

Concept of logistics processes in the activity of a construction company in the implementation of innovative construction projects

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Abstract. The main objective of the study is the study and analysis of logistics processes in the activities of construction companies. During the study, methods were used to analyze existing approaches to the management of the logistics system in construction, as well as methods for the effective management of material and technical support. It was revealed that, based on the prevailing conditions, the mission of the logistics center is the introduction of an effective logistics system to ensure construction, which supports the growth of construction volumes by uninterrupted supply of construction materials to Group A. The main goal is to reduce construction time by implementing MRP2 and just-in-time concepts and a cost-effectiveness strategy. It can be concluded that logistics considers the movement of material flows in a company as a single and interconnected process, regardless of which unit controls these flows at the moment. Moreover, logistics technology involves close interaction with other departments at various stages of work with external contractors.

1. Introduction

Many companies have established special departments or logistics centers to achieve competitive advantages in the market. After collecting and analyzing the information, the employees of the department (logisticians) are engaged in planning the company's activities in different directions, followed by the organization of the relevant processes. Logisticians give recommendations to all services and departments of the construction company, based on the optimization of costs in the professional production of construction products and their sale to the customer. Control also concerns the fulfillment of the company's obligations on the basis of concluded contracts, including those related to the supply of construction materials. By acting correctly in all areas of logistics activities, they achieve the fundamental goal of increasing profits and gaining competitive advantages.

Thus, in order to optimize logistics at a construction company, it is necessary to apply a set of measures that reduce costs not only in a separate element of the supply chain, but in the aggregate in the entire chain of construction production.

To do this, it is necessary to implement a logistics management methodology. Logistics management is a set of methods and methods for managing the product distribution process based on determining the optimal parameters (the optimal criterion can be the minimum overall logistics costs, the level of service provided to customers, and the level of risks in the supply chains).

2. Materials and methods

Many construction companies that have switched to logistics management have become more efficient in organizing the entire production cycle [1]. Thanks to this concept, they were able to make more

sense: use loans for the purchase of material resources, purchase raw materials, select suppliers, organize the processes of both production and distribution of finished products, as well as related information processes that accompany all stages of production organization [6].

New principles of organization and management, based on conceptual approaches and methods of thinking, United by the general concept of “logistics”, are increasingly and successfully applied in practice by the most effectively functioning construction companies [3]. One of these competitive enterprises is «HCC “VostSibStroy”».

The company «HCC “VostSibStroy”» uses one of the levels of logistics management, i.e. a universal plan for optimizing logistics costs. However, based on the optimization methods presented below, you can make an individual plan to improve the efficiency of material flows at the construction company.

First of all, it is necessary to plan the supply of construction materials and related operations, which allows you to optimize purchases and inventory levels. It is necessary to analyze the entire range of purchased products and determine the part of it that brings the maximum effect, because, according to Pareto's law, 20% of efforts give 80% of the result, and the remaining 80% of efforts – only 20% of the result.

To do this, the *ABC*-analysis method is used: dividing the entire range into groups based on the demand for products-from the most popular, fast-turning products to the most low-consumption and unprofitable ones. In turn, *XYZ*-analysis allows you to evaluate the regularity of delivery of a particular group of materials. Based on a combination of these methods, the product range is optimized, which leads to a reduction in purchasing costs and helps to avoid the accumulation of excess products.

Second, suppliers of materials are determined after the rating is compiled. For this purpose, the main criteria for selecting a supplier are set, for example: reliability of delivery, price, quality of goods, payment terms, the possibility of unscheduled deliveries, and the financial condition of the supplier. The specific weight of each criterion is determined. For example, if you need to order construction material that is not in short supply, then the reliability of delivery will have the largest share. Then suppliers are evaluated according to the criteria on a point system from 0 to 10. Further, the rating of each is calculated as the sum of the products of the score of the criterion value by the specific weight of the criterion. The supplier with the highest rating, and is the best for the company «HCC “VostSibStroy”».

After optimizing the procurement procedure and inventory rationing, the most efficient warehouse logistics model is selected. When solving this issue, the financial capabilities of the enterprise, the volume of turnover, and others are taken into account. Your own warehouse allows you to change your storage strategy. But the use of such a warehouse is economically justified with a consistently high demand for construction products and profitability of the enterprise.

When optimizing logistics, we should not forget that the human factor plays a significant role in this process. It is the warehouse employees who accept the goods, place them on the shelves and complete them when ordering, as well as send materials to construction sites.

Optimization of transport logistics allows you to reduce the cost of transporting construction materials by increasing the number of transported goods, delivery points, reducing the cost of wages (by reducing the number of drivers), and the number of vehicles. This is achieved by using the company's own transport, which does not depend on tariffs, which makes it possible to plan transportation more accurately and improve the quality of services.

When using its own transport, the company «HCC “VostSibStroy”» forms the optimal routes for the delivery of materials. For this, first of all selected optimization criteria – the length of the route or time of delivery, and also takes into account parameters such as the area of delivery, schedule, delivery of the goods, the number of flights, the introduction of monitoring of mileage and consumption of fuel and lubricants (FAL). In addition to the standard fuel consumption accounting system, which includes mileage, fuel receipts submitted by drivers, and the amount of fuel consumed, modern fuel consumption monitoring systems based on *GPS*-monitoring are used, which can reduce

fuel costs by up to 40%.

Specialists of the logistics center are responsible for purchasing products in accordance with requests received from internal consumers, which are the objects of construction. At this stage of implementation of the logistics system for construction, the logistics center is responsible for purchasing and delivering materials that cost 70-80% of the total cost of all materials (except for subcontracting works) - these are group A materials [4].

Currently, the list of group A materials includes the following:

- long and shaped products (fittings and other metal products);
- concrete;
- brick facing and effective;
- plywood;
- concrete goods;
- insulation material;
- elevator equipment;
- translucent structures (windows and stained glass);
- metal doors;
- ventilated curtain wall.

The mission of the logistics center «HCC “VostSibStroy”» is to implement an effective logistics system for construction support, which supports the growth of construction volumes by ensuring uninterrupted supply of construction objects with group a materials [5]. The main goal is to reduce construction time by implementing the *MRP2* and *just-in-time* concepts and the quality-cost ratio strategy [6].

It is necessary to identify the reasons that affect supply and demand in construction, improve the execution of operations, after which the stocks will disappear [2]. Managing staff in a construction company creates current, insurance and optimal reserves by purchasing additional capacity and installing backup equipment. However, these actions only hide the causes of problems. Effective management is about identifying the real problems and solving them. The *JIT* concept is an effective management system [4] that involves working in the following areas:

- *Stocks of construction materials.* HCC seeks to acquire the optimal batch of inventory [7].
- *Quality of construction materials.* Elimination of defects and improvement of quality of supplies of materials and performance of works [8].
- *Suppliers of building materials.* HCC is committed to long-term contracts with reliable suppliers of construction materials.
- *Lead time for delivery of construction materials.* Optimization of processes associated with deliveries and reduction of delivery times [10].
- *Reliability of supplies.* Continuity of delivery, without failures and downtime [9].
- *Workers.* Need a spirit of cooperation between workers, as well as between managers and workers, because the well-being of each of them depends on their overall success in work, and all employees should be treated equally and fairly. Any creative initiative expressed by any employee about possible improvements in the work is encouraged [8].
- *Information support* in the company must be perfect and allow rapid exchange of information in order to effectively manage the company [4].

The logistics center «HCC “VostSibStroy”» coordinates the processes of delivery of construction materials. Supply is made on the basis of requests. Delivery planning is carried out for a period of 1 year: the list is compiled in September and updated in December [10]. The task of the line staff of each object in the HCC structure is to submit a plan for the supply of construction materials for the year, broken down by months. Data for this plan is formed based on the estimated documentation [5]. Planning includes the following tasks:

1. Development and coordination of supply plans.
2. Choosing the best ways to supply construction.
3. Use of an effective inventory management system.

4. Implementation of information technologies in logistics.

The organization of deliveries provides:

1. Research of the current situation on the market of construction materials.
2. Evaluation and selection of suppliers.
3. Efficient inventory management.
4. Organization of storage facilities.
5. Control of material, money and information flows.

The implementation provides:

1. Purchase of construction products.
2. Delivering it to construction sites.

Implementation of the control system and analysis assume:

1. Contract enforcement.
2. Analysis and monitoring of the effectiveness of construction materials deliveries.

3. Results

The selection and evaluation of suppliers of building materials is carried out subjectively. It is necessary to further develop criteria and tighten the procedure for evaluating suppliers. In 2018, the logistics center «HCC “VostSibStroy”» formed and completed the Schedule of competitive selections for 2018. 23 competitive selections were held. 112 contracts have been concluded, with about 250 specifications attached to them.

Members of the competition committee are guided by the following criteria when evaluating submitted bids:

- quality;
- ability to fulfill obligations under the contract;
- delivery time;
- price;
- payment term;
- production capacity;
- availability of warehouse and transport infrastructure;
- warranty obligation;
- compliance of applicants proposals with the application conditions, technical requirements, russian standards, security requirements, and other criteria;
- business reputation and other criteria put forward by members of the competition commission [3].

After evaluating and selecting suppliers, the actual suppliers of building materials are determined.

The next stage is the implementation of the “management and document management concept”:

1. Communication with the line staff of construction projects.
 - collection of requests for the supply of construction materials;
 - calculation of delivery schedules and models for acceptance of materials for the construction site;
 - coordination of deliveries of construction materials.
2. Conducting analytical work:
 - summarizing the results of the department's activities at the end of the reporting period, analyzing the effectiveness of its group of materials;
 - creating, monitoring, and analyzing inventory;
 - regulatory work of the delivery business process [9].
3. Document management support.

The logistics approach in the company contributes to the growth of construction volumes by ensuring uninterrupted supply of group A materials, despite the fact that:

- growth in the supply of materials (by 67% compared to 2017);
- late submission of applications by construction projects (870 applications were completed,

of which about 20% were unscheduled);

- failure to meet deadlines for entering the site;
- “non-payment season” in August-September (the logistics center's budget was not fulfilled by 50% during this period). In connection with the implementation of the logistics approach in the company «HCC “VostSibStroy”» the following events were held:

1) Successfully implemented the project “Winter procurement 2018”, which allowed to avoid a shortage of materials and get savings on the cost of fittings; organized responsible storage of purchased materials in the warehouses of suppliers, construction/retrofitting of the warehouse economy.

Project efficiency: at the time of completion – 21%, at the end of the year (due to falling prices on the metal market) - 17%.

2) The practice of planning competitive selection has been applied:

- a Schedule of competitive selections for 2019 has been formed and completed;
- 23 competitive selections were held; 112 contracts were concluded, with about 250 specifications attached.

3) 630 concrete fills were organized and coordinated, and 60 thousand cubic meters were delivered (an increase of 1.7 times compared to 2017). If there is a shortage of cement and non-payments in August-September, the volume declared by the objects is generally fulfilled with the minimum possible transfers. In relation to the main suppliers of concrete, a new system of price changes has been introduced: the cost of concrete changes in proportion to the change in prices for materials that make up the main cost of concrete. Thanks to this we managed to contain speculative price growth:

- the increase in the price of concrete on the market was 27%;
- increase in the purchase price-only 20%;

4) Organized storage of materials (rebar, brick, cellular blocks) in the warehouses of suppliers. Work was carried out with 7 warehouses of responsible storage. By working with suppliers and organizing storage of materials in their warehouses, significant cost savings were obtained (relative to the average market prices for storage of inventory items).

5) The centralization of material delivery continued: the delivery of 93% of rebar and 25% of piles was coordinated by the logistics center. The system of payment for transport services per flight was introduced, which allowed to perform 1 or 3 flights per day (in 2017, it was possible to make 2 flights per day).

6) Work was carried out within the framework of regulation of the supply process:

- the procedure for submitting applications based on group A materials has been put into effect, and training on application deadlines has been organized;
- in order to streamline the flow of documents for the supply of materials, together with the accounting department, the procedure for the movement of documents for the supply of materials of group A has been developed and put into effect.

7) The system of operational accounting of goods in the company's warehouses in natural units has been introduced. This made it possible to check in real time the balances of the central warehouse.

4. Conclusion

Based on the above description, as well as the analysis of approaches and methods, the following conclusions should be drawn: logistics considers the movement of material flows in the company as a single and interrelated process, regardless of which division controls these flows at the moment. Moreover, logistics technologies involve close interaction with other departments at various stages of working with external contractors.

For example, a contract with suppliers has two parts: commercial and legal. These parts are quite closely related to each other. The commercial part includes the choice of assortment, purchase price, substitute products, etc. the logistics part includes delivery conditions: their frequency, batch size,

speed of order processing and preparation, distance from the supplier's warehouses, availability of goods in stock during the service period, etc.

When choosing a supplier and entering into a contract with it, it is necessary to work out not only the commercial part, but also the above-mentioned logistics parameters. This is what logisticians working in the logistics center «HCC “VostSibStroy”» do. The logistics center plans to support the overall strategy of this company. This year, we set goals for the introduction of additional information products, an effective system for managing the supply of construction materials, expanding the geography of purchases, finding new partners and concluding supply agreements. Due to the difficult economic situation in the country and the region, the logistics center is tasked with reducing production costs.

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