling of logistics was adopted, understood as a tool supporting management in functional terms in the scope of implementation of logistics processes, including projects ranging from obtaining raw materials, through technological processes occurring in the area of production logistics, to the delivery of finished products to the final customer. This tool should be supported by appropriate information, material flows and financial flows.

Increasingly, one can find companies that base their activities on logistics management and with the help of controlling of logistics supervise the costs of transport, storage, and shipping, as well as the costs of production planning, waste management and data processing. This means that controlling of logistics is treated as a comprehensive tool for assessing a given company's management system.

The positive financial results achieved by an enterprise is not linked with incurred costs and revenues, but rather is the result of implemented processes that contribute to costs and revenues. It should also be emphasized that the introduction of process controlling is closely related to the progressive orientation of management systems on processes implemented in the enterprise (Nowak, 2003, p. 14). Therefore, process controlling is becoming a significant factor in business management.

There are many definitions of process controlling in the literature. According to Obermeier, Fischer, Fleischmann, and Dirndorfer (2014, p. 40), it is an instrument supporting process management that enables their identification, measurement, monitoring and improvement, mainly using process cost accounting. In other terms (Błoński and Stausberg, 2003, p. 23), this instrument is referred to as a system that skillfully supports those responsible in planning, controlling, providing information and coordinating processes. Fink (2013, pp. 28-29) suggests that it can also be described as a tool for improving business process management by introducing their planning, steering and control. Its main goal is to optimize the course of economic processes from the point of view of specific final results. Particular attention should be paid to the economic processes that determine the competitive advantage of an enterprise.

It should also be emphasized that the introduction of process controlling is closely related to the progressive orientation of management systems on processes implemented in the enterprise. For the purposes of the article, it has been assumed that the task of process controlling is to inform managers about processes through their planning, evaluation, control and improvement. In process controlling, various management tools should be used, including: activity cost management, activity-based budgeting, reconstruction of business processes, and strategic scorecard.

The analysis of the definition of controlling of logistics and process controlling allows to state that in the case of the former the enterprise is considered in terms of functionality, whilst in the latter from a process point of view. Controlling of logistics processes is an overlapping part of controlling of logistics and process controlling, as shown in Figure 1.

For the purpose of achieving the required goal, it was assumed that controlling of logistics processes is an instrument that supports the management of logistics processes, allows their identification, measurement, monitoring, assessment of process efficiency and their improvement.

The main tasks of controlling of logistics processes can be defined as collecting and sharing information and knowledge about logistics processes, their evaluation and monitoring. Therefore, the tasks of controlling of logistics processes include the assessment and control of these processes, with the help of appropriate meters.

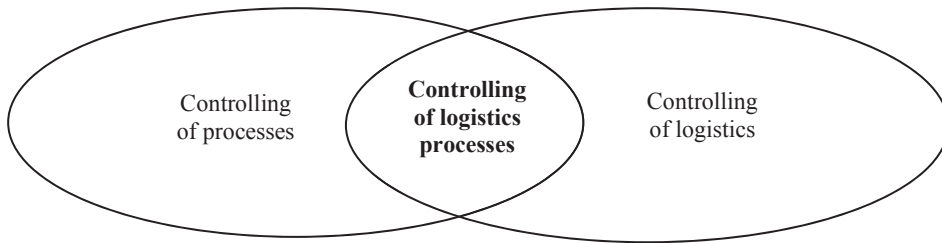


Fig. 1. Logistics process controlling as a system composed of controlling of processes and controlling of logistics

Source: own study.

Summing up the tasks of controlling of logistics processes, it can be stated that it includes all activities aimed at improving the flow of raw materials, materials, finished products and information. Its most important tasks include the coordination of processes in logistics subsystems (in the sphere of supply, production and distribution), measuring the effectiveness of subsystems and logistics processes, thanks to a suitably adapted system of indicators and measures, elimination of bottlenecks, as well as cost planning and control of logistics processes.

3. Controlling of logistics and controlling of logistics processes in enterprises – results of empirical research

An important aspect in achieving the assumed goal was to examine the conditions for the functioning of controlling of logistics processes in manufacturing enterprises. The surveyed enterprises were characterized based on the following criteria:

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

Taking into account the criterion of the size of the surveyed entities, it should be pointed out that the majority (54.8%) of the participants in the conducted research are large enterprises. This fact results from a non-random, deliberate selection of the sample. The structure of respondents, taking into account their size, is presented in Table 2.

Table 2. Structure of the surveyed enterprises by size

Enterprise size	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

Source: own study based on research results.

The next 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 the participants by organizational and legal form, is shown in Table 3.

Table 3. Structure of the surveyed enterprises by 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
Partnership	1	2.4
Sole proprietorship	1	2.4

Source: own study based on research results.

As part of the conducted research, the participants were also divided according to the degree of internationalization of economic activity. In this way four categories of entities were distinguished: national, international, multinational and global enterprises. The distribution of the surveyed enterprises according to the degree of internationalization is presented in Table 4.

Table 4. Structure of the surveyed enterprises according to the degree of internationalization of economic activity

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 study based on research results.

The survey participants are dominated by international (45.2%) and domestic (38.1%) enterprises. Global enterprises constitute 11.9% of respondents and multinationals 4.8%.

It should be emphasized that in the studied sample the majority were large or medium-sized enterprises, which are limited liability or joint-stock companies. They were most often represented by top management or middle management.

The research sample consisted in manufacturing companies with an implemented quality management system in accordance with the PN-EN ISO 9001:2015 and

PN-EN ISO 9001:2009² standards, whose headquarters or branches are located in the Podkarpackie Voivodeship. The group was selected in a non-random manner.

The survey used a questionnaire in electronic or letter form. The first stage was a pilot study based on a questionnaire survey on a sample of four companies. Thanks to this research, the research tool was verified. The questionnaires were completed by the person/s responsible in the company for the functioning of controlling (logistics), and if it was not implemented, then by the head of the finance department, logistics manager or a member of the management. These are the people who have the most knowledge about finance and logistics in the surveyed business units.

The research tool was sent to companies that have a quality certificate. This assumption was aimed at reaching those enterprises that should, in accordance with the requirements of PN-EN ISO 9001:2015, comply with the rules of the process approach. According to this standard, enterprises should “establish, implement, maintain and constantly improve the quality management system including the processes needed and their interaction”.

The survey questionnaires with covering letters were sent to 128 companies. The data collection stage was carried out from 19 November 2018 to 19 January 2019; 42 questionnaires completed by enterprises were adopted for the analysis of results, which constitutes 32.81%.

The results obtained from the surveys show that 33 enterprises participating in the survey have a separate controlling cell, whereas nine surveyed enterprises do not have controlling implemented.

It should be noted that among the companies declaring the functioning controlling these were mainly functional controlling (17) and company controlling³ (15). The next aspect of the research was the identification of functional areas for which controlling was distinguished. Figure 2 presents the results of the surveys regarding the studied enterprises.

Functional controlling spheres include finance (57.6%) and logistics (51.5%). The percentage of respondents who chose these two areas is significantly higher than the percentage of respondents choosing the next in terms of popularity of the studied sphere. It should be emphasized that research and development (6.1%) are the least frequently indicated, followed by quality (12.1%) and HR (15.2%).

One of the considered aspects were processes in the area of logistics in the surveyed enterprises. Among all respondents, 32 enterprises, or 76.2%, confirm that they have separate processes in this area, and of these, 25, or 78.1%, declare that they are separated in a formal (documented) manner, while 21.9% in an informal manner. In turn, ten enterprises participating in the survey do not have separate logistic

² From the perspective of the purpose and subject of the research, such a distinction has no effect on the shape of the conclusions. Despite the introduced differences, both standards apply to companies with an implemented process approach. The main assumption was that the companies participating in the study had separate processes.

³ Enterprise controlling – performing tasks of controlling for the entire enterprise.

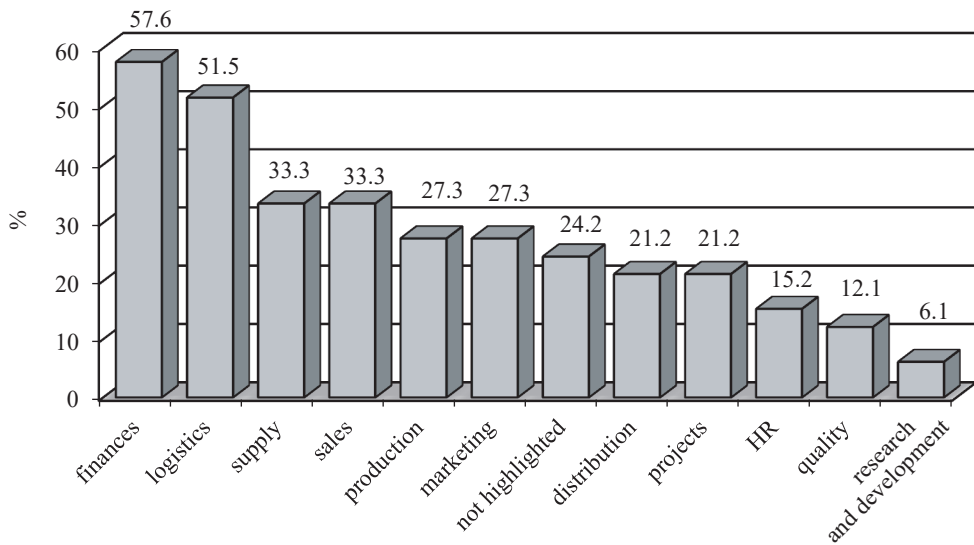


Fig. 2. Functional areas in which controlling in enterprises was distinguished – research results

Source: own study.

processes. Logistic processes are distinguished in the analyzed enterprises in the areas of supply logistics, production and distribution.

From the perspective of achieving the assumed goal, it is important to establish the relationship between the occurrence of controlling of logistics and the separation of logistics processes. Table 5 presents the results of the independence test for assessing the implementation of the controlling cell depending on the processes of logistics identified. There was a significant relationship between the aspects examined.

Table 5. Results of the independence test for assessing the implementation of the controlling of logistics cell depending on the fact of isolating logistics processes

	Statistical analysis results				Dependency assessment
	Chi ²	df	Chi ^{0,05}	p-value	
Separation of the controlling of logistics cell	13,03	1	3,84	0,0001	depends

Source: own study.

Based on the research carried out on the conditions of functioning of controlling of logistics processes in enterprises from the Podkarpackie Voivodeship, the following conclusions can be drawn.

In most enterprises there is a separate controlling department. Functional controlling is the most common type of controlling used. The vast majority of the analyzed entities also use strategic controlling.

The two most frequently indicated areas of controlling are finance and logistics. Therefore, it can be concluded that these are the most important functional areas in most of the surveyed enterprises. The implementation of controlling of logistics is associated with the separation of logistics processes, which is indicated by the result of the independence test. This means that controlling of logistics processes occur in these enterprises.

The results of empirical research also confirm that in enterprises with separate processes under controlled applications there are instruments assigned to the control of logistics processes. Most often these are indicator-oriented processes focused on management reporting as well as budgeting and cost control of logistics processes. In addition, the units surveyed measure, monitor and evaluate the effectiveness of logistics processes.

4. Conclusion

Based on the analysis of the literature on the subject and own research, it can be stated that controlling of logistics is mistakenly identified as controlling of logistics processes and these terms are used interchangeably or the term is not defined at all (see Cieśla and Gąska, 2016, pp. 81-88). This is a misguided simplification, because controlling of logistics processes applies only to enterprises with separate processes and is considered at the micrological and metalogistic level. In addition, controlling of logistics processes is adapted to the logistics of processes implemented in the company, supports them, shapes them and allows for their assessment by means of a suitably adapted meter system.

At micrological level, controlling of logistics processes includes logistics of processes in the enterprise and the relationships between these processes. In turn, at metalogistic level it supports both the logistics of processes at enterprise level and the relationship between the enterprise and its suppliers and customers.

Controlling of logistics is a broader concept, including logistics in functional terms at every level of the institutional criterion, both micrological, metalogistic and macrological. Controlling of logistics processes, similarly to controlling of logistics, uses diverse management methods and tools.

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