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## ANALYSIS OF THE FUNCTIONALITY OF LOGISTICS MANAGEMENT FOR EFFECTIVE SUPPLY CHAIN MANAGEMENT IN CONSTRUCTION

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**Abstract.** The article delves into the critical role of logistics management in the construction industry, emphasizing the need for efficient material resource management and optimized supply chains. It aims to explore the principles of logistics management in construction organizations for supply chain management, with a specific focus on minimizing costs and optimizing resource utilization. The proposed strategic approach involves the transformation of classical concepts into logistics-oriented organizational activities, integrating advanced technologies and innovative resource management systems to unlock the full potential of material assets and streamline operations. The article underscores the potential impact of these strategies on the nation's economic landscape, emphasizing their contribution to economic stability and resilience. Additionally, the integration of logistics management into construction practices is highlighted as a catalyst for scientific advancements within the field. Serving as a roadmap for construction companies, the article urges the adoption of forward-thinking strategies aligned with the demands of the contemporary construction landscape. By embracing innovative approaches and leveraging advanced technologies, construction organizations can drive economic revitalization and contribute to broader urban development initiatives. Additionally, the article emphasizes the importance of collaboration and integration among stakeholders in the construction industry, leveraging digital platforms and collaborative tools to enhance communication, share real-time data, and streamline coordination among suppliers, logistics providers, and project teams. Integrated logistics networks will enable seamless flow of information and resources.

**Keywords:** *logistics management; supply chains in construction; resource optimization; construction management*

## АНАЛІЗ ФУНКЦІОНАЛУ ЛОГІСТИЧНОГО МЕНЕДЖМЕНТУ ДЛЯ ЕФЕКТИВНОГО УПРАВЛІННЯ ЛАНЦЮГАМИ ПОСТАВОК У БУДІВНИЦТВІ

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**Анотація.** Розглядається роль логістичного менеджменту в будівельній галузі, підкреслюється необхідність ефективного управління матеріальними ресурсами та оптимізації ланцюгів поставок. *Мета статті* – дослідження принципів формування логістичного менеджменту в будівельних організаціях для керування поставками з акцентом на мінімізацію витрат та оптимізацію використання ресурсів. Запропонований стратегічний підхід передбачає трансформацію класичних концепцій в логістично-орієнтовану організаційну діяльність, інтеграцію передових технологій та інноваційних систем управління ресурсами для розкриття повного потенціалу матеріальних активів та оптимізації операцій. Підкреслюється потенційний вплив цих стратегій на розвиток економіки країни, наголошується на їх внеску в економічну стабільність. Інтеграція логістичного менеджменту в будівельну сферу виступає каталізатором наукового прогресу в цій галузі. Стаття слугує дорожньою картою для будівельних компаній і закликає до прийняття далекоглядних стратегій, що відповідають вимогам сучасного будівельного ринку. Застосовуючи інноваційні підходи та передові технології, будівельні організації можуть сприяти економічному відродженню після перемоги та зробити свій вклад у ширші ініціативи з розвитку міст. Акцентовано увагу на важливості співпраці між стейкхолдерами в будівельній галузі, використання цифрових платформ та інструментів спільної роботи для поліпшення комунікації, обміну даними в режимі реального часу та оптимізації координації між постачальниками, логістичними провайдером та проектними командами. Інтегровані логістичні мережі забезпечать безперервний потік інформації та матеріальних ресурсів.

**Ключові слова:** управління логістикою; ланцюги поставок у будівництві; оптимізація використання ресурсів; управління будівництвом

**Introduction.** The relevance of logistics in the contemporary business landscape is undeniable, with a multitude of researchers and industry professionals directing their focus towards addressing logistical challenges. It is noteworthy that enterprises allocate a substantial portion of their revenue (up to 35 %) to logistics, depending on the nature of their operations, geographical scope, and other pertinent characteristics. Furthermore, developed nations invest billions of dollars in logistics annually, with a consistent trend of escalating expenditure over the years. Notably, the transportation component accounts for a significant share of logistical expenses across virtually all countries.

In the context of the construction industry, the efficient management of material resources

and the optimization of supply chains are paramount. The complexities of modern construction necessitate a strategic approach to minimize costs and enhance operational efficiency. This article delves into the fundamental role of material resource management in the construction sector, advocating for the meticulous analysis and transformation of classical concepts into logistics-oriented organizational activities. By integrating cutting-edge technologies and scientific methodologies, construction organizations can unlock the full potential of their material assets and streamline their operations..

**The objective of this article** is to optimize management systems in construction organizations, aiming to streamline operational

processes, enhance resource utilization, improve project efficiency, and ultimately contribute to the overall advancement and sustainability of the construction industry.

**The research methodology** through the exploration of innovative logistical principles and the implementation of effective supply chain management strategies, the article seeks to provide actionable insights for construction organizations to adapt to evolving market demands, fortify project management practices, and foster a more resilient and competitive construction. In addition, scientific publications on the topic are analyzed and systematized. A review of current publications that have been published in recent years is made.

**State of the issue and research objectives.** The text Y. Zhang [1] underscores the significance of leveraging big data and IoT (Internet of Things) in logistics management to enhance operational efficiency, security, and information management. It highlights the transition from manual-based logistics to a data-driven approach, emphasizing the potential for improved decision-making and risk mitigation. The integration of genetic algorithms and big data technologies in logistics management signifies a shift towards advanced, automated, and intelligent logistics systems.

Kitsis A. M., Chen I. J. [2] highlights the significance of stakeholder pressures, including those from media, customers, employees, government, NGOs (non-governmental organizations), and rivals, as driving forces for firms to engage in environmental sustainability. In the construction industry, stakeholders such as regulatory bodies, local communities, and environmental organizations exert pressures that influence the adoption of green supply chain practices and sustainable construction operations. They provide valuable insights into the theoretical foundations, survey methodologies, and implications of stakeholder pressures on green operations, offering a framework for understanding and implementing sustainable practices in construction logistics management.

The emphasis on GSCM (Green Supply Chain Management) implementation and the

conservation of resources resonates with your objective of proposing a strategic approach to minimize costs through the optimization of supply chains and logistics-oriented organizational activities. These stages [3] represent different aspects of the construction process, from the initial stages of material sourcing and production (upstream) to the actual construction activities (midstream) and finally to the delivery and distribution of the finished products or services (downstream).

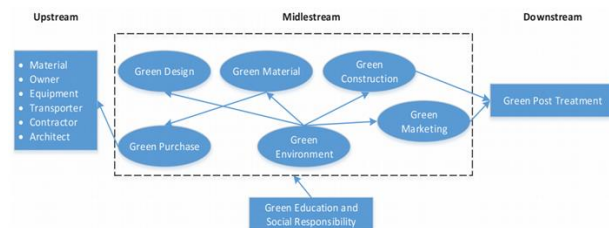


Fig. 1. Value chain construction industry [3]

Figure 1, in the context of the construction industry, the upstream stage typically involves activities related to the extraction, processing, and supply of raw materials such as timber, steel, concrete, and other construction materials. The midstream stage encompasses the actual construction processes, including building and infrastructure development, as well as the coordination of various construction activities. The downstream stage involves the distribution, delivery, and maintenance of the constructed facilities or structures. The concept of the value chain in the construction industry consisting of upstream, midstream, and downstream stages provides a framework for analyzing and optimizing the various processes involved in construction, ultimately contributing to improved resource management, operational efficiency, and stakeholder collaboration.

The article [4] emphasizes the critical role of an efficient logistic information platform product supply chain in the modernization of agriculture. It addresses the existing challenges in the agricultural supply chain network of the country, including inadequate facilities, limited operational integration, high logistics costs, supply and demand imbalances, and significant concerns related to agricultural product quality and safety. The paper proposes a solution by incorporating big data technology to investigate

an intelligent agricultural product supply chain system. Additionally, the network equilibrium method is employed to develop a model for the agricultural product supply chain network. The model considers the collaborative efforts of multiple producers and retailers, presenting a comprehensive approach to enhancing efficiency and addressing key issues in the agricultural supply chain.

In the article by [5], the pivotal role of innovation capability among logistics professionals in enhancing the competitiveness of the logistics industry is underscored. It emphasizes the importance of reinforcing the development of scientific research skills among logistics talents to elevate their innovation and research proficiency, thereby stimulating technological advancement within the agricultural product logistics industry. Moreover, the article advocates for the encouragement of entrepreneurial initiatives among logistics talents, offering entrepreneurial support and services to fuel their innovative drive and bolster the innovative progression of the logistics sector. It also stresses the establishment of a logistics talent innovation platform as a critical step in fostering an environment conducive to continuous innovation within the industry.

This study [6] significantly contributes to the field of GSCM and Technological Innovation (TI) literature, providing valuable insights for managers and entrepreneurs aiming to establish an ecologically sustainable society and validate their practices. The research underscores the importance of technological innovation and the adoption of GSCM practices in attaining competitive advantages, offering a foundational framework for managers, practitioners, and environmental management researchers to highlight the value of GSCM practices in enhancing operational sustainability.

However, certain limitations are evident in this study. Firstly, it is confined to the manufacturing sector of a single country. Secondly, the generalizability of the study is constrained due to data obtained from a single respondent per firm, typically from top or middle management. Additionally, the data

predominantly represent large firms, with limited inclusion of Small and Medium Enterprises (SMEs). Future research could focus on SMEs, exploring the interplay between various dimensions of GSCM (e.g., green transportation, internal environmental management, green packaging, and green distribution) and green innovative performance within the context of the construction industry.

The valuable research [7] can serve as a guide for industries seeking to transition from traditional supply chain management to GSCM, offering insights into essential barrier categories and the sequential eradication of these barriers. Furthermore, the study's identification of 26 essential barriers out of 47 provides a foundation for future research to explore additional barrier categories and sectors for a more comprehensive understanding of GSCM implementation.

In the context of Ukraine's post-war reconstruction, this research could inform the country's industrial sectors on the pivotal role of identifying and addressing essential barriers to facilitate the adoption of environmentally sustainable supply chain practices. By recognizing and gradually mitigating these barriers, industries can work towards establishing ecologically responsible supply chains, contributing to the country's overall environmental rehabilitation and sustainable development efforts.

The research topic remains highly relevant and is being explored by numerous scholars [1-12]. Considering our analysis, it is evident that as researchers, we should contribute to understanding and overcoming barriers in the adoption of environmentally sustainable logistics practices. In the future, we can use the results of such research for the reconstruction of cities post-victory, highlighting the critical importance of integrating logistical principles within the construction industry.

#### **Presentation of the main material.**

Resource management is a deliberate exertion of influence by process participants on the evolving characteristics of logistics flow to accomplish predetermined objectives through resource redistribution. In the resource management system of production activity, the

focus lies on the process of movement of resource flows (logistics process) as the object of management, while the closed cycle of labor item reproduction (logistics cycle) serves as the subject. Participants of the logistics process act as the focal point.

In this context, construction logistics represents a methodical approach to shaping and overseeing a series of construction material support flows (resource support) aimed at ensuring the optimal balance between cost and service quality for consumers of construction products and services, particularly within competitive market conditions. This is achieved through the dynamic stability of integral flow characteristics, their synergism, and adaptability in the external environment.

The construction logistics system, tailored to the specific needs of construction enterprises, encompasses a series of coordinated actions by project participants, intricately linked within a unified logistics chain. These participants include manufacturers, suppliers, material bases, construction enterprises, and transport companies, working collaboratively to ensure the realization of project objectives.

An effective construction logistics system also emphasizes sustainability and environmental impact, ensuring that resource flows and material support are managed in a manner that aligns with eco-friendly practices, minimizing the ecological footprint of construction activities (Fig. 2).

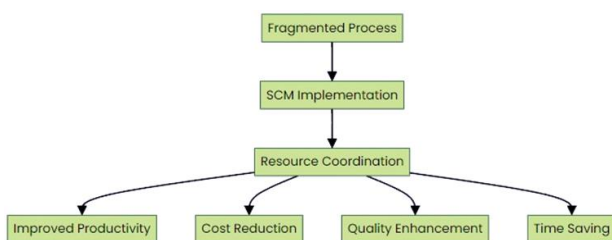


Fig. 2. Key Points for SCM optimization

To enhance residential construction, the article outlines several key points to consider when implementing SCM (Fig. 2):

- Resource coordination: Ensuring timely availability at all stages;
- Productivity: Cost reduction, quality enhancement, and time-saving;

- Research methodology: Using questionnaires for builder insights.

The rational implementation of a logistics system in industrial building and structure reconstruction projects allows for the enhancement of the resource provision system for each subsystem, encompassing planning, regulation, and control.

The construction process, characterized by significant participant fragmentation, often leads to various challenges stemming from the lack of coordination among involved parties. Supply Chain Management (SCM) offers several principles aimed at mitigating this fragmentation and minimizing its impact. Nevertheless, it's crucial to note that these principles were primarily developed within the manufacturing environment, which inherently offers more favorable conditions for their application.

Future research endeavors should focus on digital transformation, sustainable innovation, regulatory impacts, and benchmarking best practices within logistics management for construction organizations. By addressing these areas, the construction industry [8] can elevate its SCM practices, fostering a more sustainable, resilient, and efficient future, thereby aligning with the evolving landscape of logistical principles in construction.

The paper [9] contributes to the understanding of construction supply chain management by proposing methods for improvement based on a comprehensive literature review. It emphasizes the need for benchmarking, performance measurement, waste identification and elimination, knowledge management, and the application of information technology to enhance supply chain processes in the construction industry. Also highlights the unique challenges and characteristics of construction supply chains, such as intermittent flow and non-repeated projects, and the importance of integrated efforts to improve performance and reduce waste. It underscores the significance of human



resources and training in strengthening supply chain implementation and performance.

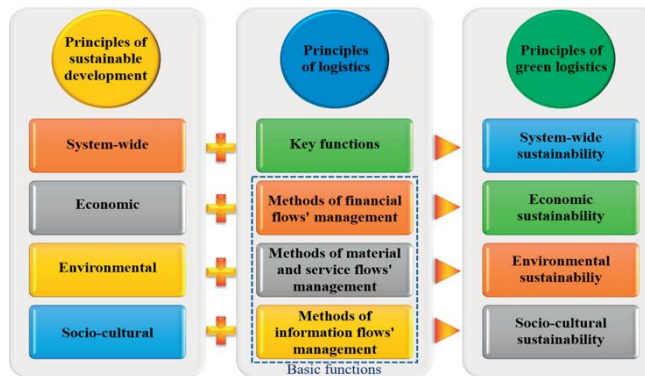


Fig. 3. Conceptual framework of Green logistic [10]

In the context of sustainable development, it is evident from Figure 3 that benchmarks for measuring the success of transport businesses encompass factors related to sustainable development, which hold particular significance for the logistics field [10]. However, there have been challenges in comprehending, developing, and implementing green logistics (GL). Therefore, the primary focus of this work is to underscore the pivotal aspects of the role of GL in establishing a sustainable supply chain.

The importance of human resource management, implementation of information technology and knowledge management are also highlighted as key aspects for improving supply chain management in construction. Thus, to formulate logistics management principles in construction organizations for supply chain management, it is necessary to pay attention to benchmarking, improving supplier performance, eliminating waste, training and information sharing, as well as implementing information technology and knowledge management.

Upon acquiring the necessary permissions, the critical task of establishing a proposal chain becomes paramount. Particularly in the realm of social housing, developers maintain relationships with material suppliers, sub-contractors, and clients, shaping the construction supply chain based on these connections. Similarly, private developers uphold associations with material and labor suppliers, tailoring their own supply chain in alignment with their specific designs. Within

the residential construction sector, the pricing process becomes a pivotal component of the product delivery methodology, wherein developers oversee material, financial, resources, and information flows alongside on-site construction processes.

The integration of green logistics practices is essential for mitigating the environmental impact of transportation and warehousing activities in the construction industry. By emphasizing sustainable practices, risk management, and collaboration, construction organizations can align their logistics operations with global environmental goals and contribute to sustainable development.

In the realm of construction logistics, establishing a robust proposal chain is crucial for developers, especially in the domain of social housing. Developers cultivate relationships with material suppliers, sub-contractors, and clients, shaping the construction supply chain around these connections. Similarly, private developers tailor their supply chains based on associations with material and labor suppliers, aligning them with their specific design requirements. Within the residential construction sector, the pricing process holds paramount importance, as developers oversee material, financial, resource, and information flows alongside on-site construction processes.

The integration of green logistics practices emerges as a vital strategy for mitigating the environmental impact of transportation and warehousing activities in the construction industry. By emphasizing sustainability, risk management, and collaboration, construction organizations can align their logistics operations with global environmental objectives and contribute to sustainable development. The distinction between traditional logistics and green logistics in the construction industry lies in their approaches to environmental impact and sustainability. While traditional logistics prioritizes efficient material resource management and supply chain optimization to minimize costs and enhance operational efficiency, green logistics places a strong emphasis on reducing the environmental

footprint of transportation and warehousing activities.

The key difference between traditional logistics and green logistics in the construction industry lies in their approach to environmental impact and sustainability. Traditional logistics primarily focuses on the efficient management of material resources and supply chains to minimize costs and enhance operational efficiency. On the other hand, green logistics places a strong emphasis on mitigating the environmental impact of transportation and warehousing activities in the construction industry.

In the coming years, the field of construction logistics is expected to undergo significant transformations driven by technological advancements and innovative practices. These future trends have the potential to revolutionize the industry, enhancing efficiency, safety, and sustainability in construction logistics operations.

The future of construction logistics is increasingly focused on green and sustainable practices [11]. Green logistics initiatives aim to minimize the environmental impact of transportation and warehousing activities by promoting energy-efficient vehicles, eco-friendly packaging, and optimized delivery routes.

## Conclusions.

The article provides a comprehensive analysis of the role of logistics management in the construction industry, emphasizing the need for efficient material resource management and optimized supply chains. Also highlights the potential impact of these strategies on economic stability and resilience, urging construction companies to adopt forward-thinking strategies aligned with the demands of the contemporary construction landscape.

The integration of green logistics practices is highlighted as a positive practice in the global logistics industry, emphasizing the importance of sustainable practices, risk management, and collaboration in the construction industry. In future need research to focus on digital transformation, sustainable innovation, regulatory impacts, and benchmarking best practices within logistics management for construction organizations.

In conclusion, the principles of logistics management in construction organizations play a pivotal role in ensuring the seamless flow of materials, resources, and information throughout the supply chain. The future of construction logistics is increasingly focused on green and sustainable practices, which aim to minimize the environmental impact of transportation and warehousing activities by promoting energy-efficient vehicles, eco-friendly packaging, and optimized delivery routes.

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