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The Problem of Organizing Product Delivery to Distribution Warehouses in Logistics

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Annotation
Organization of product delivery to distribution warehouses is one of the important issues in the field of logistics. The main focus is on optimizing the process of delivering products from the manufacturer to the warehouse on time, with minimal cost and high reliability. The issue of effective organization of product delivery to distribution warehouses in the logistics system was studied. Information was provided on how to effectively organize processes aimed at optimizing the process of delivering products to distribution warehouses, reducing delivery time, reducing costs and minimizing errors.

Keywords: logistics, distribution, warehouse, product, inventory, customer, delivery, storage, system, transportation costs, optimization, service, planning.

Introduction

The continuous development of world trade requires fundamental changes in transport markets, including the transport system of our country. The development of transport in accordance with international standards and the latest technologies has increased the interest of specialists in the field of development of forwarding services. The intensification and intensification of competition have led to the fact that the level of service is currently given the greatest attention.

Activities in the field of logistics are multifaceted. They include transportation and distribution processes, management of reserves and warehouses, organization of information systems, management of commercial and financial activities. In the modern logistics system, it is important to deliver goods in a reliable, fast and cost-effective manner. In particular, the correct selection of suppliers serves to increase the operational efficiency of the enterprise, reduce costs, and optimally satisfy customer needs. The main goal of logistics is to optimize material resources in the supply system, to effectively meet the demand of production pieces for raw materials, materials, parts, semi-finished products, and to reduce total costs, taking into account all efforts to deliver finished products to consumers [1-2].

Literature analysis and methodology. In logistics, there are many scientific works and studies on the issues of product delivery to distribution warehouses. Many of them are focused on the following directions:

Supply Chains and Their Optimization - Methods for the effective location of distribution warehouses and optimization of supply chains. This includes optimization through mathematical models, simulation methods and algorithms. Logistics Network Planning - Using mathematical and statistical models to reduce delivery times and transport costs when building a network of distribution warehouses. Quality and time management - Quality management in the delivery of products, for example, ensuring that deliveries are made on time. Sustainability and Green Logistics - Environmental aspects should also be considered during the delivery of products to distribution warehouses. The development of sustainable logistics and green transportation systems is one of the main directions in this direction, and there are studies aimed at reducing the environmental impact in logistics systems. As in other fields, various methodologies and techniques, as well as empirically based scientific approaches, are used in the logistics sector. Usually, combining these methodologies, using them in practical work and scientific research, as well as introducing advanced technologies, is the main goal of effective delivery of products to distribution warehouses [3].

In modern literature, in connection with the current economic conditions, more and more attention is paid to quality problems. Many foreign and domestic authors have always paid special attention to the issues of speed and quality of cargo delivery in their studies, especially the works of such classics as A. Feigenbaum, E. Deming, K. Ishikawa, S. Shiro, J. Harrington. It is their research and development, as well as their practical application in creating a universal management philosophy, that have helped many developed countries (USA, Japan, etc.) to become leaders in the world economy today. However, the practical and theoretical problems of increasing the efficiency of transport companies, the quality of service and the complexity of the provided services have not yet been considered. The implementation of an automated system of speed and quality management in the activities of transport companies optimizes the process of product distribution from the manufacturer to the end user. This article determines the relevance, its purpose is to form new approaches to the management and organization of the cargo delivery process [4-5-6-7].

The above constitute the scientific basis for the effective organization of a system for delivering products to distribution warehouses. By implementing these methodologies, the efficiency of distribution systems can be improved.

Methods. Logistics is considered from two aspects: managerial and technological. Organization of distribution management, promotion of material flows and sales support is an organizational direction. Thus, organization of direction in the field of logistics is a functional area of logistics that stimulates material flow and provides supply marketing. The technological direction of the logistics sector is a functional area of logistics that implements the improvement of transport technologies, warehousing, information support, planning and control. Individual functional directions of logistics (shown in table 1).

The main tasks of logistics that are solved in various fields.

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№	Logistics directions	The main tasks
1	Reserves	Planning, forming and maintaining the necessary reserve
2	Production	Production of material goods and production of material services (works that increase the value of previously created goods)

3	Distribution	Determining consumer demand, establishing economic relations, providing services to consumers, choosing reasonable forms of distribution and organizing trade.
4	Product transportation	Selection of the type of transport, means of transport, planning and control of product delivery.
5	Warehouse and warehouse processing	Choosing the location of the warehouse, managing the warehouse, packaging.
6	Information provision	Collecting information on the movement of material flows and supporting logistics processes with computers.

Distribution is a field of logistics that includes all tasks to manage the flow of material from the producer to the consumer, from the moment of the fulfillment task to the delivery of the product to the consumer or the completion of after-sales service. As a result of the application of logistics, raw materials and goods stocks are minimized, suppliers and stocks are located optimally, the time of movement of goods from production to the consumer sector is reduced, and all this ultimately leads to a decrease in total costs [8-9]. Requirements for warehouse planning:

- the possibility of using effective methods of placing products;
- ensuring conditions for the full preservation of storage pieces;
- to eliminate the negative effects of certain types of products during their joint storage with others, to ensure the conditions for maintaining product quality;
- the possibility of effective use of transport equipment, lifting equipment; convenient access to products;
- ensuring the flow and continuity of the warehouse process [10].

Distribution warehouses are infrastructures designed to store, manage, process products and then deliver them to customers or other departments. The organization of effective product delivery systems in logistics consists of the following key components:

Warehouse management - Methods of effective warehouse management for storing products and delivering them within the planned timeframe.

Transportation and delivery - The use of transport systems to transfer products from a distribution warehouse to the buyer or to subsequent production pieces.

One of the most modern forms of organizing and storing a warehouse is the organization of warehouses. A warehouse store is a warehouse with various degrees of mechanization and automation, designed for the placement, storage and retrieval of packaged products in a wide range of products. In this regard, the operation of this repository is normal. The main thing is that if the excess transit volume in the warehouse exceeds the planned transit volume, it is allowed to quickly sell it to small wholesale buyers. For this, the sales floor and receiving, collecting and shipping areas, as well as administrative and service rooms should be located in the warehouse [11].

Discussion. Before defining the logistics of backup, we need to know what backup is. Reserves are an integral element of any economic system, eliminating inequality of production, exchange, distribution and consumption, material wealth. The presence of reserves can be considered as positive and negative situations in the economy of the enterprise. Excess reserves divert significant financial resources. Commodity and material reserves are various types of material resources intended for industrial consumption. We highlight the main reasons for the formation of reserves:

- ✓ inconsistency of the volume of delivery with the volume of one-time consumption;

- ✓ the time interval between the moment of receipt of materials and its consumption;
- ✓ climatic conditions of the area;
- ✓ reduction of transport costs [12].

Reserve logistics deals with the management and organization of goods and material reserves in warehouses and controls the costs of warehouse operations. Next, let's take a look at the functions that reserves perform:

1. The accumulation function is the main function of reserves. For example, if the demand for a product is high in the summer, production should be increased in the winter season to meet the summer demand. Thus, accumulation of production products avoids losses due to stock shortages.

2. Inflation protection function. By putting the cash in the bank, the company can make a good profit. Reserves can grow in value faster than money in the bank. Consequently, stocks are a good investment, but storage costs and risks must be considered.

3. Function of cost management. As the order volume changes, we change the order volume to receive discounts, otherwise, by increasing reserves, we reduce the ability to invest in other projects. The concept of reserves is inextricably linked to the concept of shortage. The following types of shortages are distinguished:

- ✓ natural (lack of certain types of resources);
- ✓ technological (they were formed because they did not do the right thing);
- ✓ artificial (appeared artificially).

If there is a possibility of a shortage, it is necessary to create reserves that allow maintaining the required level of production regardless of the situation [13].

Result. Problem statement. The finished goods warehouse of an industrial enterprise has a stock of 900 pieces of products. The minimum (reserve) balance in their warehouse is 100 pieces. The products of the enterprise are distributed through three distribution warehouses. The stock of products in the first warehouse is 80 pieces, and the average daily sales volume is 20. The stock of products in the second warehouse is 100 pieces, and in the third - 120 pieces, and the average daily sales volume is 25 and 40, respectively.

The accuracy of the optimal volume of product delivery from the warehouse of finished products to distribution warehouses, taking into account their available number and volume of sales in these warehouses (given in Figure 1).

1. We determine the average supply of products by Tsr, taking into account the fact that distribution warehouses are replenished with stocks from the warehouse of finished products on the day of sale:

$$T_{o'r} = \frac{Q_{o'r} + E\, z_{t.o}}{E\, p_{t.o}}$$

In this formula, $Q_{o'r}$ — is the stock of distribution products in the warehouse of finished goods (900 - 100 = 800 pieces); ΣZt.o. — the sum of products located in the distribution warehouses (80 + 100 + 120 = 300 pieces); ΣPt.o. — the sum of daily average sold products in distribution warehouses (20 + 25 + 40 = 85 pieces).

$$T_{o'r} = \frac{800+300}{85} \quad 1294 \text{ days.}$$

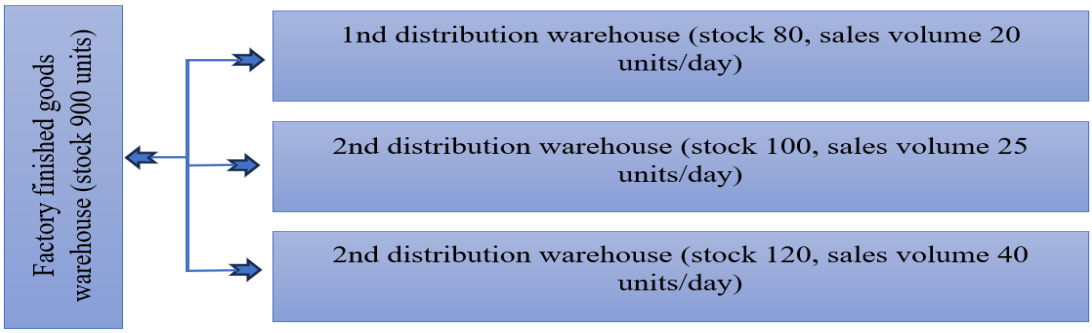

Fig. 1. Scheme of delivery of products to distribution warehouses.

2. The number of products sent from the warehouse of finished products to the first distribution warehouse Q1 is calculated by the following formula:

$Q1 = (T_{o'r} - Zt.o.1 / Pt.o.1 \times Pr.s.1$ pieces)

In this formula, Tor - is the average supply of products to all distribution warehouses (for 12.94 days), taking into account replenishment from the enterprise's finished goods warehouse; Zt.o.1 - is the available stock of products in the first distribution warehouse (80 pieces); Pt.o.1 - is the daily sales volume from the first distribution warehouse (20 pieces).

Q_1 (12.94-80/20) × 20 = 178.8 or 179 pieces.

3. Similarly, we calculate the optimal batch of products that should be sent from the finished goods warehouse to distribution warehouses No. 2 and No. 3:

Q_2 (12.94-100/25) × 25 = 223.5 or 223 pieces.

Q_3 (12.94-120/40) × 40 = 397.6 or 398 pieces.

We compare the results obtained with the total volume of distributed products in the finished goods warehouse: 179 + 223 + 398 = 800 pieces.

Thus, taking into account the given data, the estimated shares of the distribution of the factory's finished product stock to distribution warehouses No. 1, 2, and 3 are 22%, 28%, and 50%, respectively [15-16-17].

Conclusion

In logistics, modern distribution systems are one of the most important aspects of organizing the delivery of products to distribution warehouses. Effective management of this process helps to increase the overall efficiency of the company and reduce costs. It is necessary to correctly select vehicles for delivering products to warehouses, develop optimal routes and time plans, and take into account the full needs of warehouses with a complete inventory. Effective management of the supply of products to distribution warehouses helps to ensure the continuity of commercial and production processes, while improving the quality of customer service. Creating an effective distribution system also reduces the costs associated with the movement of stocks and products, optimizes costs and time [18-19].

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