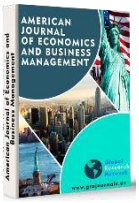

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Article

Improving and Assessing the Effectiveness of Logistics System Management in the Construction Industry

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Abstract: IEDs has become an indispensable logistics system that offers construction cost efficiency, service quality improvement, and competitive advantage due to increasing complexity of material flows and supply chains in the construction industry. Although the processes of logistic system are usually broken up in construction enterprises, which leads on weak influence on the management of logistic systems, there is still a lack of proper evaluation mechanisms of the whole construction enterprise activities, therefore, this study tries to provide a solution for the issue of improvement and effectiveness of management of logistic systems, comparing various options even work from the past. The major knowledge gap states the absence of a comprehensive and empirically validated methodological framework for assessing logistics performance and enabling management decisions under uncertainty and market turbulence. It uses a multi methodological approach based on system analysis of logistics chains, quantitative and qualitative indicators of logistics performance, and PEST analysis of Political, Economic, Socio cultural & Technological factors affecting the efficiency of logistics chains. ConceptsCore indicatorsTotal logistics costsLogistics cycleLogistics service characteristicsInventory turnoverComprehensive efficiency indicators based on profit, income, and distribution costs and more. These results indicate that integrated logistics evaluation system enhances the transparency of material flow and information flow, lowers the logistic cost, shortens the delivery cycle period, and increases the reliability of services. The results do express that application of the advanced logistics management tools and information systems predominantly assist in enhancing the whole workflow of resources among different locations, but also holds the capacity to decrease risk within construction processes. The research suggests that systematic logistics management is effective in enhancing economic performance and promoting sustainability in construction firms. From a practical perspective, this research offers stakeholders the decision support framework for improving logistics chains, validating investment efficiently and enhancing competitiveness of the construction industry.

Keywords: Construction Industry, Logistics, Pest Analysis, Construction Complexes, Logistics Chains, Management, Logistics Costs

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1. Introduction

The effective organization of the supply chain and logistics processes is of great strategic importance in the activities of modern enterprises, as they serve to optimize costs, rational use of resources, and increase overall production efficiency. Deficiencies in the logistics system can lead to disruptions in supply processes, incomplete satisfaction of consumer demands, and ultimately a decrease in the competitiveness of the enterprise.

In the current environment, consumer demands for service quality are increasing, which encourages supply chain participants to operate in accordance with speed, accuracy and high-quality standards [1]. Logistics management plays a central role in this process,

and it is it that is responsible for ensuring the quality of services provided and the sustainability of customer satisfaction.

The system for evaluating logistics activities in modern enterprises should be based on a set of interrelated elements consisting of evaluation indicators, measurement units and an evaluation base. The degree to which the selected indicators accurately reflect the content and strategic directions of logistics activities directly affects the reliability of the evaluation results and the possibilities for further improvement of the enterprise's logistics strategy [2].

2. Results and Discussion

The efficiency of logistics activities is assessed using indicators such as warehouse capacity, delivery cycle duration, order fulfillment accuracy, on-time delivery, transportation costs, the percentage of unusable products, inventory turnover ratio, and warehouse capacity. Warehouse capacity plays an important role in inventory accounting and planning logistics operations. Logistics management is important in ensuring information transparency in the supply chain of any enterprise. Using advanced transportation management systems (TMS), historical data is processed in real time and the movement of goods is monitored, which allows for effective optimization of logistics processes and prevention of potential failures and disruptions.

Ensuring transparency in the supply chain is one of the important factors in reducing operating costs [3]. Effective management of logistics processes creates conditions for increasing revenues, implementing systematic control over incoming cargo, implementing reverse logistics mechanisms, maintaining optimal stocks, and using the most appropriate modes of transport. As a result of the complex impact of these factors, the costs of the enterprise are significantly reduced.

In the process of optimizing the logistics system of a construction company (or enterprise), it is necessary, first of all, to objectively and comprehensively assess its condition [4]. This assessment system is formed on the basis of the following four main groups of indicators:

1. The total logistics cost indicator is formed taking into account all types of costs associated with the organization and management of logistics processes, as well as the risks associated with damage and loss of cargo. This indicator is usually expressed as a percentage and is evaluated in relation to standards, production or sales volumes, and resource utilization indicators.
2. The logistics process duration indicator reflects the average time spent on the full execution cycle of one order [5]. When determining this indicator, the starting point is the receipt of the order, and the end point is the return of the vehicle to the warehouse of the enterprise or logistics operator.
3. The service quality indicator is formed based on subjective assessments of customers, customers, and participants in the logistics process. It uses service safety, reliability, speed, employee behavior, and other quality parameters to assess it.
4. The efficiency of the logistics system is expressed through integral indicators such as the return on investment calculated over the logistics cycle and the volume of cargo turnover per unit of time.

Based on the criteria and assessment results developed for each indicator, management decisions are made to optimize business processes [6].

The integral efficiency indicator of logistics activities is determined based on the following formula:

$$R = \frac{\mathrm{S} - \mathrm{C}}{\mathrm{C}}$$

Here

R - the profit level of the commodity distribution process;

S - sales revenue of the construction company;

C - distribution costs;

The introduction of a logistics approach in the process of analyzing the activities of a construction company helps to identify opportunities for effective organization of resource movement, increase the competitiveness of the enterprise, improve the efficiency of using financial and material resources, and eliminate problems associated with optimizing construction processes.

The success of the logistics system in the construction industry is determined, on the one hand, by the degree of comprehensive optimization and rationalization of the entire logistics system, and on the other hand, by the systematic adaptation and improvement of the organizational, economic and social environment in which construction processes are carried out [7].

In the construction industry, the movement of materials, structures and technical resources within certain territorial and organizational boundaries includes such basic processes as procurement, delivery, storage, use in construction and installation works, and redistribution of surplus residues. At the same time, auxiliary logistics operations such as transportation, warehousing, inventory, packaging, loading and unloading, processing and management of information flows are also carried out within these processes.

In the construction industry, the interconnected movement of materials, equipment and information flows forms a holistic system consisting of interconnected and finite dynamic elements. In this system, all logistics elements are interconnected and interact with each other in order to fully implement the principles of a systematic approach.

The modern construction logistics system is a highly complex and dispersed system. This is explained, on the one hand, by the location of construction sites over large geographical areas, and on the other hand, by the long periods of project implementation [8]. It is worth noting that even in micrologistics systems within individual construction sites, the intersection of different regions and macroregions is common. This situation significantly complicates the management of the construction logistics system and requires its high dependence on modern information and communication systems.

The modern construction logistics system is an integrated (unified) system. At the same time, it can be divided into separate segments and a number of subsystems according to its functional characteristics. There is an interdependence between systems and subsystems in terms of time, space, and resource use. In addition, the construction logistics system also provides an integral interdependence between a single goal, total costs, and final results.

According to the operational dependence of the construction logistics system, it can be divided into the following main subsystems: a system for packaging and completing building materials and structures; a system for loading and unloading operations; a system for transporting building materials and technical resources; a system for storing (storing) materials and items; a system for processing and preparing building materials; and a system for distributing and managing the flow of materials [9].

The modern construction logistics system is dynamic, in which the volumes of supply and demand, supply channels, prices, system elements and operational processes are constantly changing. Changes in construction production conditions, renewal of the composition and volume of material and technical resources, the development of cooperative relations between construction enterprises and other factors directly affect the functioning of the construction logistics system.

Effective management of logistics processes in the construction industry ensures a continuous flow of building materials, structures and technical resources, improves interaction with customers and partner organizations, and reduces the need to store excess inventory [10]. It also helps to reduce errors and losses, optimize delivery times and increase the economic efficiency of the construction company’s activities.

Thus, making management decisions on the formation of a logistics system in a construction enterprise is a complex and multifactorial process, which is always associated with a certain level of uncertainty. At the same time, the process of forming a system of indicators for evaluating the logistics activities of a construction enterprise should be based on the theory of compromise [11]. According to this approach, compromise is achieved by choosing the most optimal combination of evaluation indicators, their units of measurement and the evaluation base.

This approach allows you to harmonize accurate information about various logistics operations and processes carried out within the logistics system of a construction company and organically link them into a single integrated system. This creates the opportunity to comprehensively assess the efficiency and effectiveness of not only the logistics activities of individual construction companies, but also logistics processes within the entire construction supply chain.

Today, there are a number of scientifically based methodologies for analyzing and assessing factors affecting the performance of various socio-economic systems, including construction enterprises. This study identified the main factors that have the strongest impact on the performance of construction enterprises, and used the PEST (political, economic, socio-demographic and technological factors) analysis method to comprehensively assess them, which allows for a broader coverage of the degree and direction of the impact of factors [12].

As part of the PEST analysis, the main factors affecting the efficiency of construction enterprises operating in our republic were identified, systematized and divided into separate groups and reflected in Table 1. The degree of influence of factors included in each factor group on the efficiency of construction enterprises and the significance of this influence were assessed based on the conclusions of leading experts from the Research Institute for Technical Normativity and Standardization in Construction.

Among the political and legal factors, factors such as the political stability of the state, the level of bureaucracy and corruption, the state's tax policy, changes in state regulation of competition between construction companies, and the level of implementation of legislation were selected.

The following economic factors were selected as economic (GDP) growth rates, real income levels, consumer price index (inflation rate), the volume of investments in the sector, the number of construction companies operating in the sector, the share of small businesses and private entrepreneurship in the sector's activities, the level of development of the infrastructure system, the average nominal wage in enterprises in the sector, and the interest rate.

Socio-cultural factors include the stages of the state education system that provides qualified specialists in the field, the level of unemployment and its main causes, an analysis of the population structure by age and gender, the population's attitude to leisure, the level of the population's need for health restoration and physical recovery, the life expectancy of the population, the size and composition of families [13][14].

Scientific and technical factors included the level of use of innovations in increasing efficiency in construction enterprises, the attention of tourism enterprises and the state to supporting scientific research and development, the ability of enterprises in the sector to purchase new technologies, the level of introduction of new technologies in the sector, and the level of use of software products by tourism enterprises.

Table 1. PEST analysis.

Environmental factors	Signs of impact	Quality Rating	Points level	Weight	Importance rating x weight	Demonstration
Political - legal						
Developing a strategy for developing trade under sanctions	+	tools	8	0,07	0,56	Development of the construction materials market in our republic
Strengthening tax legislation	-	weak	6	0,06	-0,36	Increased cost of imported goods
Import restrictions	-	tools	7	0,1	-0.7	Price increases and the exit of some foreign manufacturers of construction goods from the market Failures in the supply of imported products
Economic						
Increase in inflation rate	-	strong	8	0,09	-0,72	Rising prices for imported construction goods and declining consumer power
The exchange rate will rise.	-	tools	7	0,07	-0,49	Changes in the price of imported goods
Yuqori darajadagi raqobat	-	tools	7	0,06	-0,42	Increased competition and difficulty in choosing are affecting consumers
Daromad darajasining o'sishi	+	strong	8	0,08	0,64	Increasing consumer power
Socio-cultural						
Increase in population income indicators	+	tools	8	0,09	0,72	Increased consumption of construction goods
The tendency of the population to engage in self-dealing	-	weak	6	0,05	-0.3	Increased purchase of construction goods. Quality threat by the consumer
Striving for a peaceful lifestyle	+	tools	7	0,07	0,49	Increased demand for construction goods
Increase in the number of highly educated specialists	+	tools	7	0,08	0,56	Attracting more qualified employees
Scientific and technical						
Scientific and technological progress in the social sphere	+	weak	5	0,04	0,2	Increasing the level of population needs.

The emergence of new innovative construction products	+	weak	6	0,05	0,3	Increase in the price of imported construction goods.
Ensure faster software update speeds	+	tools	8	0,09	0,72	Improve their qualityh Studying customer needs, automating business processes

The consistent implementation of the import substitution policy in Uzbekistan is explained by measures aimed at replacing imported construction materials and technologies with locally produced products, as well as the introduction of parallel import mechanisms for construction goods [15]. In the context of geopolitical and external economic restrictions, many suppliers of construction materials and trade organizations are experiencing certain difficulties in logistics processes, and some foreign companies are temporarily refusing to cooperate with Uzbek construction enterprises and retail entities.

3. Conclusion

Based on the above-defined tasks and practical results, the following suggestions and recommendations were made:

The effective use of logistics management chains in the construction industry allows you to reduce the volume of various stocks, control the amount of work in progress, reduce risks that may arise during the construction process, accelerate the movement of products and resources, and accelerate capital turnover. It also provides synchronization of logistics resource delivery processes, which increases the overall efficiency of investments in construction and installation works, production processes, and technological equipment, as well as the construction cycle.

The problems of complex improvement of micro-level management systems in the construction sector in our country have not been sufficiently covered in scientific research to date. There are certain approaches aimed at analyzing the relevance of the problem of improving the management of construction enterprises, the state of existing trends and the dynamics of development, as well as studying this issue in the scientific literature. However, scientifically based and practically tested methodological mechanisms for making management decisions based on the logistics chain in conditions of instability and uncertainty of the economic situation have not been sufficiently formed.

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