

APPENDIX DEFINING POINT OF BUSINESS LOGISTICS

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Abstract: *Logistics is a term that has been accepted by economic science from military science and practice, where it is commonly used as a synonym for military supply and military formation on the field (as a professional name for a part of the war skills). Otherwise, today the term logistics usually means controlling the flow and storage of materials respectively all activities in the transfer of raw materials, semi-finished and finished products from the first producer to final consumer. However, it should be noted that logistics has been for a long time a completely new area of economic scientific exploration, and its content was most commonly identified with transport and storage. The interest for the management of activities in the field of logistics has led to different interpretations of the concept of her and she answered with a kind of confusion, because the number of terms used to denote the process of physical movement of goods from suppliers through manufacturers and intermediaries to the final consumer. As with most economic terms, in the scientific and professional literature today there are more opinions, even about the origin of the concept of logistics and many of its definition, which this paper will try to scientifically illuminated and somehow relatively harmonized.*

Key words: *logistics, business logistics, supply chain, streams of material, physical distribution.*

1. INTRODUCTION - THE ETYMOLOGY OF THE CONCEPT

In essence, the battle was won and decided by the officers for the supply and before the shooting started. (Erwin Johannes Eugen Rommel)³⁴

Etymological³⁵ 3, logistics is most often associated with the Greek word *logistikos*, which marks the skill and experience in computing, and is also associated with a certain stock of clerks. One should take into account the word *logo*, which means the notion, reason, or wit, and the word *logismos*, which means the bill or salary.³⁶

In ancient Athens, logistics are called people who led finances and preparations for wars and supplies of military formations on the ground. Also, Abidin Deljanin³⁷ says that many logistics with the Greek word *logistikos*, as a skill in solving problems with letters (instead of digits), which was also used by the Latin so-called. logistics, or finance officials.

The origin of logistics is also associated with logic, as it deals with the integration of certain activities that lead to the achievement of a goal. Velibor Peulić³⁸ binds the concept of logistics with the English word logistics which signifies the science of the back office (transport and supply). In the analysis of the genesis of the notion of logistics, it is necessary to start

³⁴ German general from the Second World War (1891-1944)

³⁵ Etymology is the determination of the origin of the word and its relation to other words of the same or other languages. See the clause in Klaid, B.: Dictionary of Foreign Words - Strangers and borrowers, Nakladni Zavod Matice Hrvatske, Zagreb, 1990.

³⁶ Logistics. Available at <https://www.fsb.unizg.hr/zindin/LOGISTIKA.pdf> (February 13, 2017).

³⁷ See more at Deljanin, A.: The Logistics in Transport and Communication (Part I and Part II), Faculty of Transport and Communications, University of Sarajevo, Sarajevo, 2009. Available at <http://web.efzg.hr/doc/market/lectures/plbj11-12.pdf> (March 16, 2017)

³⁸ Peulid, V.: Logistics and Forwarding, Pan-European University Apeiron, Banja Luka, 2016. Available at <http://www.apeiron-uni.eu/lycboardclient/Detail.aspx?DocumentID29822> (March 14, 2017). 147

from the time of Byzantium, because the Emperor Leontos-Leo VI is there. Wise (886-911) first introduced the concept of logistics that, according to him, was to arm the army proportionally with the need for protection and weaponry, to take care of its needs on the ground in time, and to prepare its actions in the war effort.³⁹

Logistics links Wikipedia⁴⁰ with the Greek words of logos (the science of principles and forms of correct thinking) and logistics (skills, experience and knowledge on the preservation, evaluation and judgment of relevant elements in the space and time necessary for optimal solution of strategic and tactical tasks in all areas of human activities). In scientific literature, other views on the origin of the name of logistics are also encountered, and some consider it to originate from the French word logger (to live, to spend the night underneath the clear sky, to end), which various authors use in various contexts and in various contexts define the concept of logistics, for example:

■ John P. Magee⁴¹ says that logistics are of French origin (from a logger that means to settle there), and in military terminology means the mode of transport, supply and accommodation of military hulls and defines logistics as the art of running material and goods flow from suppliers to the bearer of need.

■ In addition, the source⁴² of the constipation mentioned below is associated with the word logger, which, according to this source, means to reside, to stay, to

reside and to take care of the guest or soldier for a short time and its placement in the living room.

■ Also, Abidin Deljanin⁴³ claims that many authors have the concept of logistics for word logger, which, according to him, means to settle down, to settle down, to lie under the clear sky, and in military terminology means the mode of transport, supply and accommodation of the army, storage and storage of military goods.

■ Finally, on Wikipedia⁴⁴, among other things, claims that logistics comes from the word logger, which, according to the authors, means to live, to spend the night under the clear sky, to be accommodated.

Therefore, Wikipedia deals with the etymology of the notion of logistics, and besides the above, it claims at the same site that it originates from the French word logistique, which was derived from the officer's logistic logic (marechal de logis), whose task was to plan everything administrative affairs related to the progress of forces in the French army in the 17th century. In his book, Josip Šamanović⁴⁵ says that logistics specifically refers to the strategy of accommodation and supply of army and military formations on the ground, and that military logistics includes transportation, accommodation (hiring and supply), transport, storage and maintenance of military goods and technology.

³⁹ See more in the Business Administration (script), Technical Faculty, Zrenjanin, University of Novi Sad, 2014 p. 4.-7. Available at http://www.tfzr.uns.ac.rs/Content/files/1/Skripta-POSLOVNA_ADMINISTRACIJA.doc (March 11, 2017).

⁴⁰ See in Logistics. Available on hr.wikipedia.org/wiki/Logistics (February 15, 2017).

⁴¹ Translated from Ivankovic, M.: Traffic Logistics, Faculty of Traffic Sciences, University of Zagreb. Available at <http://www.docsity.com> ...> Slides Logistics in Traffic (March 18, 2017). 150

⁴² See more on Logistics - meaning, definitions and concepts. Available at <http://www.logisticmagazin.com/?p=442> (March 22, 2017).

⁴³ See more at Deljanin, A.: The Logistics in Transport and Communication (Part I and Part II), Faculty of Transport and Communications, University of Sarajevo, Sarajevo, 2009. Available at <http://web.efzg.hr/while/market/lectures/plbj11-12.pdf> (March 16, 2017).

⁴⁴ See in Logistics. Available on hr.wikipedia.org/wiki/Logistics (February 15, 2017).

⁴⁵ See more at Šamanović, J.: Logistics and Distribution Systems, Faculty of Economics, University of Split, Split, 1999 p. 13.

2. CONCEPT - DEFINITIONS OF LOGISTICS

Amateurs talk about strategy, professionals about logistics. (Colin Pauwel⁴⁶)

According to one view⁴⁷, the logistics first appeared in 1670 in the military documents of King Louis XIV of France. (1638-1755) on the importance of supplying military troops on the battlefield with the necessary material resources and food, or their armament, equipping and food, and transport support in their shifting from one position to another. Thanks to the development of information technology, military logistics reached very high reach during the Korean and Vietnamese war.

This has attracted the attention of scientists and businessmen who have dealt with management problems and they are trying to apply logistics to production and the market. Military logistics is based on political-military criteria, accommodation and supply of the army, while economic, technical, legal and similar criteria apply to business logistics. Unlike military logistics, which relates to activities related to transportation and accommodation of military goods and troops, and maintenance of equipment, business logistics relates only to activities related to the movement of goods, but the maintenance of facilities and equipment is not included in logistic activities.

The abovementioned author Abidin Deljanin, in the same place, argues that logistics is a multifaceted term and is used in various areas, primarily in economic science and practice, transferred from military terminology. Although there are many definitions, nowadays, logistics is usually understood as managing flows and storing material, or all activities in relocating raw materials, intermediate products, intermediate goods and finished

products from the first producer to the end consumer. The Council of Europe defines logistics as the management of goods and raw materials flows, processes of production of finished products and associated information from the point of origin to the point of final use in accordance with the needs of the buyer. The author also introduces a new aspect, arguing that in a wider sense logistics involves the return and disposal of waste materials.

In modern conditions, logistics is most often used to indicate business functions and scientific discipline that deals with the coordination of all movements of materials, products, and goods in physical, informational and organizational terms through the circular process of procurement, through production and sales to consumers. In this regard, it is said that logistics as a science represents a set of multidisciplinary and interdisciplinary knowledge that studies and applies the principles of planning, organizing, managing and controlling the flows of materials, faces, energy and information in systems, seeks to find methods for optimizing these flows in order to achieve positive economic effects (profits), while logistics as a business function encompasses all the activities necessary for the complex preparation and realization of spatial and temporal transformation of goods and knowledge.

In fact, with the use of human resources and resources in systems, logistics is trying to satisfy the consumer's researched interests, with emphasis being always put on cost and optimization, and in order to increase profitability. In his online attachment on logistics and freight forwarding, Velibor Peulic⁴⁸ claims that logistics had only had a breakthrough in all economic activities in the early 19th century in order to rationalize production, trade, warehousing, transport, distribution, supplying consumers and

⁴⁶ Retired US Army and former US Secretary of State

⁴⁷ See more on Logistics - meaning, definitions and concepts. Available at <http://www.logisticmagazin.com/?p=442> (March 22, 2017).

⁴⁸ Peulic, V.: Logistics and Forwarding, Pan-European University Apeiron, Banja Luka, 2016. Available at <http://www.apeiron-uni.eu/lycboardclient/Detail.aspx?DocumentID29822> (March 14, 2017).

users to various products. In the same place, the author also lists several interesting definitions of logistics (paraphrased):

■ American Logistics Management Council: Logistics is the process of planning, applying and controlling efficient and effective flow (and storage) of raw materials, production processes, finished products, services and related information, from place of origin to place of consumption (including input and output outgoing and internal and external developments) in order to adapt to the demands of consumers.

■ European Logistics Association: Logistics is the organization, planning, implementation and control of flows of goods from development and from purchasing (from place of origin to place of sale) through production and distribution to the end customer with the aim to minimize costs and minimize capital expenditure (minimum investments) satisfy market demands.

The Logistics International is defined in a somewhat narrower sense from the point of view of engineering application, and it is said that it is the skill and management, engineering and technical activities related to technical requirements, design and development, supply and provision of resources for maintenance of technical material assets, with the aim of providing effective support to plans and operations. In other words, the difference between military and economic logistics is primarily reflected in their goal: military logistics has a strategic and political goal, while economic logistics has an economic and economic goal. The above-quoted author lists some more in the literature of categorized definitions and logistical observations (paraphrased):

■ Logistics is a strategic process by which the company organizes and supports its activity.

■ Logistics is the management of all

activities that contribute to product circulation and coordination of supply and demand. ■ Logistics is the management of the physical distribution of materials and products, or the external movement of products from producers to consumers, including information that serves the successful performance of all the activities it deals with.

■ Logistics includes activities that manage product flows and resource and market coordination, achieving the necessary level of services with the lowest cost.

■ Logistics includes all the activities through which the spatial and temporal transformation of goods, its quantity and structure takes place.

Transformations from the last definition make the logistic determinant of the overall flow of goods that is planned, managed, realized and controlled. All activities should be mutually harmonized to ensure an efficient flow of goods from the place of dispatch to the place of reception. Paraphrasing the previous Peulić's statement on the transformation from his last definition, Abidin Deljanin⁴⁹ notes that joint activities of these activities also trigger the flows of goods that effectively connect the point of delivery and the point of receipt. In addition to the already presented definitions from other sources, in his Deljanin he presents the often cited definition of Hans-Christian Pfohl⁵⁰, who says that logistics covers all the activities that plan, manage, realize and control spatial-temporal transformation of goods in relation to their quantity, type and character, handling, and logistic determination.

Also, the British Logistics Institute defines logistics as a time positioning of resources within the supply chain, while the US Council (Advice, Board) for Logistic

⁴⁹ See more at Deljanin, A.: The Logistics in Transport and Communication (Part I and Part II), Faculty of Transport and Communications, University of Sarajevo, Sarajevo, 2009. Available at

<http://web.efzg.hr/while/market/lectures/plbj11-12.pdf> (March 16, 2017).

⁵⁰ A distinguished German scientist, theoretician and author in the field of logistics.

Management (CLMa⁵¹) is defined as a process of planning, production, control, more efficient and effective flow and storage of goods and information from sources to the place of use for the purpose of satisfying the consumer. During the late 70s and early 80s of the 20th century, the need for the integration of functional areas within the company appeared in the world. Supply chain management extends the concept of functional integration from one company to all participants in the supply chain, creating the notion of integration in the 1990s.

Observed in a broader sense, the above-quoted author Deljanin also states the following definition: Logistics is a system of activities that enable the design, design, direction, introduction and regulation of the flow of goods (materials, products), energy and information within and between systems. From the aspect of the movement of goods, logistics can be defined as a set of all activities through which design, design, management and control of procedures in the field of manipulation, storage and transport of goods are carried out in a particular system.

Thus, logistics involves controlling logistics activities in accordance with the plan or strategy, and attention must be focused on two interdependent basic activities, namely: movement (denotes flows of input materials from the supplier to the production process in the company and the flows of finished products to the user, which relates on the selection and use of transport modes based on certain criteria to be analyzed) and storage (the input materials are stored before processing, process materials in the intermediate stages, and the finished products are dispatched to the user, which is related to determining the number, size, design, type and location of the warehouse and the definition of other stock-related problems).

The below quoted and unauthorized Internet attachment⁵² is the fact that in the context of the Logistics concept, many terms are used (their number varies between different managerial specialties, especially between researchers in the field of logistics and marketing, and are usually dealt with the following syntagms: industrial logistics, marketing logistics, business logistics, technical logistics, distribution management, supply chain management, logistics management, material management, and the like.

Also, several pubertified definitions of logistics are stated, as follows: Logistics deals with the acquisition of space and time with the least cost; it is the process of strategic management of the procurement, movement and storage of materials and finished goods through the organization and its marketing channels, and in the most cost-effective, most appropriate and profitable way for the company and the buyer; and it includes all business functions and scientific disciplines that deal with the coordination of physical, informational and organizational movement of materials, products, goods.

From the above text, it can be concluded that there is no universal definition of logistics, but from the above-presented definitions, it is clear that logistics business is easiest to describe as supply chain management (SCM⁵³), that is, it can include all the activities required to deliver the goods our supplier to our customer. As a rule, these activities should not include the activities of finding a supplier and contracting the prices and quantity of goods we order, as well as the activity of selling goods to customers, but should be done through other parts of the company's organizational structure (procurement department and sales department). Simply put, in economic activities, logistics is a set of activities for successful business process

⁵¹ Acronym of the Council of Logistics Management.

⁵² Logistics Definitions, 2008. Available at <http://bestlogistika.blogspot.hr/2008/07/definicijelo-gistike.html> (March 25, 2017).

⁵³ Acronym of Supply Chain Management.

management and business goals.⁵⁴ However, in order to determine the general definition of logistics, its basic tasks and goals must be emphasized, and they are different nowadays than before. As the main task of logistics is to manage material and related information within the supply chain, and the main goals of cost optimization and the fulfillment of user requirements, it is worthwhile to analyze the already cited definition of logistics by the American Council (councils, committees) for logistical management that outlines efficiency and effectiveness flow of raw materials, semi-finished products and finished products from the source point to the point of consumption for the purpose of satisfying the customers' requests.

When it comes to efficiency, we can say that this is a general concept that can be defined by the relationship of two components: the values of the system characteristics and the value of the spent resources. Also, efficiency explains the relationship between the system and the environment, so it can be talked about internal (internal) and external (external) efficiency. On the other hand, effectiveness is an efficiency-related concept, but primarily refers to external (external) efficiency. By defining this distinction, Peter F. Drucker⁵⁵ says efficiency means to do things in the right way, and effectiveness means to do the right thing (hence, the system can be internal, but not necessarily, and externally efficient, that is, it has an effect).

Accordingly, an efficient logistics system (efficient logistics) is a successful (efficient) system that works in the best possible way and with the least losses, while the effective logistic system

(effective logistics) is adequate in fulfilling the purpose, that is, the one that achieves the intended or expected result. Efficiency can be defined as the level of resources used, which can be linked to cost, and effectiveness as a goal of achieving goals, which implies the realization of the optimality of several parameters related to the fulfillment of user requirements, and hence the logistic system should aim at achieving the optimal level of fulfillment of user requirements in relation on costs (effective) and reduction of logistics costs (efficient).

In the magazine *Industrija*⁵⁶, logistics is defined as the process of managing transport, stockpiles, storage and information on goods and materials from the source (place of production) to the place of final consumption, as well as the activity that deals with space and time mastering at the lowest cost, and involves transport, stocks, storage and information, as four subsystems of logistics or logistics management. Lately, due to technological development, in particular the information and communication industry, there has been a significant change in the approach and application of logistical aspects lately. Indeed, due to the complexity of the whole area, it is better to talk about the supply chain and its management, because it is more comprehensive and broader than the concept of logistics.

John W. Langford⁵⁷ says that logistics uses quantitative methods of engineering and analysis to incorporate logistic assumptions into product design, its development, production and functioning, but is at the same time a kind of art because it integrates human experience, intuition and creative judgment, while Sandra Renko⁵⁸, defining

⁵⁴ See more at Logistics. Available at <https://www.fsb.unizg.hr/zindin/LOGISTIKA.pdf> (February 13, 2017).

⁵⁵ A renowned American scientist and prolific author in the field of management and entrepreneurship (1909-2005).

⁵⁶ Logistics - Some questions of theory and practice: in the journal *Industrija* (publisher: IndMedia, Belgrade), number 36, February 2012. Year VII. pp. 27 -32. Available at:

<http://www.industrija.rs/images/.../casopis/Industrija.36.pdf> (February 13, 2017). 165

⁵⁷ Langford, J.W. : Logistics: Principles and Applications, McGraw-Hill, 1995. p. 35.

⁵⁸ Renko, S. : The concept and history of business logistics (PowerPoint presentations for lectures), Faculty of Economics, University of Zagreb. Available at <http://web.efzg.hr/doc/TRG/1.nastavna.celina.pdf> (April 10, 2017).

the objective of business logistics (to connect the place of the source of goods more effectively with the point of its delivery to consumers), paraphrasing the definition of CLM⁵⁹ from 1991, and says: Logistics is the process of planning, implementation and verification of the success of the actual flow and storage of goods, services and relevant information from the place departure to the place of consumption, all in accordance with the requirements of customers.⁶⁰

Josip Šamanović⁶¹ says that business logistics presupposes the skill and experience in assessing all the elements necessary for making optimal strategic and tactical decisions and assuming a systemic approach to managing and controlling the physical flow of material assets and the necessary information that the company sends to the market and from the market. In the quoted script⁶² it is claimed that from the beginning of civilization development to the present there is a geographical dislocation of the seller and the insurer, which causes the need to move goods, and this is what allows the logistics activities. So logistics is also a very old and very new area of business, underneath it when it was implied. In the same source, it is noted that certain definitions can enable a more complete understanding of the nature and importance of logistics. Therefore, any definition that corresponds to the given business situation can be used. On the other hand, while attempting to define business logistics, two Osijek authors⁶³ simply say that it implies the totality of activities in setting up, securing and improving the availability of all persons and assets, which are a prerequisite, auxiliary assistance or insurance for flows within the system.

In many places and in many versions, the definition is 7R or 7P (Right = Right), which is sometimes said to be a layman's description of logistics, and paraphrased as follows: To ensure the availability of the right product, in the right quantity, in the right state, in the right place the right time, for the right buyer, at the right price and at a minimum cost. This definition contains the most important logistical activities, since it emphasizes the spatial and temporal dimension (place, time, movement and storage) and provides a thorough understanding of the logistics area, and emphasizes price and service, as logistics managers have to continuously evaluate the costs and level of services, necessary changes in the logistics system.

In addition, this definition highlights another very important aspect, ie emphasizes the importance of satisfying the needs of consumers. Consumer focus is essentially logistics, as logistics plays an important role in meeting consumer demand. An additional element of the definition of quality is the idea that the company must perform the right task at the right time or the real task in the competitive market. The importance of quality in the production of products, as well as in other areas of company's activity, and especially in the field of logistics, is noticed.

Logistics can also be defined as efficient management and as an effective control of stocks (raw materials, semi-finished goods and ready-made goods) in their movement or retention in plants. This simpler definition suggests that supplies are the essence of logistics, because they are important when they are at rest and when moving. The costs of providing services to customers are also significant. Breaking

⁵⁹ The acronym of the Council of Logistics Management (American Council of Logistics Management).

⁶⁰ Transferred from Brčić-Stipčević, V.: The importance of logistics in the improvement of sales, *Modern Trade*, Vol. 21. br. 3/1994. p. 58.

⁶¹ Šamanović, J.: *Logistics and Distribution Systems*, Faculty of Economics, University of Split, Split, 1999 p. 13.14.

⁶² See more in *Business Administration (script)*, Faculty of Engineering, Zrenjanin, University of Novi Sad, 2014 p. 4.-10. Available at http://www.tfzr.uns.ac.rs/Content/files/1/Skripta-POSLOVNA_ADMINISTRACIJA.doc (March 11, 2017).

⁶³ Transferred from Segetli, Z. and Lamza-Maronić, M.: *Distribution system of trading companies*, Faculty of Economics, University J.J.Š. Osijek, Osijek, 1995. p. 80.

this simpler definition requires serious discussion and analysis. Flow and storage of materials (in the logistics channels) from the seller to the consumer provides perspective logistics. Therefore, raw materials, semi-finished products and finished products must be driven to different distances between suppliers, factories (warehouses) and markets (consumers), and the company must arrange these goods and secure them in quantities that are sufficient for its anticipated needs.

Transport decisions affect storage (for example, a slower and less reliable way of transportation usually requires holding large stocks), and the number and location of the warehouse affect the size of the delivery and the available modes of transport. The CLM definition contains a number of logistics activities. However, it does not provide an overview of the specific activities of the logistics system. However, the definition emphasizes the managerial nature of logistics (planning, implementation and control) and emphasizes its main role in meeting customer demands, as the market is increasingly compelling companies to pay special attention to delivering services to consumers.

Ronald H. Ballou⁶⁴ similarly defines business logistics as planning, organizing and controlling all activities that allow the product to move from the place where raw materials are purchased to final consumption, as well as the movement of the accompanying information. In the same source, the author claims that a successful logistics management company requires careful coordination and movement and storage activities. It also requires the possession of knowledge and interest in related areas, such as handling materials and industrial packaging. These two areas between warehouse and transport deserve special attention. For example, the size and

type of packaging affect the use of transport equipment (stacking of goods for more complete utilization of vehicle load) and storage space, as well as transfer of goods between transport equipment and warehouses.

As we have said, the definition of CLM clearly includes both internal and external movement of materials and products, and hence a unique material management concept (MM⁶⁵ 3) and physical distribution management (PDM⁶⁶). This definition particularly emphasizes the movement and storage of goods from the source to the consumption, and shows that the company should include other areas, to carefully coordinate them in order to achieve the efficiency of the overall logistics system. Therefore, material management and physical distribution management are integral parts of logistic movement. Raw materials, parts, semi-products and other goods move to the company from external sources, and in the process of production they are transformed into finished products.

Hence, it can be concluded that material management is related to regulating the flow of goods up to the beginning of the production process, while managing physical distribution is linked to regulating the flow of finished products from the completion of the process of production through the warehouse to the consumer. In this regard, it is useful to compare the above presented logistics definitions, but before analyzing and analyzing the specifics of these definitions, all the above terms should be analyzed to indicate the different components of the physical movement process of goods (from suppliers through producers and intermediaries to the end consumer).

Also, different author's views on this process should be analyzed. The analysis of the reason for the use and the differences

⁶⁴ See more in Ballou, Ronald H. : The evolution and future logistics and supply chain management, *European Business Review*, 19 (4), p. 332.-348. Available at <http://www.emeraldinsight.com> (April 12, 2017).

⁶⁵ Acronym of Materials Management.

⁶⁶ Acronym from Physical Distribution Management

between the individual terms and the guidance of the authors, who and when they formulated, would in theory have been virtually useless at this time. It is important to know that the terms mentioned refer to the description of certain physical flows of raw materials, semi-finished products, finished products, services and information, both in one and between several companies. From the above definitions it is evident that in us and in the world there is a different understanding and interpretation of the very concept of logistics. In general, we can say that the term has two meanings. First, this term refers to the scientific discipline, and secondly, the specific function in organizational systems of support for improving the efficiency of these systems is indicated.

3. CONCLUSION

Logistics is a combination of science and art. (John W. Langford⁶⁷)

In economic literature, business logistics came to the market five decades ago, under different names such as distribution logistics, logistics logistics, industrial logistics, marketing logistics, distribution engineering, procurement logistics, distribution logistics, and the like. Many experts in this field interpret different terms differently, and often replace them. Most of them under any of the above concepts include a set of activities that relate to relocation of work items and information in the process of reproduction, that is, a system of management and insight into the flows of work items from their source to the users, that is, from the supply of raw materials to the delivery of finished products.

The application of logistics in various forms of human activity also caused its differentiation, so, apart from military and technical, the business logistics developed

in this paper, and we attempted to give an annex to its definition. Some authors opt for the term logistics, whether it is used as business logistics, logistics management, integral logistics management, logistics management, or somehow similar, and can in large part be considered synonyms, which, in my view, is apparent from of this article, we were not the very first to agree. However, it should be noted that the terms of material management and physical distribution describe a subset of activities within the logistics function itself.

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⁶⁷ He is a renowned American economic scientist and prolific author in the field of logistics

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THE USE OF METAL-CONTAINING POLYMERS IN THE AUTOMOTIVE INDUSTRY

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Abstract: *Modern machine building requires expanding the range of wear-resistant materials possessing strong exploitation characteristics. In this respect, obtaining new polymer composite materials is of great interest. Such materials have been developed based on thermo resistant polyamide S-1 by means of introducing powder-like carbonyl nickel. The compositions were prepared by means of mixing the components within the rotating electromagnetic field. According to the obtained data, the characteristics of this system are defined by the filling degree. In this way the impact strength reaches its maximum at nickel content of 15 mass %. As for the hardness, compression strength and thermo physical properties of metal-containing polymers, they all grow with the increase of Ni content, which is provided for by good adhesion between the filler and the binder. The smallest wear in the conditions of dry friction is that of the composition material containing 15 mass % of carbonyl nickel. This system is more than eleven times as wear-resistant as pure S-1. With this regard, developed metal-polymers have been designed from metal-containing polymers for pivot knots and brake systems of ZIU, UMZ, Skoda trolleybuses instead of bronze. These have shown good performance and reliability at exploitation. Due to the proposed bushings dimensions, the entire range of sleeves repair can be solved and purchases of new ones can be reduced. Thus, given the reliability and work efficacy of the mentioned bushings, replacing the series parts of trolleybus friction knots made of alloys based on non-ferrous metals with the metal-containing polymers ones becomes profitable.*

Keywords: *polymers comprising a metal, thermal resistant polyamide, S-1, carbonyl nickel, trolley buses, ferrous metals*