OPTIMIZATION OF BUSINESS PROCESSES IN THE AIRPORT WAREHOUSE COMPLEX

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ABSTRACT

Business problems of the warehouse complex, consisting of many different subsystems and elements, put together to perform economically motivated functions for transformation of material flows are considered. Their main parameters are given, the necessity of warehouses in logistics systems is substantiated, risks are analyzed directly in regard to warehouse logistics. The features of operation of cargo terminals of airports are outlined.

Keywords: air transportation, airport, warehouse logistics, business processes, economic efficiency, material flow, risks.

Background. *Warehouse logistics is one of the priority areas for development of the entire logistics industry. Optimizing the costs of storage can significantly affect the amount of costs when selling goods. In countries where the market economy is only at an early stage of development, an understanding of distribution of the financial component of logistics by its elements is not sufficient to carry out a truly effective business.*

In the Russian Federation, due to not always identical borrowing of foreign technologies and the specifics of own business, logistical costs for storage often go beyond acceptable limits. The lack of serious competitors in logistics and among forwarding companies does not force them to restructure the warehouse business, they can afford to operate in the usual mode and rhythm. The entry of successful foreign companies into the Russian market would be able to initiate the process of introducing new technologies and equipment into the logistics business, but there is also a downside to the coin. For such competition, on the one hand, there will inevitably be a contraction of the companies themselves, and on the other – a general gradual increase in the cost of services for carriage of goods.

Despite the fact that speed of delivery of goods is, in fact, a regulator of the entire transport industry, the accompanying freight transportation costs for players in the Russian logistics market have a fairly large share in the total cost of services. So, if we go to the warehousing logistics, the cost of storing cargo sometimes reaches 80 % of the cost of the whole process of transporting goods. It becomes obvious that once the goods temporarily do not participate in movement of material flows, then they cannot bring additional alternative incomes. The lost profit emerges, the total volume of which is able not only to influence development of the transportation industry, but also to develop the entire economy of the country.

Objective. *The objective of the author is to consider optimization of business processes in the airport warehouse complex.*

Methods. *The author uses general scientific methods, comparative analysis, evaluation approach, statistical method, economic evaluation method.*

Results.

In accordance with the conceptual apparatus of logistics science, a large warehouse (Pic. 1), regardless of the nature of goods, container or piece, is a complex technical structure with many different subsystems: a complex of buildings, a set of processed goods, an information network, a whole set of elements for implementation given functions on transformation of material flows.

With the use of the principles of logistics and modern approaches to inventory management, the attitude to warehouses also changes. They become a place of transformation of material flows aimed at satisfying the needs of customers. The logistics of warehousing implies not the implementation of the warehouse management process, but rather the predominant management of commodity flows passing through the warehouse network.

Optimal functioning of the logistics infrastructure in relation to the warehouse complex means matching the characteristics of incoming and outgoing flows while optimizing the available resources: warehouse capacities, technical facilities, personnel, etc. This result is achieved by solving the problems of planning commodity flows.

Of great importance is the reduction of storage and handling of cargo flows, as well as downtime. However, without warehouses, the implementation of the supply chain cannot be imagined. Another question is how efficiently this or that complex will work, what will be the technologies used by its personnel.

A warehouse, regardless of industry, has always had a complex system, which is characterized by a variety of parameters, technological, volume-planning solutions, the design of the equipment used, the characteristics of processed goods and the operating conditions of the entire complex. But being an already complex system, the warehouse is necessarily, nevertheless, also an element of the logistics system with which it continuously interacts. In fact, most of the problems that arise within it are due precisely to the external logistics environment.

As a part of the integrated logistics system, the warehouse is provided with a set of organizational, technical and economic requirements. The same differentiation can be applied to the risks associated with warehouse activities, but depending on the transport industry in question, it will undergo certain changes.

Any system can function only in conditions of observance of necessary norms, achievement of the set goals, compliance with the criteria of optimal functioning. Warehouses are no exception, their existence is dictated by the conditions of cargo processing. In logistics systems, this is reinforced by the need for:

- *coordination and alignment of supply and demand in supply and distribution;*
- *reduction of logistics costs during transportation;*
- *ensuring maximum satisfaction of consumer demand;*
- *creating conditions for maintaining a sales strategy;*
- *increasing the geographical coverage of the market;*
- *uninterrupted supply of end consumers, the possibility of organizing the commodity stocks;*
- *providing a flexible service policy, especially in systems with independent demand.*

From the requirements for cargo keeping, the main functions of warehouses follow:

- *leveling the intensity of material flows in accordance with consumer's demand;*

Pic. 1. Elements of a large warehouse.

• *conversion of the assortment within the material flow in accordance with client's order;*

• *maintenance of concentration and storage of stocks;*

• *smoothing the asynchrony of the production process;*

• *unification of the shipment consignment;*

• *provision of services for warehousing, cargo handling, packaging, transportation, information support.*

A warehouse, properly performing its functions, solves the problem of timely provision of goods and services to consumers, thereby ensuring the maximum level of customer service. It concentrates and replenishes stocks at optimal costs on the basis of inventory accounting in natural and value terms. Thanks to warehouses, there is a balance between the increase in the rates of production and the volume of output with the growth of consumer demand.

A warehouse also solves the traditional problems associated with implementation of the technological process of cargo processing:

• *maximum use of warehouse capacities;*

• *rational handling of loading and unloading and storage operations;*

• *efficient use of warehouse equipment;*

• *elimination of losses of goods during their warehousing and storage;*

• *preparation of goods for sale: marking, special packaging, etc.*

The storage policy and the activities of the company's warehouse are influenced by:

• *warehouse location in the logistics system;*

• *features of the industry;*

• *the purpose and objectives of the business, implemented by the company;*

• *availability of capital;*

• *characteristics and features of goods, storage conditions, variety of commodity items, the possibility of replacing one product with another;*

• *shelf life of the goods;*

• *economic conditions of the company;*

• *competitive business environment;*

• *seasonality of demand for goods;*

• *applicable logistics technologies;*

• *use of e-commerce and much more.*

Warehouses, regardless of the field of application, are characterized by mandatory parameters:

• *location of the warehouse and its size;*

• *peculiarities of access roads;*

• *construction: storey, height of the building, step of the columns, availability and location of auxiliary rooms;*

• *loading and unloading front: the number of gates, the height of the ramp, the size of the site in front of the warehouse, its equipment;*

• *storage system and spatial planning solutions: types of racks, their placement in space, the availability and size of working areas; applicable information system, as well as the system of commissioning and management of cargo processing;*

• *technical equipment – types of hoisting and transport equipment;*

• *warehouse personnel: distribution of functional responsibilities, the number of members, distribution of liability;*

• *commodity flows: assortment, intensity of receipt on a warehouse and an output from a warehouse, commodity carriers and transport container;*

• *customer base;*

• *suppliers.*

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Optimal work of the warehouse depends on the set of questions facing its owners, the incorrect solution of which carries its risks first of all for the warehouse itself, as well as all elements of the external environment – customers, intermediaries, suppliers, etc.:

1. How to improve the performance of the warehouse?

2. How to optimize available resources?

3. How many employees should be employed?

4. Which motivation system is effective?

5. How to take into account the workload per employee?

6. How to reduce theft?

7. How to improve customer service performance?

8. How to shorten the order picking time?

9. How to improve labor discipline?

10. How to ensure financial responsibility?

11. Which information system is optimal?

12. Is it rational to use the technique used?

13. Is it necessary to send out a forwarding department?

Only a differentiated approach to solving these problems, taking into account external and internal factors, reduces risks to possible minimum and makes warehousing activities profitable.

In any case, the organization of the warehouse economy should be accompanied by development of a project that provides the necessary infrastructure while respecting economic feasibility. At this stage, such tasks as the creation of a master plan, a structure of warehouse zones and their volumetric design decisions are being solved. Of great importance is the analysis of the implemented project and the subsequent optimization of the structure elements of the entire complex.

Thus, regardless of the sectoral nature of logistics activities, there is an inherent need for specially designed and equipped places for storage and handling of goods. In addition, such a need arises at all stages of the flow of material flow in the supply chain.

Each type of transport, as well as potential customers interested in its use for cargo transportation, have certain features. Transportation of goods by air is also inherent in its specificity. Almost any major airport, in addition to passenger transportation, also carries cargo.

Adapted for handling material flows, cargo terminals have their own internationally accepted name – cargo (from «cargo» – load, loading). It is characteristic that Russian airports today do not have autonomous cargo terminals, whose activities would have a complete closed cycle of services in isolation from the passenger sector. That is, cargo terminals in the Russian Federation mainly operate under the auspices of passenger airports.

Cargo terminals of airports play the same role in the chain of deliveries of goods from producer to consumer, as well as many other terminals and warehouses of different modes of transport. The main function of terminals in air transport is ground handling of cargo flows, providing warehouse and other services accompanying the process. Warehouse logistics in cargo terminals is not without the logistics of financial, informational and mandatory – reverse flows.

In Russia, due to disproportionate development of passenger and freight traffic by air transport, state subsidies to the latter are carried out in insufficient mode. Such a distribution has its consequences: entry to the market of freight traffic of new companies is complicated not only by the absence of the designated territories and airfields, but also by the large material burden that falls almost entirely on the shoulders of private business. For high costs, the cost of services for customers should be increased.

In addition to this factor, the Russian air cargo market has a disproportionate distribution of time of cargo being on land and in the air, and with a clear advantage in favor of ground operations. The lack of initiatives to optimize warehouse logistics directly affects the cost of transportation services for their customers. The result of a combination of these factors is a gradual rise in the cost of services to a level where the number of interested parties is significantly reduced.

Not all types of cargo are cost-effective to be transported by air. For example, the most popular of them – raw material is not transported by air due to volume, cost, weight and for many other equally valid reasons. Transportation by air transport usually involves: lightweight, heavy, large-sized, valuable, perishable, wet cargo, live cargo, dangerous goods, radioactive materials.

The flow of goods as a material flow, processed in terminals of cargo airports, has its own peculiarities:

• unevenness in time, and, consequently, uneven load of cargo terminals themselves;

• shipment of cargo is usually carried out by small shipments, because of direct dependence of the cost of transportation on the volume of goods;

• special conditions for storage and transportation of goods due to their specificity.

The cargo complex of the airport, in accordance with the functions of receiving, sending, processing, handling and loading cargo onto aircraft, is equipped with all necessary infrastructure facilities and without fail – a covered heated warehouse or warehouses, delivery and mechanized loading and unloading means, machinery to handle bulk goods and containers.

Conclusions. *Due to the characteristics inherent only in the aviation industry, the transportation of certain types of cargo can often be carried out only by air transport and no other transport mode can be used. In addition, modern technologies of the aviation industry make it possible to develop this field of activity to economically efficient limits: a new special cargo technology – new prototypes of airplanes and helicopters appear; the pace and quality of handling and transportation of goods is growing, and speed along with quality in logistics is a priority.*

The overall efficiency of business processes in a concentrated form is demonstrated by the airport system, including the cargo complex subdivisions. And the role of terminals and warehouses is becoming more significant, since they participate in transformation of material flows. The logistical component in the chain of air transportation is being increased. The study of the problems presented in the article, the ways to solve them, the problems of optimizing warehouse activities at airports confirms the growing scientific interest in the topic under discussion.

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