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ON THE ISSUE OF PRODUCTION LOGISTICS

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Annotation: This article sets out the definitions, the class of tasks to be solved and the main logistics systems, The analysis of the problems of industrial logistics is carried out, and the solutions of problems are given, as the problem of the maximum (max).

Key words: logistics, logistics systems, production logistics, information flow, material flow.

Logistics as a practical art of command and control and the theory of planning and managing the movement and logistics of troops were widely developed during the Second World War.

Logistics is the science of planning, controlling and managing transportation, warehousing and other material and non-material determinations made in the process of bringing raw materials and materials to a manufacturing enterprise, inside the factory processing of raw materials, materials and semi-finished products, bringing finished products to the consumer in accordance with interests and requirements the latter, as well as the transfer, storage and processing of relevant information [1].

The main object of follow-up and management in logistics has always been the material flow. Logistics is defined - as the management of the movement of goods - by all physical definitions for the delivery of goods from the supplier. From an economic point of view, logistics is interpreted as an activity with the aim of optimally obtaining the required quality of products at a specified location and information support at the lowest cost.

"Logistics is the science of managing and optimizing material flows, service flows and related information and financial flows in a certain micro or macroeconomic system in order to achieve its goals."

“Logistics is an integral management tool that contributes to the achievement of strategic tactical or operational goals of a business organization through an effective point of view of reducing overall costs and meeting the requirements of end users and the quality of products and services of managing material and service flows, as well as the corresponding information and financial flows. ".

Material flow - products that are detuned in the process of applying various logistics operations to it (transportation, warehousing, production, etc.) and related to a time interval. According to the characteristics of the cargo of the material flow during transportation (heavy, large mass, lightweight, oversized, bulk, bulk, piece, packaged pieces), as well as goods in containers, pallets on nas, boxes, etc. etc.

Information flow - a set of messages circulating in the logistics system, between the logistics system and the external environment, necessary for the management and control of logistics operations, exists in the form of speech, documentary (paper), electronic (paperless) and other forms [2].

From the point of view of cybernetics, an economic object (enterprise) - a link in the logistics system - can be represented as an element that transforms the material, financial, and information flows included in it (Figure 1).

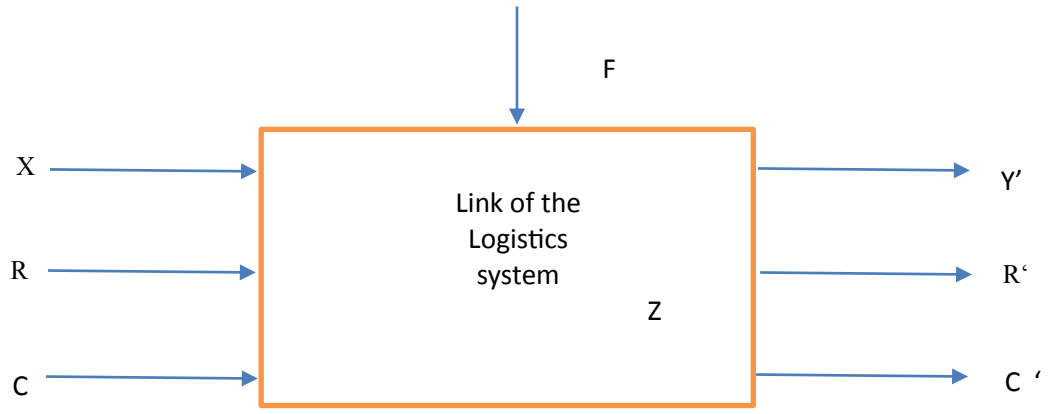


Figure 1. Flow vectors of the logistics system.

On fig. 1. X, R, C are vectors of input material ($X = \{x_1, x_2, .., x_n\}$), informational ($R = \{r_1, r_2, .., r_n\}$) and financial ($C = \{c_1, c_2, .., c_k\}$) flows F is a vector of external disturbances (environmental impact) ($F = \{f_1, f_2, .., f_l\}$); Z – is the vector of parameters of the state of the link of the logistics system

$$(Z = \{z_1, z_2, .., z_s\}).$$

Y', R', C' represent the output vectors of parameters, respectively, material (Y), information (R) and financial (C) flows, the dimension of which in the general case may not coincide with the dimension of the input vectors [3].

Thus, the objects of logistics research are material, informational, financial and service flows.

Logistic operations can be the collection and transfer of information about the material flow, settlements with suppliers and buyers of goods [4].

The basic (complex) logistics activities (functions) include supply, production and marketing. The literature also identifies key (complex) logistics activities: maintaining standards of customer service; procurement management; purchases; transportation; Inventory Management; management of order procedures; production operations management; pricing; physical distribution.

In addition to basic and key logistics activities, complex activities include supporting activities, including the following: warehousing; cargo handling; protective packaging support return of goods; provision of spare parts and services; collection of returnable waste; information and computer support.

Complex logistics activities (functions) - basic, key and supporting - are basic, but do not exhaust the whole variety of actions on material, service flows and related information and financial flows. In conclusion, we briefly formulate the definition of the above terms.

A logistics operation is a separate set of actions aimed at transforming a material or information flow (warehousing, transportation, assembly, loading, unloading, movement of raw materials; collection, storage and processing of information flow data).

Logistic function - 1) an enlarged group of logistics operations aimed at achieving the goals of the logistics system and set by the values of indicators that are its output variables (supply, production, sales); 2) the relationship between the level of logistics costs and the gross national product, between the company's sales volume and the volume of its logistics costs.

An elementary logistic activity (logistic operation) is any action that is not subject to further decomposition within the framework of the research task, which is associated with the emergence, transformation or absorption of material and accompanying information and (or) financial flows (loading, unloading, transportation, etc. .).

A logistic function is a separate set of logistic operations aimed at the implementation of the tasks assigned to the logistic system [5].

In logistics as a scientific discipline, it is customary to single out such sections as supply logistics, production logistics, sales logistics, transport logistics, etc. In the

literature, they are also called types of logistics, its subsystems and functional areas. For example, the following types of logistics are distinguished: logistics associated with the provision of production with materials (purchasing logistics); production logistics; sales (distribution) logistics; transport logistics; computer, or information, logistics [6].

A logistics system is a complex organizationally completed economic system, consisting of elements-links interconnected in a single process of managing material and accompanying flows of element-links. Their totality (elements-links), the boundaries and goals of the organization of the enterprise and external goals.

The main goal of the logistics system is to deliver goods in the right quantity and assortment and, to the maximum extent possible, ready for industrial or personal consumption to the place required by the consumer ("the right product at the right time and in the right place") at a given level of logistics costs.

The elements-links are enterprises - suppliers of material resources, manufacturing enterprises and their divisions, marketing, intermediary organizations, transport and forwarding enterprises, exchanges, banks, information and computer service enterprises. Most links of the logistics system is a synthesis of subjects and objects of management with their own criteria for optimizing the functioning, which greatly complicates the management in the logistics system.

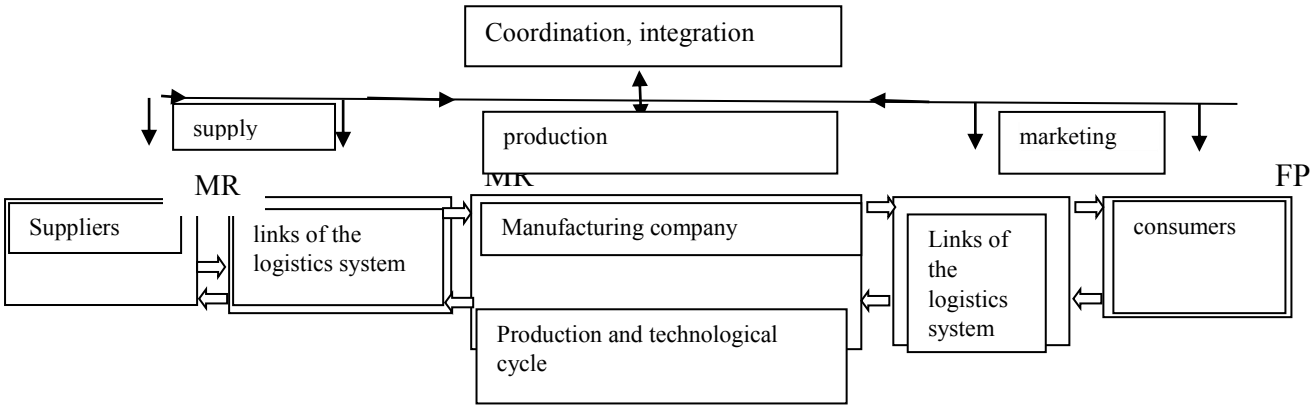
Logistics systems are divided into two groups: micro logistics and macro logistics systems. Accordingly, there are concepts of "micro-logistics" and "macro-logistics". [4].

Micrologistics systems - industrial, commercial enterprises, etc. - are designed to manage and optimize material, information, financial flows in the process of production or supply and marketing.

Within production, such systems solve the problems of efficient use of material resources, reducing their stocks, accelerating the turnover of the enterprise's working capital, reducing the main production time, managing inventory in the warehouse system and optimizing the operation of technological transport.

The links of the logistics system can be both intra-company transport, production or warehouse divisions, as well as attracted intermediary enterprises. The most important tasks of micrologistics systems are the coordination of goals with suppliers and intermediaries, the coordination and integration of logistics operations. In this case, internal production and external logistics systems can be considered as subsystems of an integrated logistics system. [2]. Fig 2.

Here is the structure of the micrologistic system



RMF	RMF	RMF	RMF
- Purchases -Transportation -Inventory Management - Warehousing - Cargo handling -Collection of returnable waste, containers	Production procedure management - Intra-factory transportation - Inventory Management - Maintaining quality standards for the production FP - Protective packaging - Cargo handling - Warehousing - Pricing	Management of order procedures - Transportation Protective packaging - Cargo handling - Warehousing - Inventory Management - Provision of spare parts and service - Support for the return FP of the collection of returnable waste, containers - Support for customer service standards - Pricing	
Logistics operations (functions)			
Information and computer support			

Fig.2. The structure of the micrologistics system

-- ⇨material flows; - information and financial flows; MR – material resources; FP – finished products; RMF – return material flows

On fig. Figure 2 shows the structure of the micrologistics system, which, depending on the scope of logistics operations, can function as an integrated or intra-production one [7, 8].

And so, micro-logistics solves local problems within individual links and provides logistics operations for planning, implementing and controlling the processes of moving goods inside or outside industrial enterprises.

"Macrologistics solves issues related to the analysis of the market of suppliers and consumers, the development of a general concept of distribution, the placement of warehouses at the service site, the choice of the mode of transport and vehicles, the organization of the transport process, the rational directions of material flows, the points of supply of raw materials, materials and semi-finished products with the choice of transit or a warehouse scheme for the delivery of goods.

In production logistics, tasks can be formulated as a task of maximum max. This means the task of logistics with the criterion of maximum profit from manufactured goods, raw materials, semi-finished products, etc.

Production logistics with maximum profit To solve this problem, it is necessary to find the volume of goods produced at maximum performance [9, 10].

$$F = \sum_{j=1}^{m} P_j Y_j - \sum_{r=1}^{n} \sum_{q=1}^{Q_r} r_r^q x_2^q \rightarrow max$$

1. $\sum_{r=1}^{k} \sum_{q=1}^{Q_r} M_{rj}^q x_r^q \geq Y_j \quad (j = 1 \div m) \rightarrow.$
2. $D_i \leq Y_j \leq D_j$
3. $\sum_{r=1}^{k} \sum_{q=1}^{Q_r} G_{ri}^q x_r^q \geq G_i \quad (i = 1 \div L)$
4. $\sum_{q=1}^{Q_r} x_r^q \leq 1$
5. $x_r^q = \begin{cases} 1 \\ 0 \end{cases}$

D_i – the volume required by the consumer,

D_j – the maximum necessary goods for sale,

P_j – sales chains of goods,

Y_j – volume of goods for sale,

G_i – raw materials,

G_{ri}^q – types of raw materials for production,

M_{rj}^Q – the number of goods produced,

Z_r^q – storage costs,

R – logistics links,

X_r^q – the number of goods for sale, or the number of goods accepted in a trading enterprise.

Conclusion can be summarized that the task of production logistics with all criteria is the maximum task (max).

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