

# Organization of Transport and Storage Processes in Logistics Enterprises Functioning in the Łódź Region – Study Results

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The objective of this article is to try to determine the levels of implementation and the use of modern technologies in selected areas of internal transport and storage. This is primarily due to the very high dynamics of the environment and the increasing level of customer centricity that forces companies to systematically search for new, innovative and competitive solutions, particularly in logistics chain. Such solutions are particularly desirable in strategic areas of logistics, that is: storage and handling. Hence, modern companies increasingly more often decide to implement state-of-the-art solutions that would not only improve the functioning of the entire organization, but first and foremost would bring about competitive advantage on the market.

**Keywords:** relations, management, transport, storage, competitiveness.

## 1. INTRODUCTION

Contemporary innovation-driven economy is pressured by the constant search for unconventional ideas in logistics, production, management, or distribution. More and more logistic companies operating on variable and unpredictable markets see that the main competitive strategies based on low cost, product differentiation or specialization depend primarily on whether these companies are able to innovate, that is the ability to create and implement innovative solutions, through the absorption of state-of-the-art knowledge, information and resources<sup>1</sup>. Most business entities are aware of that, as nowadays being non-innovative makes them bear the biggest cost, which is the loss of the customer<sup>2</sup>.

Practically in all enterprises functioning on the market, storage operations and internal transport

are among the most important economic sectors and the basic elements of the logistics chain. This in turn fosters dynamic development of a wide variety of tools and equipment used in storage-and-handling operations. This in turn happens thanks to innovativeness among the producers of these devices, who also make them easily accessible to users, to a practically unlimited extent. European transportation market is intensely evolving towards liberalization and effectiveness of access, unification of financial, technical, social and economic relations, towards the growth of interoperability and uniform principles of intra- and inter-industry competition. These activities are aiming first and foremost at increasing competitiveness within the transportation system, as well as increasing the effectiveness of transportation<sup>3</sup>. Such approach is visible in the European transportation policy, for which the crucial issue is the implementation of changes in the branch structure of freight transport by shifting some of the freight from roads to rail transport -

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<sup>1</sup> Chieh-Yu L., *Determinants of the adoption of technological innovations by logistics service providers in China*, International Journal of Technology Management and Sustainable Development 2008, Vol. 7, No.1, p.22.

<sup>2</sup> G. Zimon, *Accounting tools vs. logistics costs control in a trading company*, LogForum 2016, Vol. 12, No 2, p.155.

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<sup>3</sup> B. Liberadzki, L. Mindur, *Zarys polityki transportowej państwa*, [w:] *Nowe wyzwania – nowe rozwiązania*, Materiały konferencyjne Polskiego Kongresu Logistycznego „Logistics 2008”, Biblioteka Logistyka, Poznań 2008, p. 238.

which is related to the construction of modern railroad-equipped warehouses. Therefore, the approach to transport processes in the functioning of modern companies is of major importance. Improper and poorly organized logistics processes negatively affect the financial condition of businesses by losing customers and lack of continuity in supply chains.

The main objective of the following article was the attempt to determine the implementation level and the excess of modern technology application in in selected areas of internal transport and storage. Emphasis was placed on identifying events in the implementation of new technologies, their functionality, benefits and barriers resulting from their use, along with prospective implementation plans designed for business development.

## 2. ORGANIZATION OF TRANSPORT AND STORAGE PROCESSES IN LOGISTIC COMPANIES – RESEARCH PURPOSE AND METHODOLOGY

Nowadays, the situation on the market forces the companies to implement and apply in practice new solutions especially in the technological area. It is mainly characterized by a high degree of customer variability - their requirements and expectations in relation to purchased products<sup>4</sup>. The decreasing loyalty of customers makes businesses take efforts to retain them by offering new developed products, at the same time seeking for sources of competitive advantage, optimizing the entire logistics chain. Operations related to using innovative technologies and system solutions allow businesses to reduce costs while maintaining a high level of service quality. This also applies to logistics companies, which due to the growing dynamics of the entire business branch are somehow doomed to implement new technologies. This is particularly evident in the example of companies operating in the Lodz Voivodeship, considered to be a highly competitive and attractive investment area in Poland, and so presenting the results of empirical research in this matter, seems a reasonable thing to do.

The sample selection was a deliberate choice. The study covered those logistics companies from the Lodz Region which declared implementation

and application of new technologies in the field of internal transport and storage. These were companies with private, foreign and mixed capital. Respondents in the study were executives and middle-level managers directly involved in the organization of the deployment and use of new technologies in the enterprise. The study was conducted using surveys, the tool of which was a questionnaire. It was conducted at the turn of May and June 2016, by direct interview method. Two sample explanatory variables were included in the sample selection for the study, which were at the same time the criteria for selecting enterprises:

- *enterprise size determined by the size of employment* - group I of less than or equal to 10 employees; group II – 11 to 50 employees; group III of 51 to 250 employees; group IV of above 251 employees;
- *the industry in which the business operates* – TFL (transport-forwarding-logistics), manufacturing, distribution and service industries.

Basing on data obtained from public administration sources, press publications and websites, with the use of specific selection criteria, a list of 45 logistics companies was created, operating in the Lodz Region. After the interviews and final information collection for analysis, 38 businesses have been qualified.

## 3. THE USE OF MODERN TECHNOLOGY IN TRANSPORT AND STORAGE

As early as in the last century, the issue of transport systems improvement had become a priority in gaining competitive advantage for businesses. Companies began to treat transport as an important element of the logistics chain, and they began to implement new technologically advanced solutions that would allow them to improve the functioning of their internal transport. According to the general principle of logistics, traffic management is one of the most important logistic activities in an enterprise, which amounts to about 1/4 of all logistic costs (see Figure 1).

<sup>4</sup> R. Walasek, *Supply chain optimization and competitiveness of an enterprise – results of the study*, Research Logistic and Production, 2016, Vol 6, No. 2, p. 178.

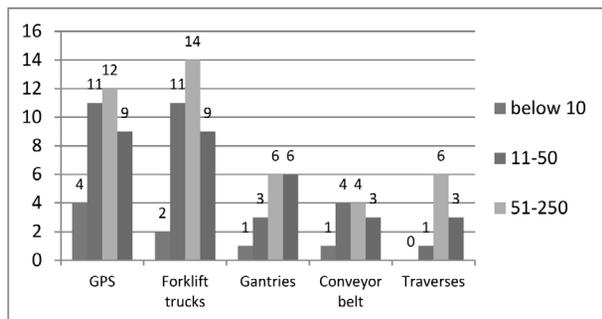


Fig. 1. The use of equipment in internal transport. Source: own study based on research.

The distribution of variables as regards the use of modern equipment in internal transport of individual companies, was even, when the time-of-market criterion was taken into account. In the study sample, almost 40% of companies indicated that the use of modern forklifts is the dominant tool used in their internal transport. More than 1/3 of respondents mentioned GPS. This tendency was predominant in small and medium-sized companies. On the other hand, gantries were used primarily by medium and large companies - almost 20% of respondents indicated this in their responses. Traverses were used by medium-sized enterprises (nearly 20% of respondents), while small companies did not use traverses at all. Basing on analyzed responses, it was concluded that medium-sized companies (11 to 250 employees) more frequently decide on implementing solutions that are technologically innovative. Among them, over 1/3 claimed that the implementation of new technologies mainly concerned forklifts. Conversely, micro enterprises (employing less than 10 employees) mainly invested in GPS systems.

In the case of significant development and construction of new warehouse space in Poland, it is assumed that modern warehouses will be equipped with modern technologies which will enable efficient and effective handling and storage operations (see Figure 2). One of the leading areas in which warehouses are equipped with modern tools and warehousing equipment is the Lodz region, due to its location in central Poland.

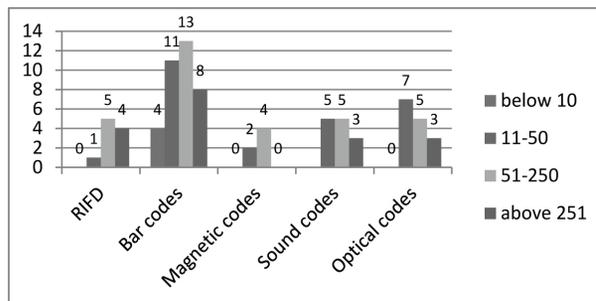


Fig. 2. The use of equipment in storage. Source: own study based on research.

In the sample tested, barcodes are used by all companies regardless of the size, measured by the number of employees. The largest percentage of companies using barcodes are the medium-sized ones (more than 35% of respondents). Magnetic codes are the least used solution to identify stocks of the Lodz sector (in total 15% of the companies surveyed), only small and medium-sized companies. Big and micro companies do not use this technology at all.

Taking the test sample into account, and considering explanatory variables, the distribution of responses regarding the use of equipment in transport and storage by industry was as follows (see Figure 3).

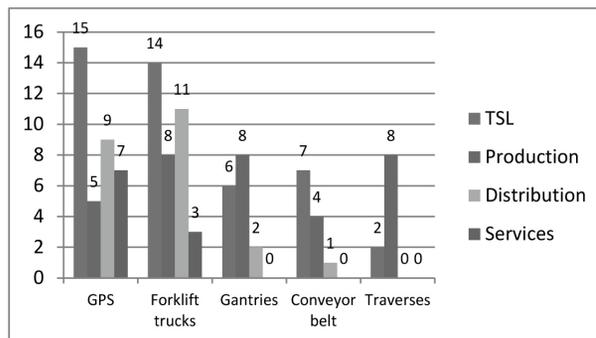


Fig. 3. The use of internal transport equipment by industry. Source: own study based on research.

Based on the analyzed responses, companies that belong to the TFL industry are more likely to adopt innovative solutions in the field of internal transport. Almost half of the companies that implement new technologies operate in the TFL industry. The least used tool of internal transport are the traverses, applied only by a small percentage of respondents in TFL and production.

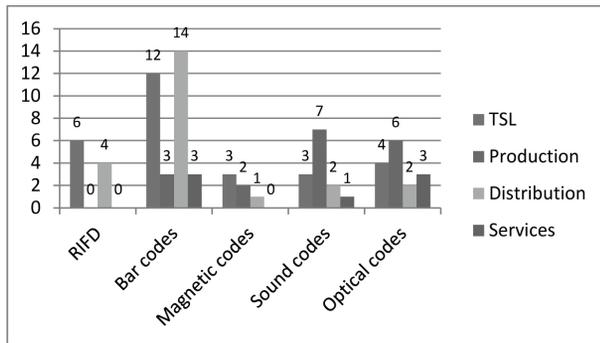


Fig. 4. The use of storage devices by industry.  
Source: own study based on research.

In the storage sector, regardless of the business sector, companies use barcodes. In this matter, the largest proportion of over 40% are distribution companies. On the other hand, sound and optical technologies are popular with manufacturing companies (almost 20% of the respondents declared its use). The lowest number of implementations of modern storage technology is noted in the service industry.

#### 4. METHODS OF STORING GOODS IN A WAREHOUSE

Another issue that has been investigated within the area of storage and internal transport was the way in which inventories are stored. The typical methods of stock valuation are LIFO, FIFO, FEFO, XYZ and ABC. These methods are important because the prices of individual products and the costs related to the production system change over time. When releasing their inventories, the company must use the appropriate valuation methodology to optimize its operations (see Figure 5).

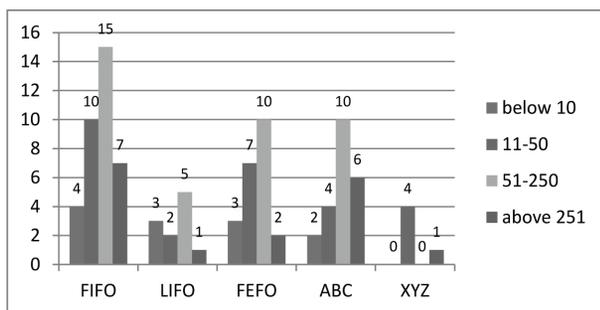


Fig. 5. Inventory valuation methods.  
Source: own study based on research.

The analysis of the collected material showed that the FIFO method was the dominant method of inventory valuation for all surveyed businesses. It was dominant among medium-sized companies

(over 40%) and small ones (over 35%). According to the FIFO rule, the first products to be released are those that have been first placed in the inventory and if this batch is exhausted, the products that have been posted next are the ones to be released. Additionally, medium-sized companies mostly used FEFO and ABC methods. The least used method of stock valuation was the XYZ method. Only slightly over 10% of all surveyed companies mentioned its use. These were mostly small businesses.

Considering the tested group and the explanatory variables, the distribution of responses to the use of equipment in internal transport and storage by inventory valuation method was as follows (see Figure 6).

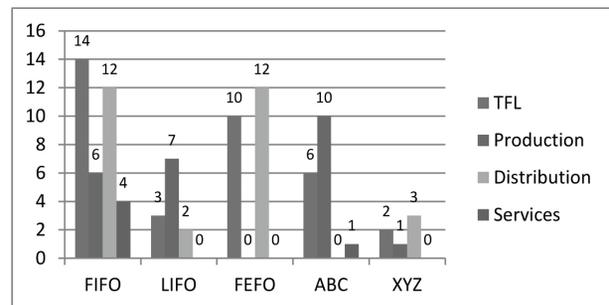


Fig. 6. Inventory valuation methods by industry.  
Source: own study based on research.

FIFO and FEFO inventory valuation methods are primarily used by mid-size companies operating in the TFL and distribution industries. This stems primarily from the fact that the FIFO method is very logical in its application and extremely easy to follow. It enables companies, which are limited by accounting regulations, to produce transparent and clear financial statements. The systematics and cost analysis largely related to inventories, should be nowadays performed ex ante and ex post. In turn, in the manufacturing industry, the most commonly used method is the ABC method.

#### 5. DEGREE OF ENTERPRISE INNOVATIVENESS IN THE FIELD OF INTERNAL TRANSPORT AND STORAGE

Contemporary businesses should be characterized by high degree of innovation. Such reasoning comes out of the permanent globalization of the market and rapid technological progress. Companies wanting to keep up with world leaders must continually acquire and implement cutting

edge technology, particularly in the field of logistics (see Figure 7). This area is strategic for every business, since its efficiency depends on the level of customer service provided - which in the customer-centric orientation is essential.

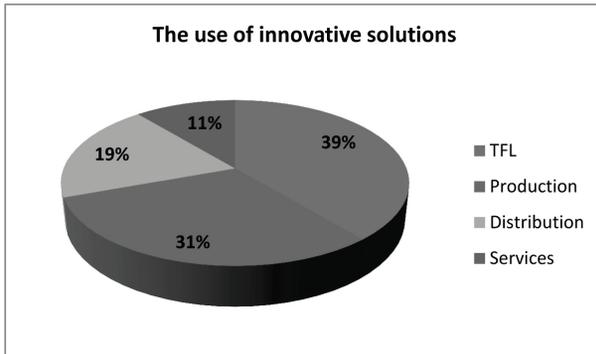


Fig. 7. The use of innovative solutions by companies. Source: own study based on research.

Among the surveyed enterprises, the most innovative ones were those operating in TFL and manufacturing industries. More than one third of the companies operating in these industries indicated that they were modern companies in their operations. The least innovative companies were service companies, as only slightly over 10% of them declared innovation in the development and implementation of modern methods and tools.

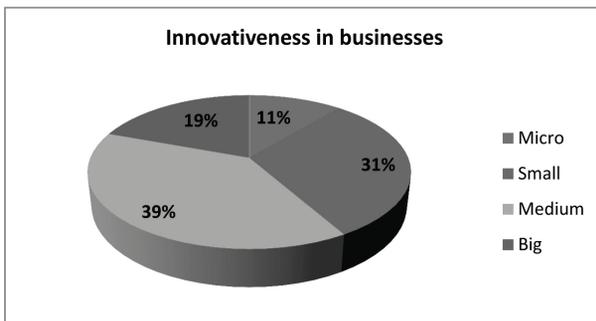


Fig. 8. Degree of innovativeness in businesses. Source: own study based on research.

Considering the size of the companies operating in the Lodz region, innovations were declared primarily by medium-sized and small enterprises - less than 40% of medium-sized businesses and over 30% of small ones, respectively. Micro-businesses turned out to be the least innovation-oriented: Only slightly over 10% of them claimed to be innovative.

## 6. CONCLUSION

Today, customer-centric trend forces companies to accelerate their logistics processes, especially those related to storage and transport. Hence, it is currently difficult to imagine warehouses that are not equipped with modern tools to streamline logistics processes throughout the supply chain. However, in many cases companies operate on elaborated schemes and models of conduct that are not always up-to-date. In most companies, warehouse operations are accomplished by having the right set of inventory at the right place, time and quantity, corresponding to customer orders. Often, however, the lack of streamlining causes delays as well as the disturbance of material flows throughout the supply chain. Customers who wait too long for their products become impatient and leave for competition, which negatively affects the condition of a business entity. The same applies to the material feed process provided by internal transport. Too slow and obsolete tools, delay the implementation of major technological processes, while frequent failures increase the cost of servicing. That is why it is so important to implement innovative solutions that enable companies to meet customer expectations and become competitive.

The study results show that modern logistics companies need to continually and systematically engage in business improvement, to be competitive in the market, along with successive implementation and application of new technologies in all areas of business. This is particularly important in the fields of internal transport, storage or automatic identification. The use of new technologies in different areas of business is beneficial for operations improvement, bringing quite a few tangible benefits that build competitive advantage. In most companies, the deployment of new technologies has increased employee productivity by the elimination of errors and allowed to intensify all activities aiming at raising the quality and speed of customer service.

Service quality improvements, matching manufacturing systems to optimize pro-innovation activities, and the use of innovative technology in various areas of business, has increased commitment to build a competitive edge in enterprises. In this context, the creation of competitive advantage is conditioned by the use of solutions backed by IT tools, that enable businesses to maximize their skills and competencies to meet the expectations potential

customers might have. The applied technology solutions, in order to perform their function, need to accelerate the implementation of changes in organization functioning, which to a large extent contribute to creating favorable customer relationships, thus affecting the level of enterprise competitiveness. Therefore, the use of new technologies is a prerequisite for the company to be able to keep up and thrive in the market of today.

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