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The mechanism of enterprise logistics system

Mechanizm systemu logistycznego w przedsiębiorstwie

Abstract. The article deals with the essence and basic principles of the formation mechanism of improving automotive enterprise logistics system in terms of adaptation to adverse changes in the external and internal environments. In particular, the mechanism of improving the logistics system of automotive enterprises from domestic reserves, consisting of scientific and methodological, regulatory and contracting, technical and technological, organizational and economic components, logistics and evaluation of the effectiveness of the proposed measures are grounded in the article. Based on the characteristics of automotive companies in Ukraine was formed phase of transformation of the logistics system, which is logistics-oriented for the consumer, and was developed and adapted for today's conceptual approach to the management and planning of the logistics system of automotive enterprise, based on the principles of flexible production concept.

Key words: logistics, logistics system, automotive enterprise, mechanism, transformation of the logistics system, management, consumer.

Synopsis. Artykuł dotyczy istoty i podstawowych zasad mechanizmu poprawy systemu logistyki motoryzacyjnej przedsiębiorstwa w zakresie adaptacji do niekorzystnych zmian w środowisku zewnętrznym i wewnętrznym. W szczególności: logistyki i oceny skuteczności proponowanych środków, mechanizmów poprawy systemu logistyki przedsiębiorstw motoryzacyjnych z rezerw krajowych, składających się z elementów naukowych i metodologicznych, prawnych, technicznych i technologicznych, organizacyjnych i ekonomicznych. Na podstawie charakterystyki przedsiębiorstw motoryzacyjnych na Ukrainie pokazano etapy przemian w systemie logistyki, czyli logistyce zorientowanej na konsumenta. Etapy zostały opracowane i dostosowane do współczesnego koncepcyjnego podejścia do zarządzania i planowania systemu logistycznego przedsiębiorstwa motoryzacyjnego, które oparte jest na zasadach elastycznej koncepcji produkcji.

Słowa kluczowe: logistyka, system logistyczny, przedsiębiorstwo motoryzacyjne, mechanizm transformacji systemu logistycznego, zarządzanie, konsument.

Formulation of the problem

Improving the competitiveness of Ukrainian industry is one of the most important tasks of promotion to a market economy. The current state of the automotive industry of the country is poor. The use of outdated technologies, high material and labor costs

lead to higher cost of production of low quality and technical characteristics. Formed control circuit in Ukrainian automotive companies provide opportunities for logistics use practices for the selection of the most favorable set of possible options for running of the business, expanding spheres of influence and increase profitability. Composition and principles of activity of enterprises require implementing logistics concepts based on the results of current research and analysis of market segments. However, the introduction of modern approach to improving the formation mechanism of enterprise logistics system is hampered weak conceptual and methodological rationale, and insufficient adaptation practice and theory of logistics systems to create conditions of modern automobile that caused the relevance of this study.

Analysis of recent research and publications

The question of determining the nature of the logistics system and the basic principles of management was most reflected in the works of local and foreign scientists A.U. Albekova, B.A. Anykin, S.O. Arefyeva, O.V. Arefyevoy, V.I. Berezhnoy, A.M. Hadrzhynskogo, M.P. Denysenko, Donald J. Bowersox, J.S. Johnson, I.M. Kreydych, V.V. Kryveschenko, E.V. Krykavsky, D.M. Lambert, R.R. Larina, I.A. Lenshyna, D.D. Kostoglodov, L.B. Myrotina, Y.M. Nerush, M.A. Oklander, Y.V. Ponomareva, V.I. Sergeeva, J.R. Stock and others.

Overall, the analysis of the literature showed that most scientists consider the nature of the logistics system in terms of the specifics of the research and determining the essence of this concept regarding logistics functional section that determines the need to study the issue from the standpoint of improving the logistics system is automobile company.

Setting task

The main purpose of the article is to outline the essence and basic principles of the formation mechanism of improving automobile enterprise logistics system in terms of adaptation to adverse changes in the external and internal environments.

The main material research.

Before going to define the essence of logistics system and its characteristics need to determine what the system, set its properties. In the encyclopedia dictionary, we see the following interpretation of the concept of the system: “The system (from the Greek. – Whole composed of parts, combination) – a lot of elements that are in relationships and connections with each other, forming a certain integrity, unity” [Dybska 2008]. Thus, under the system understand: complex elements are in interaction; elements with relationship between them and between their attributes; set of elements organized in a way that change, deletion or introduction of a new element naturally appear on other elements; the interconnection between different elements; all consisting of interrelated parts with each other; display inputs and states of the object in outputs of the object.

However, for more accurate analysis of the concept of the system and determine whether the logistics system is a system, it is necessary to determine the properties of the system and correlated with characteristics we investigated – logistics system. Bring characteristic properties of a table 1.

Table 1. Key features of properties logistics system

Tabela 1. Kluczowe funkcje właściwego system logistycznego

Property	General characteristics	Characteristics of the logistics system
1. Integrity and chlenyism	Items are only in the system. Therefore, the system is an integrated set of interrelated elements. Outside of system it only objects. Elements of the system may be diverse, but compatible	Separation of the elements of the logistics system made by different characteristics.
		At the macro level there are elements of the company, between which there is a movement of material flow. At the macro level logistics system components are:
		Purchase – subsystem, which ensures the supply of material flow in logistics system.
		Planning and management of production – this subsystem receives material flow from the subsystem procurement and manages, in the implementation of various technological operations, transforming the object of labor to the product of labor.
		Sales – subsystem, which provides disposal of material flow logistics system. Thus, the elements of logistics systems various qualities, but also compatible. Compatibility ensured unity of purpose, which is subordinate functioning logistics systems
2. The presence of links	There are significant links between components of the system (its elements) that define quality system unite. The strength of links between elements within the system more meaningful and stronger than the bonds of individual elements of the environment. This is the condition of the system existence	In systems at the macro level agreements confirmed the links and micro elements interconnected system of internal relations
3. Organization	Availability of relations – the ability to create system. For real systems, these connections have to be ordered, and thus have a structure, that is organization of system	Relations between elements of the logistics system arranged in accordance with the rules and procedures of the company, and thus the system has organization
4. Integration Quality	The whole system has its own special quality, which is not peculiar to any particular element of the system	This logistics system as a whole has the ability to put the right product, at some time in the right place, good quality, with minimal cost and also has the ability to adapt to market changes

Source: overview author based on their own research.

As we can see from the table, logistics system has all the properties of the system consists of backbone elements are closely interconnected and interrelated, that have sorted ties and form a structure with predetermined properties. Logistic systems are characterized by a high degree of concerted incoming productive forces to control flows. Therefore, the logistics are invested in the generally accepted concept of “system”.

Analysis of modern foreign and domestic literature on logistics showed that there is no single definition of logistics system. Most generalizing without specifying a particular logistics system is the definition given by A.N. Rodnikov “logistics system – a system with adaptive feedback performing certain other logistics functions and logistics operations, consisting usually of several subsystems and has developed relationships with the environment” [Rodnikov 2000].

According A. G. Kalchenko “logistics system – the organizational and economic mechanism of material and information flows. The purpose of the logistics system – delivered in a given place the required number and range of the most prepared for personal consumption or production of goods and products at minimum cost. Along with functional logistics system is also interim subsystem (informational, legal, personnel, etc.)”. [Kalchenko 2004]. However, we believe that the purpose of the logistics system is not only in the delivery of property, but primarily in the overall optimization of all the flows of the company or their association.

In his book “Logistics” Y. M. Nerush describes the logistics system as a system that organizes free distribution and exchange of products so as to ensure optimal supply and demand and optimize activity component subsystems (some units determine the required output for continuous operation of the enterprise – supply, others – engaged in the distribution of products – sales, the third – the promotion of exercise from suppliers to consumers, the fourth – collect information about suppliers, markets, consumers, etc.) [Nerush 2011]. As we noted above, we believe that the task of the logistics system is to optimize not only the performance of individual subsystems (including components), and their interaction as a whole.

Oklander determine the logistics system of enterprise as the organizational and managerial mechanism for coordination of different services professionals who manage material flow. In this sense, the term “logistics system” is used relatively regulator that affects the object – material flow. From their point of view, the logistic system – organizational management mechanism linked to the achievement of the desired level of integration of logistics functions through organizational changes in management structure and implementation of specially designed management procedures, which are based planning supplies, production support and physical distribution as a single material flow [Oklander 2004]. We consider it appropriate to consider the concept of logistics system not only in terms of the administrative mechanism, but also as an integrated set of subsystems that operate to achieve a common goal.

Russian scientists V.V. Dybskaya, P.A. Yelyashevych, Y.I. Zaytseva, A.A. Nayanzy, V.N. Sergeev and A.N. Sterligova characterize the logistics system in a broad sense as a complex organizational finished (structured) economic system, consisting of interconnected in a single process management of material flows and attendant parts, a set of which, border and tasks functioning united to organize internal and external business purposes [Logistics... 2005, Nayanzy 2006, Naumov 2010].

Dybskaya defines logistics system in the narrow sense as a relatively stable set of functional divisions, as suppliers, customers and logistics intermediaries accompanied by major flows and the attendant or combined single control for the strategic logistics plan [Dybska 2008].

Scientists M.P. Denysenko, P.R. Levkovets and L.I. Mikhailova in their work “The organization and design of logistics systems” characterize the logistics system as a set of functional integrity and interrelated elements (subsystems) that define its purpose. We agree with this definition and consider it appropriate to extend the specification of base logistics systems, supply, production, distribution, transportation and storage [Denysenko et al. 2010].

Thus, we can conclude that scientists consider the logistics system in three typical definitions:

1. As the complex processes and phenomena, and relations between them that exists objectively, independently of the subject management. There are elements of the system under study, determined that the characteristics are significant, stands system from the environment, that is least defined inputs and outputs, as well as the most exposed to analyze its structure, it turns out mechanism operation and, on this basis, the impact on the system in a wide direction. Here logistics system acts as a research object and object management.
2. As an institution, mode of study. Specialist logistics develops logistics system as some abstract reflection of real objects. This interpretation logistic system similar with concept model.
3. As a compromise between the first two groups. Logistic system is artificially created by the complex elements (commands, technical, scientific theories), designed to solve complex economic problems. Thus, a specialist in logistics not only provides protection from the system, but synthesizes it. Logistics system is a real object, while connections abstract reflection of reality.

We agree with all the stars point to the notion of the logistics system and offer their own: Logistics system – a set of logistics subsystems that are interconnected internal industrial relations, arranged according to the rules and procedures of the company or their union within a certain territory, and operate to achieve a common goal of logistics enterprises or their associations.

Logistics enterprise system determined by the specifics of its activities. Thus, commercial enterprise logistics system has a specific structure for this activity and logistics system manufacturing plant, which is any automobile building company, has according to its activity different from other logistics system.

Summarizing existing and own research we found that the domestic automotive logistics system business is different and has a common structure. Among the main features of the most important is that the automobile construction company industry enterprises logistics system is primarily determined by the production and subsystem functions according to the rhythms of work of this subsystem. Consider the generalized structure of our automobile construction company logistics system (Fig. 1).

Supply subsystem – a subsystem, that provides the necessary production parts, materials, raw material according to the orders of the subsystem planning.

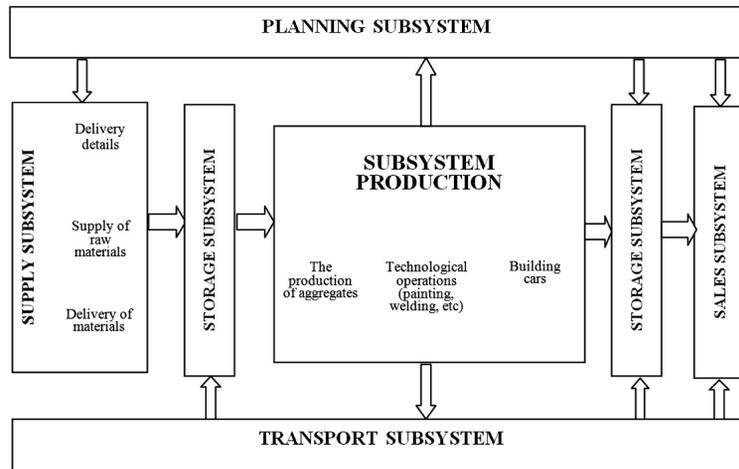


Figure 1. Structure of the logistics system automobile construction company
 Rysunek 1. Struktura systemu logistycznego przedsiębiorstwa produkującego samochody
 Source: own study.

Storage Subsystem – this subsystem, whose main task is keeping insurance stocks according to the related subsystems: if the supply of subsystems – insurance stocks subsystems supply, production – insurance reserves production, sales – sales of insurance reserves. The main task of this subsystem is to store inventory, providing the rhythm of the entire logistics system.

Subsystem production – forming system subsystem of the overall logistics system automobile construction company, which is the transformation of units, parts, raw materials received from the subsystems supply in the finished product – automotive products (cars, buses, trolleys, etc.). Subsystem production is a supplier of finished products to sales subsystem, and is the starting point of information for planning subsystem.

Subsystem planning – a subsystem, whose main task is the planning and coordination over time of all subsystems of logistic system automobile construction company. Input information for this subsystem is the subsystem manufacturing production schedule, output information – graphics supply units, raw materials supply subsystem; schedules delivery of finished products – subsystem for sale. Subsystem planning – a subsidiary subsystem, whose main task is the physical movement of units, parts, raw materials, finished products according to the requirements of the subsystems of supply, production, storage and sales.

Therefore, on the basis of the foregoing, we have developed logistics system improvement mechanism automobile construction company from domestic reserves (Fig. 2).

After analyzing the results of domestic car and considering the benefits of a flexible concept in logistics management system automobile construction company, determine the following main areas of reorganization of business:

1. In order to respond flexibly to daily fluctuations in demand in number and range to provide efficient regulation and nomenclature of production;

2. To ensure high quality products – to introduce a system of supply “just in time”;
3. With a view to the strategic development of the company – to activate the human factor.

Studies problems of organization and management logistics system automobile construction company have identified ways to improve their financial results (Fig. 3). Based on the analytical results of the study of economic data and production of automobile construction company, we can classify the economic and logistic reserves increase the economic efficiency of their operation.

Realization of improving the economic efficiency of automobile construction company and solving problem of improvement of logistics systems is possible using a flexible approach to the management of production and logistic system, and therefore provided logistic system reform of automobile construction company and process management.

Based on the foregoing, we conclude the need to reform the system of logistics of automobile construction company and approaches to address the economic, organizational, methodological and other issues of organization of the company. To address these issues the necessary tools and methods to use and implement the principles of flexibility. In this regard, note that the basic idea of organizational reforms at the domestic automobile construction company is decomposition structure based on logistics and thus the transformation of the logistics system. The beginning of the reform should be to restructure the current production at the plant subsystems, subsystems planning, a deeper integration of suppliers in the manufacturing process, implementing the principles of flexible production concept.

Based on the mechanism we have developed logistics system improvements automotive enterprises from domestic reserves (Fig. 2), we conducted a phased transformation of the existing logistics system of automobile construction company to the new that meets the principles of flexibility and modern market requirements.

According to the scientific and methodological component (Simulation-based logistics management process of organizational and economic stability automobile construction company) and features automotive companies formed phase transformation of the logistics system, that logistics-oriented consumer (Fig. 4).

The essential foundation of all creation flow system is the consumer in the broad and narrow sense. In an extended sense – it is consumer demand that can be forecast based on historical data, seasonality, forecasts, market conditions and more. In a narrow sense – a specific consumer, which forms a specific order on a certain model modification and equipment. The consumer sends your order to the dealer network. The system should seek to reduce targeting consumers and demand forecast to increase to 100% production planning orders for specific customers. Using this approach, the company offers automobile construction company to reach all optimization problems to improve economic efficiency, namely the reduction of inventory of parts, materials, units in the system, increasing asset turnover, increase production, elimination of residues of illiquid finished products, optimization of the company’s balance of payments and so on.

According to modeling processes of service delivery, which is also the scientific and methodological improvement component of the mechanism and system building business partnerships, which is a legal and contractual component built logistics process management system, which includes suppliers (Fig. 5).

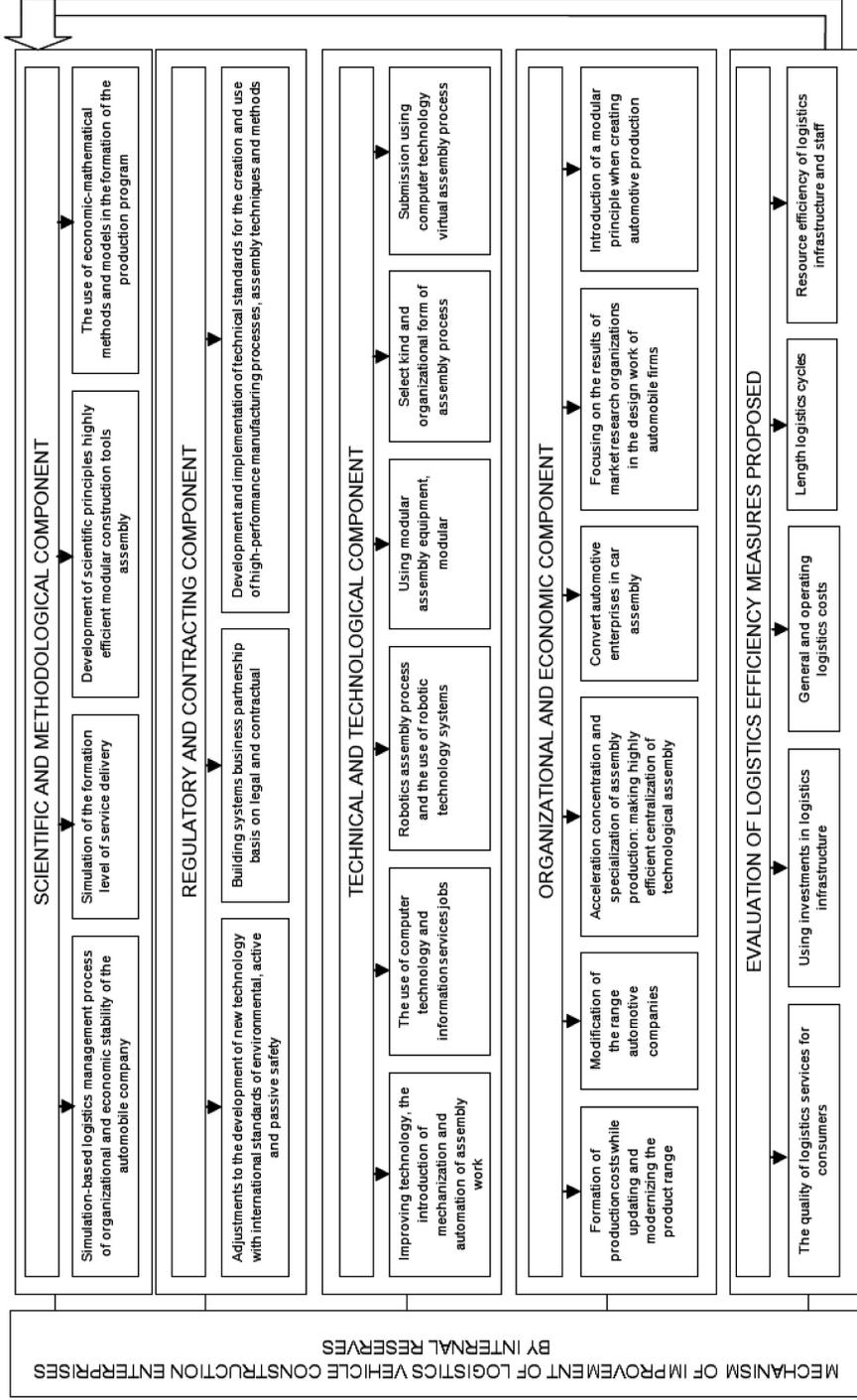


Figure 2. The mechanism of improving the logistics system automotive enterprises from domestic reserves
 Rysunek 2. Mechanizm ulepszenia systemu logistycznego branży automotive w oparciu o własne zasoby

Source: own study.

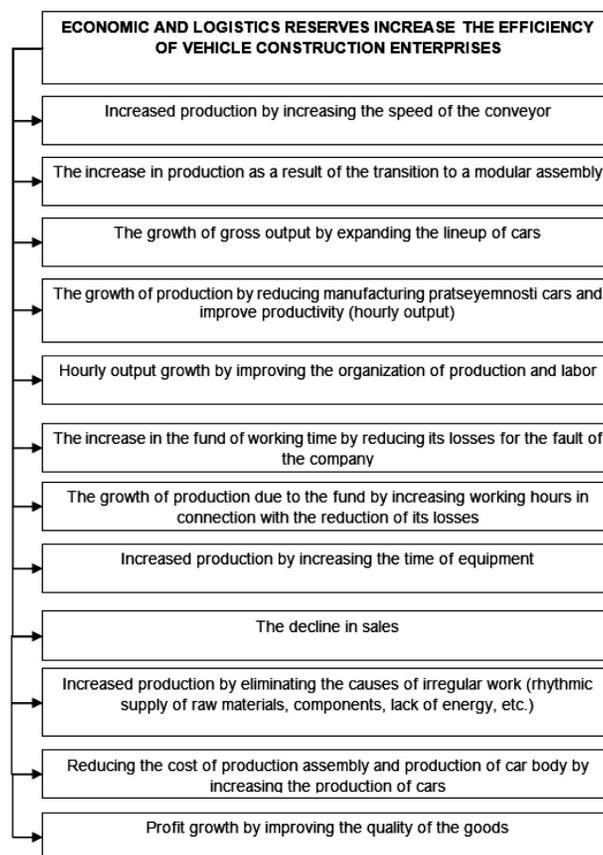


Figure 3. Economic-logistical reserves increased economic efficiency of automotive companies
 Rysunek 3. Ekonomiczno-logistyczne zasoby mające wpływ na wzrost ekonomicznej efektywności branży Automotive
 Source: own study.

The peculiarity of this phase transformation is the inclusion of suppliers in the overall process control of logistics system automobile construction company, unlike the previous system characterized by direct mutual influence suppliers and the company car production. In addition, the transformation of production subsystem that new vision includes the implementation of basic technological operations of body machine painting and in fact the basic process of modern motor vehicle – car assembly process. Production of components, parts and assemblies suitable internal (branches and related automotive manufacturing companies that are not included in production subsystem) and external suppliers. Also, as seen from the scheme, as a complete subsystem storage – subsystem remains only after production subsystems, and storage subsystem that formerly took place between supply subsystem and subsystem manufacturing re transformed into auxiliary functions subsystem supplies. This is due to the fact that the provider directly included

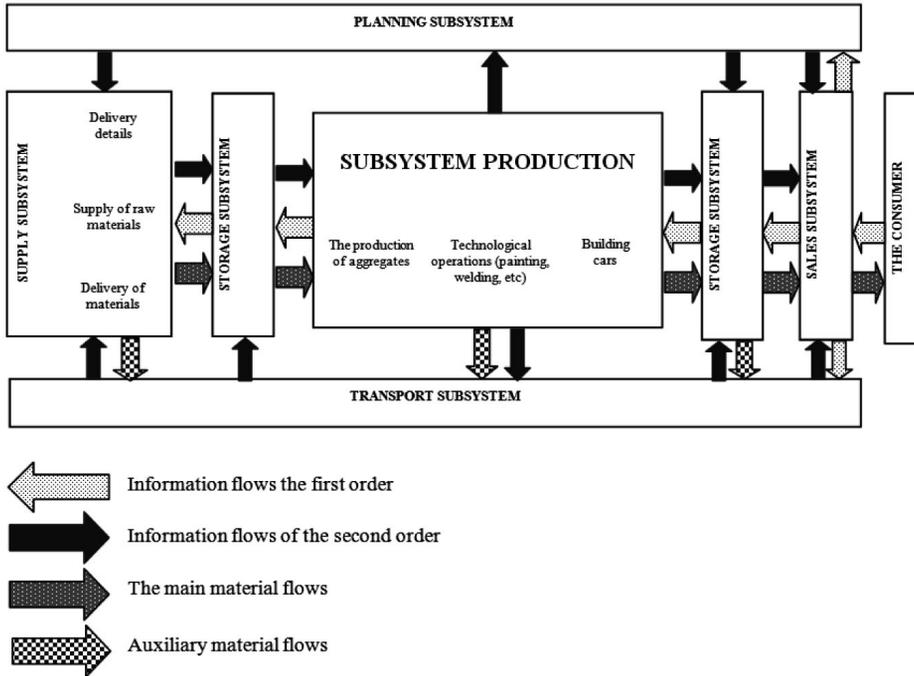


Figure 4. The second phase of the logistics system transformation automobile construction company
 Rysunek 4. Druga faza transformacji systemu logistycznego w przedsiębiorstwie branży Automotive
 Source: own study.

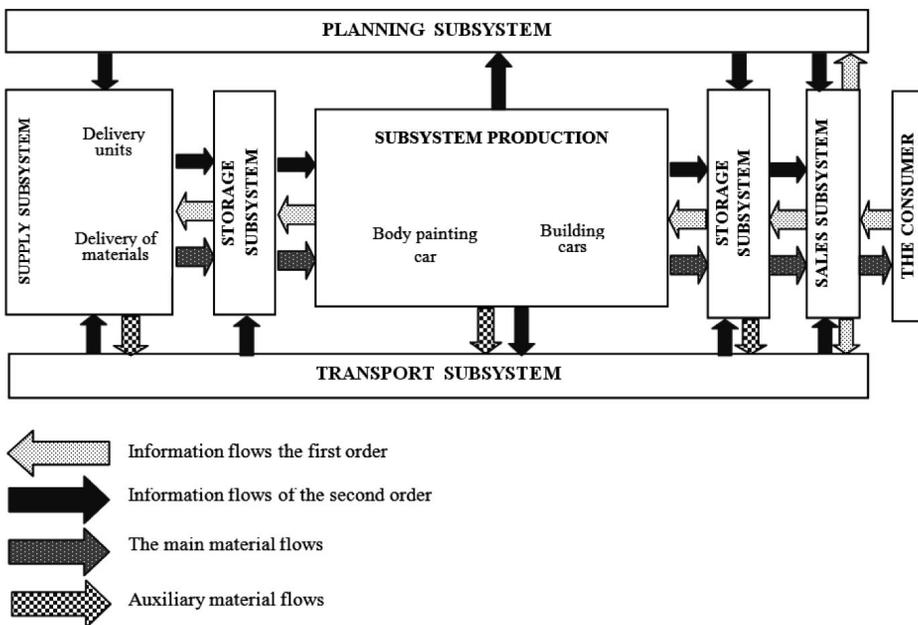


Figure 5. The third phase of the logistics system transformation automobile construction company
 Rysunek 5. Trzecia faza transformacji systemu logistycznego przedsiębiorstwa branży automotive
 Source: own study.

into the main production process manufacturing companies in the automotive subsystem allows automakers do not keep stocks of raw materials, parts, assemblies, and consequently reduce storage costs and free up working capital. The function of the new system for the storage shifted to supply subsystem.

Based on the preliminary stages of transformation we have developed adapted for today's conceptual approach to management and planning logistics system of automobile construction company, based on the principles of flexible production concept (Fig. 6).

Subsystem re transformed into sales dealer network, whose main task is to consolidate customer orders and provide consolidated information on models, modifications, equipment, number and other individual parameters center planning production cars. Implementation of this approach is impossible without reforming the system of own production company, including suppliers in the process of interaction of all divisions and mutual

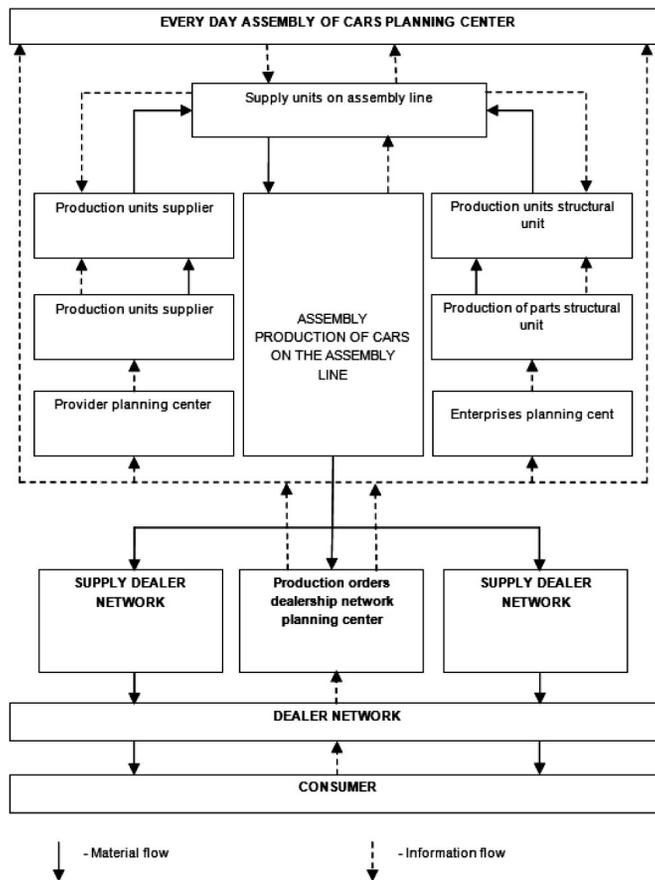


Figure 6. Management and planning of the logistics system of automobile company
 Rysunek 6. Zarządzanie i planowanie system logistycznego przedsiębiorstwa branży automotive
 Source: own study.

responsibility for the outcome. As for the correct work of the consumer in the dealer network must be accurate information on deadline orders, and auto industry must adhere to these terms. Therefore, optimization and restructuring of production processes for the implementation of the new approach is required.

Planning center detail processes the information and sends it with the specification in terms, models, modifications, equipment, additional individual parameters to planning centers suppliers and business units, which are in turn based on the above data create their own production schedules and begin production of parts and later modules and assemblies for the main conveyor.

Planning a daily exercise daily planning center, which receives information from the center of automobile production planning and the main assembly line. Based on the data center every day production planning based on the agreed schedule production car assembly conveyor, supply is supplying enterprises or structural units units and modules in specified time intervals for certain areas of assembly operations.

It should be noted that this production is the backbone subsystem component of logistic system enterprises automotive industry. On how thoroughly and effectively operates this subsystem depends on the whole final financial results of the automobile construction company. This is because the automobile construction company is a manufacturing enterprise, because its main objective is the production of cars. According to our research, advanced automobile construction company must differentiate its own production processes on the main and auxiliary. The main should include and car assembly process. Auxiliary – production of aggregates, parts and modules. Comparing existing and prospective system and planning logistics system of automobile construction company can talk about opposing approaches to planning:

1. The current system operates on a “repulsive” a certain party parts or assemblies for the next transaction and does not respond to whether there actually need them in such numbers and at this particular time. That is the “exit” get what became the “entrance”.
2. Perspective system is organized on a “pull” and shows that the work rhythm, volume and nomenclature of parts and components that are in production, determines not link harvesting but final finishing line. Thus, the production should include what is required on the output.

The findings of this study and further research in this area

The study conducted theoretical analysis of the nature and presented scientific basis of its own definition of the nature of the logistics system. Summarizing existing and own research we found that logistics system of the domestic automobile construction company is different and has a common structure. Among the main features of the most important is that the motor industry enterprises logistics system is primarily determined by the production and subsystem functions according to the rhythms of work of this subsystem. Built logistics system management mechanism automobile construction company through internal reserves based on scientific and methodological, regulatory, contractual, technical and technological, organizational and economic components,

this mechanism takes into account the specifics of modern domestic automobile enterprises. We also conducted a gradual transformation of the existing logistics system automobile construction company to the new that meets the principles of flexibility and modern market requirements. Prospects for further research in this direction could be to deepening study the basic principles of management of each of the specified components logistics system management mechanism automotive business to improve its overall efficiency.

References

- Bowersox D.J., Closs D.J., 2008: Logistics: Integrated supply chain. 2nd ed. [Trans. s English. N.N. Baryshnikova, B.S. Pinsker]. ZAO Olymp-Business, Moskva.
- Denysenko M.P., Levkovets P.R., Mykhailova L.I., et al. (Eds), 2010: Organization and design of logistics systems: Textbook. Center of educational literature, Kyiv, p. 336.
- Dybaska V.V., 2008: Logistics: Textbook, Eksmo, Minsk, p. 944.
- Kalchenko A.G., 2004: Logistics: textbook. KNEU, Kyiv, p. 284.
- Anykin B.A. (Ed.) 2005: Studies for universities, the direction of specialty “Management” / Gos. Univ exercise. etc. - 3rd ed., rev. and add. INFRA-M, Minsk, p. 367.
- Novykov O.A. [Ed.], 1996: Logistics. Studies. manual for schools, MNEPU, BIEPP. – SPb. : SZPI, p. 110.
- Naumov V.N., 2010: Organization of business. Studies. allowance for students enrolled in the direction 080300 “Commerce” and 080111 “Marketing”, ed. G.L. Bagiev. - SPb. [etc.] : Pyter, p. 377.
- Nayanzin N.G., 2006: Logistics: optimizing material resources, VGPU, p. 135.
- Nerush Y.M., 2011: Logistics, A textbook for high schools, Mosk. state. Inst Int. Relations (University) MFA RF, 4th ed., rev. and add, Prospect, Moskva, p. 517.
- Oklander M.A., 2004: Logistic system enterprise, Astroprint, Odessa, p. 312.
- Rodnikov A.N., 2000: Logistics. Terminological dictionary. INFRA-M.
- Zaburanna L.V., 2013: Modern paradigm logistics management system of enterprise, K.I.S., Kyiv, p. 210.

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