

V. Stadnik,

PhD, Associate Professor of the Department of management and marketing,
Odessa National Maritime University

ORCID ID: <https://orcid.org/0000-0003-2930-6532>

L. Zadorozhnyi,

Postgraduate student of the Department of Management and Marketing,
Odessa National Maritime University

ORCID ID: <https://orcid.org/0009-0008-2152-925X>

DOI: 10.32702/2306-6814.2026.4.218

ECONOMIC PRINCIPLES OF IMPROVING THE EFFICIENCY OF LOGISTICS CENTERS

В. Г. Стаднік,

к. е. н., доцент, доцент кафедри "Менеджмент і маркетинг", Одеський національний морський університет

Л. Ю. Задорожний,

аспірант кафедри "Менеджмент і маркетинг", Одеський національний морський університет

ЕКОНОМІЧНІ ЗАСАДИ ПІДВИЩЕННЯ ЕФЕКТИВНОСТІ ФУНКЦІОНУВАННЯ ЛОГІСТИЧНИХ ЦЕНТРІВ

In the context of growing international trade volumes and the increasing complexity of supply chains, logistics centers play a crucial role in ensuring the efficient movement of goods. In fact, these infrastructure facilities are essential components of the logistics system, as they define the set of principles, methods, and tools that ensure the achievement of maximum logistics operation productivity through cost optimization, reduction of delivery times, and enhancement of the competitiveness of business entities. In this regard, the aim of this article is to substantiate the economic foundations and identify directions for improving the efficiency of logistics centers in modern business conditions. The research results indicate that the economic foundations of logistics center operations should be based on a comprehensive approach that combines cost optimization, productivity enhancement, innovation implementation, and strategic activity planning. In modern business conditions, the key directions for improving logistics center efficiency are: rationalization of resources and inventory management; automation and introduction of innovative technologies; optimization of logistics processes and routes; economic planning and cost control; and enhancement of personnel competence and motivation. The study demonstrated that rationalizing resources and managing inventory ensures the optimization of warehouse locations, centralization of material flows, and the implementation of effective accounting and demand forecasting systems. The research also found that automation and the introduction of innovative technologies increase the speed of order processing and the accuracy of logistics operations, while optimization of logistics processes and routes reduces delivery time and improves logistics reliability. Furthermore, the study illustrated that economic planning and cost control ensure improved profitability of logistics center operations, while enhancing personnel competence and motivation, which affects the productivity of the logistics center and the quality of customer service. The overall value of the study lies in demonstrating that implementing the above directions enables logistics centers to adapt to a dynamic market environment, increase operational efficiency, and strengthen their competitive positions in the market.

В умовах зростання обсягів міжнародної торгівлі та суттєвого ускладнення ланцюгів постачання логістичні центри відіграють ключову роль у забезпеченні ефективного руху вантажів. Ці інфраструктурні об'єкти фактично формують сукупність принципів, методів та інструментів, що сприяють досягненню максимальної продуктивності логістичних операцій шляхом оптимізації витрат, скорочення термінів доставки та підвищення конкурентоспроможності суб'єктів господарювання. Метою статті є обґрунтування економічних засад та визначення напрямів підвищення ефективності функціонування логістичних центрів у сучасних умовах господарювання. Встановлено, що економічні засади функціонування логістичних центрів мають базуватися на комплексному підході, який поєднує оптимізацію витрат, підвищення продуктивності, впровадження інновацій та стратегічне планування діяльності. У сучасних умовах господарювання ключовими напрямками підвищення ефективності логістичних центрів є: раціоналізація ресурсів та управління запасами; автоматизація та впровадження інноваційних технологій; оптимізація логістичних процесів і маршрутів; економічне планування та контроль витрат; підвищення компетенції персоналу та мотивації. Так, дослідження показало, що раціоналізація ресурсів та управління запасами забезпечує оптимізацію розташування складів, централізацію матеріальних потоків, впровадження ефективних систем обліку та прогнозування попиту. Дослідження встановило, що автоматизація та впровадження інноваційних технологій підвищує швидкість обробки замовлень і точність виконання логістичних операцій, а оптимізація логістичних процесів і маршрутів скорочує час доставляння та підвищує надійність логістики. За змістом дослідження проілюстровано, що економічне планування та контроль витрат забезпечує підвищення рентабельності діяльності логістичних центрів, а підвищення компетенції персоналу та його мотивації впливає на продуктивність логістичного центру та якість обслуговування клієнтів. Загальна цінність дослідження полягає у доведеності того факту, що реалізація виділених вище напрямів дозволяє логістичним центрам адаптуватися до динамічного ринкового середовища, підвищувати ефективність операцій та зміцнювати конкурентні позиції на ринку.

Key words: logistics centers; supply chains; cargo movement; economic planning; cost control; resource rationalization; inventory management.

Ключові слова: логістичні центри; ланцюги постачання; рух вантажів; економічне планування; контроль витрат; раціоналізація ресурсів; управління запасами.

PROBLEM STATEMENT

In the context of growing international trade volumes and the increasing complexity of supply chains, logistics centers play a crucial role in ensuring the efficient movement of various types of cargo. In fact, these infrastructure facilities are essential components of the logistics system, as they define the set of principles, methods, and tools that ensure the achievement of maximum logistics operation productivity through cost optimization, reduction of delivery times, and enhancement of the competitiveness of business entities. Accordingly, there is a growing need for an in-depth study of the economic foundations for improving the efficiency of logistics center operations.

Modern business conditions are characterized by the high dynamism of market processes, rising resource costs, and intensified competitive pressure, which require logistics centers to adopt innovative management approaches and optimize internal processes. The level of economic planning determines the effectiveness of their operations, the rational use of resources, the imple-

mentation of advanced information and transportation technologies, as well as their ability to adapt to changing external conditions.

ANALYSIS OF RESEARCH AND PUBLICATIONS

Numerous scientific studies in the field of logistics have been identified, among which the works of Papinko A., Kudinov V.V. and Kolodiy Kh. [4], Shekarabi S., Kiani Mavi R., Makau F. [7], Bottani E., and Caselli G. [2] are particularly valuable, as they systematically address issues related to the organization of logistics processes, supply chain optimization, and the functioning of logistics centers. At the same time, the issue of developing economic mechanisms to improve the efficiency of logistics center operations requires further research, especially considering national specifics, market characteristics, and contemporary challenges of the global economy, such as logistics digitalization, fluctuations in energy prices, and instability in international supply chains.

Table 1. Common problems in the functioning of logistics centers in Ukraine

Problems in the functioning of logistics centers	Description of Problems in the functioning of logistics centers	Specific examples of problems in the functioning of logistics centers
High operational and transportation costs	A significant portion of logistics center costs is allocated to transportation, energy, and warehouse maintenance.	Transportation of goods from regional warehouses to major cities is often carried out via non-optimal routes due to the lack of integrated planning systems, increasing fuel and driver costs.
Insufficient automation and low level of information system integration	Many logistics centers rely on manual processes, which increase processing time and the likelihood of errors.	Sorting and order picking in warehouses are performed manually, which extends processing time by 30–40% compared to automated systems.
Ineffective inventory management	The lack of accurate demand forecasting and centralized accounting leads to either excess or insufficient inventory.	In warehouses in the Kyiv region, goods that remain unsold for long periods often accumulate, while demand in Lviv is not met in a timely manner.
Delays in supply chains	Logistics centers face transport downtime, customs queues, and delays in the supply of raw materials.	The supply of imported goods through Odesa seaports may be delayed by 5–7 days due to uncoordinated delivery schedules and warehouse congestion.
Unstable demand and fluctuations in market prices	Rapid market changes and seasonal fluctuations create planning difficulties and increase the risk of financial losses.	During peak electronics sales periods (Black Friday, New Year holidays), inventory shortages and delivery delays often occur.

Source: developed based on [1; 3; 7–8].

This underscores the relevance of conducting research aimed at developing practically applicable economic approaches and strategies for enhancing the efficiency of logistics centers in Ukraine.

FORMULATION OF THE ARTICLE'S OBJECTIVES

This article aims to substantiate the economic foundations and identify directions for improving the efficiency of logistics center operations under modern business conditions..

THE PAPER MAIN BODY

According to various business databases, Ukraine has more than 93,900 entities related to transport and logistics (including warehouses, transportation, and logistics services), of which over 42,090 are logistics centers located across all regions of the country. It should be noted that more than 50% of logistics centers in Kyiv, Lviv, Odesa, and other regions face numerous challenges. Specifically, 12–15% of centers experience instability in operational and transportation costs, 25% suffer from insufficient automation and low levels of information system integration, 30% face ineffective inventory management, and 8% encounter delays in supply chains, unstable demand, and fluctuations in market prices (see Table 1).

Furthermore, in 70% of cases, logistics centers report personnel-related issues, caused both by a shortage of qualified staff and by insufficient employee motivation and

slow adaptation to economic and technological changes [7–8]. These factors (see Table 2) significantly limit the efficiency of logistics center operations, as it is the employees who ensure the timely sorting, processing, and dispatch of goods, as well as maintain the coordination of operational processes and a high level of logistics service.

Given the critical importance of logistics centers in ensuring the efficient movement of various types of cargo — in particular their ability to maintain uninterrupted supply chains, reduce delivery times and transportation costs, and influence the competitiveness of enterprises engaged in manufacturing, distribution, and retail — we agree with the view of Hosseini, Shekarabi S., Kiani Mavi R., and Romero Macau F. [7] that it is currently essential to define the economic foundations for improving the efficiency of logistics center operations. This should be based on the principles of rational resource use, business process optimization, and maximization of the economic effect from the activities of such infrastructure facilities.

The application of these principles is implemented through the efficient use of material, financial, and labor resources, which allows for the reduction of logistics costs, avoidance of excess inventory, and shortening of delivery times to the end consumer. Lyulchak Z.S. and Danylytsiv O.I. [6] demonstrate that centralizing goods storage in a strategically located logistics center enables simultaneous service to multiple regions, thereby reducing transportation costs and the need for large inventories at regional warehouses.

Table 2. Personnel-related problems in logistics center operations in Ukraine

Problems in the functioning of logistics centers	Description of Problems in the functioning of logistics centers	Specific examples of problems in the functioning of logistics centers
Shortage of qualified personnel	The insufficient number of warehouse operators, drivers, and logistics specialists limits productivity and the speed of cargo handling.	The shortage of experienced drivers leads to delivery delays between regional warehouses and major cities.
Insufficient employee motivation	The absence of incentive and motivation systems reduces work efficiency and increases staff turnover.	Warehouse employees are often not sufficiently motivated to adhere to cargo handling time standards, which increases the average order processing time by 20–30%.
Slow adaptation to economic and technological changes	Warehouse and logistics center employees do not always quickly master new IT systems, automated equipment, and new business processes.	Implementing a WMS (Warehouse Management System) in a warehouse requires 3–4 months of staff training, during which operational efficiency initially decreases.

Source: developed based on [1–2; 4; 7–8].

The economic justification of management decisions facilitates implementing innovative technologies and automating sorting, packing, and cargo transportation processes. Bottani E. and Caselli G. [2] note that the use of automated sorting lines and robotic warehouses enables processing twice as many orders within the same time frame while simultaneously reducing errors and personnel costs.

Furthermore, Papinko A., Kudinov V.V., and Kolodiy Kh. [4] emphasize that applying modern planning and control methods, including integrated WMS systems and GPS-based transport monitoring, ensures cost transparency, efficient resource allocation, and forecasting of potential delays, increasing the productivity of the logistics center and the overall economic efficiency of its operations.

Thus, the economic foundations of logistics center operations should be based on a comprehensive approach that combines cost optimization, productivity enhancement, innovation implementation, and strategic activity planning. In this context, the key directions for improving the efficiency of logistics centers under modern business conditions can be identified as follows [1; 4–5]: (1) rationalization of resources and inventory management; (2) automation and implementation of innovative technologies; (3) optimization of logistics processes and routes; (4) economic planning and cost control; and (5) enhancement of personnel competence and motivation. The implementation of these directions enables logistics centers to adapt to a dynamic market environment, improve operational efficiency, and strengthen their competitive positions in the market, which is confirmed by analytical research findings (see Figure 1).

Thus, rationalization of resources and inventory management is a key direction for improving the efficiency of logistics center operations, given its impact on optimizing warehouse locations in order to reduce transportation costs and delivery times, as well as on the

centralization of material flows, which enables more efficient use of available resources and helps avoid inventory duplication across different regions [1; 6]. For example, when ATB-Market consolidated several of its regional warehouses into a central logistics center in the Kyiv region, the company was able to reduce transportation costs for deliveries to western and southern regions by 20% and decrease excess inventory by 15%, while simultaneously increasing order processing speed. In practice, within this direction, the implementation of any measures that reduce logistics costs, accelerate order processing, and rationalize the use of warehousing and transportation resources is of particular importance.

Automation and the implementation of innovative technologies constitute an important direction for improving the efficiency of logistics center operations, as they generate optimization effects through the use of robotic sorting systems, automated warehousing complexes, and advanced IT solutions for managing transportation and warehousing processes [2; 6]. For example, at the Denka Logistics logistics center (Kyiv), an automated sorting and warehouse management system was implemented, which made it possible to reduce order processing time by 30% and decrease picking errors by 40%.

In practice, the use of such systems and solutions significantly increases order processing speed, reduces the likelihood of errors during picking and shipment, and optimizes the use of labor and material resources [4; 6]. Within this direction, the implementation of measures that enhance the productivity of logistics operations, improve customer service quality, and increase the overall efficiency of logistics center activities is of particular importance.

Optimization of logistics processes and routes is an important direction for improving the efficiency of logistics center operations due to its effect on delivery times and the reliability of logistics operations. These

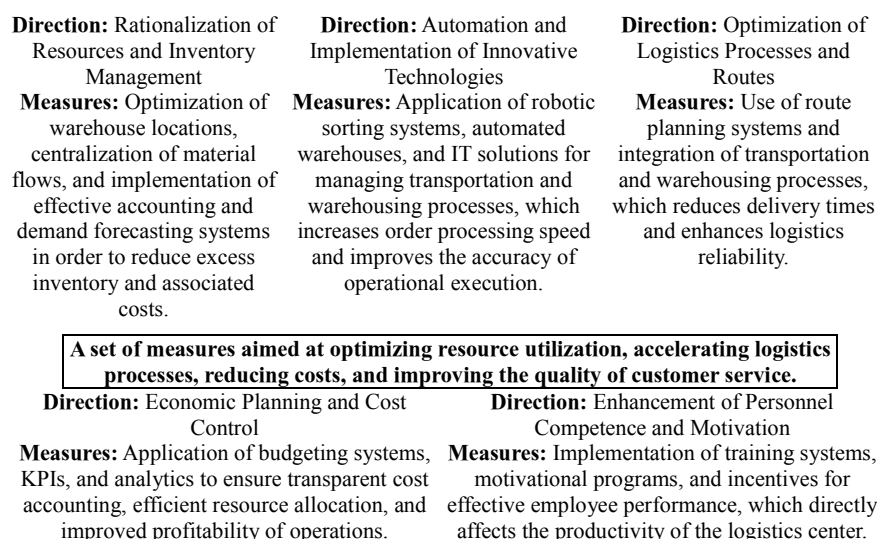


Figure 1. Directions for improving the efficiency of logistics center operations under modern business conditions

Source: developed based on [1—2; 4—5].

effects are achieved through the use of modern route planning and optimization systems, which take into account transportation costs, road congestion, time constraints, and order specifications [1; 5].

For example, the Ukrainian retailer Fozzy Group implemented a dynamic route planning system for deliveries to its own networks (Silpo, Fora, Le Silpo, THRASH!, Fozzy), which enabled a 25% reduction in average delivery time in the Kyiv and Lviv regions and a 15% decrease in fuel costs. An important factor in achieving these effects is also the integration of transportation and warehousing processes, in particular, planning delivery routes based on the actual readiness of orders in the warehouse.

In practice, within this direction, the implementation of measures that reduce vehicle downtime, improve on-time delivery, and enhance the reliability of the logistics system is of particular importance [3—4].

Economic planning and cost control is an important direction for improving the efficiency of logistics center operations due to its optimizing effect on the use of financial resources [5—6]. These effects are achieved through the application of budgeting systems integrated with Key Performance Indicator (KPI) dashboards and analytical tools, which provide calculation of logistics costs per unit of cargo handled (e.g., per order, pallet space, or ton of product [1]).

For example, the experience of Metro in Ukraine demonstrates that analyzing costs per order allows the identification of inefficient operations related to excessive picking time, employee downtime, or irrational use of warehouse equipment. Similarly, evaluating transportation costs per trip or per unit of cargo transported enables a justified review of routes, delivery schedules, or fleet structure.

In practice, within this direction, measures are implemented that ensure a justified allocation of financial resources among logistics operations, timely identification of inefficient expenditures, and management decision-making aimed at improving financial performance and the economic stability of logistics centers [1; 4; 6].

Enhancement of personnel competence and motivation

is an important direction for improving the efficiency of logistics center operations, as work productivity largely depends on employee qualifications and engagement [1]. According to the experience of Denka Logistics logistics center, implementing this direction includes practical training programs, such as workshops on operating automated conveyor and sorting systems, training in WMS systems, and exercises for rapid order fulfillment of large shipments. This enables personnel to master modern technologies and effectively utilize automated equipment in everyday operations.

Furthermore, the implementation of motivational programs and incentive systems, including performance-based bonuses, KPIs, and corporate development programs, increases employee engagement and promotes more effective execution of operations. As a result, these measures contribute to higher logistics center productivity, reduced order processing times, and improved overall economic efficiency of its operations [1—2].

Enhancement of personnel competence and motivation is an important direction for improving the efficiency of logistics center operations, as work productivity largely depends on employee qualifications and engagement. For example, at DSV Logistics in Ukraine, regular training sessions on automated sorting systems and warehouse software enable employees to quickly master new technologies. FM Logistics Ukraine organizes internal internships and training programs to enhance the skills of warehouse operators, while Raben has implemented a KPI— and performance-based bonus system, which increased employee engagement and reduced order processing times [1; 3].

In practice, the implementation of these measures results in faster order processing, higher operational accuracy, and improved overall economic efficiency of the logistics center.

CONCLUSIONS

The research results indicate that the economic foundations of logistics center operations should be based on a comprehensive approach that combines cost

optimization, productivity enhancement, innovation implementation, and strategic activity planning. Under modern business conditions, the key directions for improving the efficiency of logistics centers are: rationalization of resources and inventory management; automation and implementation of innovative technologies; optimization of logistics processes and routes; economic planning and cost control; and enhancement of personnel competence and motivation.

The study showed that rationalization of resources and inventory management ensures the optimization of warehouse locations, centralization of material flows, and the implementation of effective accounting and demand forecasting systems.

The study found that automation and the implementation of innovative technologies increase order processing speed and the accuracy of logistics operations, while the optimization of logistics processes and routes (when implemented through the use of route planning systems and integration of transportation and warehousing processes) reduces delivery times and enhances logistics reliability.

Furthermore, the study demonstrated that economic planning and cost control (through budgeting systems, KPIs, and analytics) ensure increased profitability of logistics center operations, while the enhancement of personnel competence and motivation (through training programs, workshops, incentive systems, and performance-based employee rewards) positively affects logistics center productivity and the quality of customer service.

The overall value of the study lies in demonstrating that the implementation of the aforementioned directions enables logistics centers to adapt to a dynamic market environment, improve operational efficiency, and strengthen their competitive positions in the market.

Література:

1. Аулін В. В., Митник М. М., Ляшук О. Л., Гевко І. Б., Цьонь О. П., Лисенко С. В., Гудь В. З., Гриньків А. В., Голуб Д. В., Бабій М. В. Формування та функціонування логістичних центрів в регіональних транспортно-логістичних системах України: монографія. Тернопіль: ФОП Паляниця В. А., 2024. 393 с

2. Bottani E., Casella G. Discrete-event simulation in logistics and supply chain management: a scientometric perspective. *Production & Manufacturing Research*. 2024. № 12 (1). <https://doi.org/10.1080/21693277.2024.2415038>

3. Gurzhii N., Gurman O., Leskova S., Tyagunova Z., Lubetska M. Analysis of the modern personnel management system under the influence of digitalization of business processes: Experience of international companies, Ukrainian realities. *Financial and Credit Activity Problems of Theory and Practice*. 2022. № 1 (42). pp. 484—492.

4. Папінко А., Кудінов В. В. та Колодій Х. Економічна ефективність стратегій оптимізації логістичних процесів. *Acta Academiae Beregsasiensis. Economics*. 2025. № 11. С. 164—178.

5. Karabacak E., Kutlu H. A. Evaluating the Efficiencies of Logistics Centers with Fuzzy Logic: The Case of Turkey.

Sustainability. 2024. № 16 (1), 438. <https://doi.org/10.3390/su16010438>

6. Люльчак З. С., Данильців О. І. Логістичні центри в Україні — наявний стан та проблеми створення. Глобальні та національні проблеми економіки. 2014. № 2. С. 603—608.

7. Hosseini Shekarabi S., Kiani Mavi R., Romero Macau F. Supply Chain Resilience: A Critical Review of Risk Mitigation, Robust Optimisation, and Technological Solutions and Future Research Directions. *Glob J Flex Syst Manag*. 2025. № 26. P. 681—735.

8. Hurman O., Kostenko D., Runcheva N., Bocharova N., and Khytrova O. Corporate management in the economic sphere under martial law: a response to the challenges of the times, *Amazonia Investiga*. 2023. № 12 (65). P. 246—255.

References:

1. Aulin, V. V., Mytnyk, M. M., Lyashuk, O. L., Hevko, I. B., Tsyon, O. P., Lysenko, S. V., Gud, V. Z., Hrynkyv, A. V., Holub, D. V., and Babi, M. V. (2024), *Formuvannya ta funktsionuvannya lohystychnykh tsentriv v rehional'nykh transportno-lohystychnykh systemakh Ukrainy* [Formation and functioning of logistics centers in regional transport and logistics systems of Ukraine]. FOP Palyanytsya V. A. Ternopil, Ukraine.

2. Bottani, E., and Casella, G. (2024), "Discrete-event simulation in logistics and supply chain management: a scientometric perspective", *Production & Manufacturing Research*, vol. 12 (1). <https://doi.org/10.1080/21693277.2024.2415038>

3. Gurzhii, N., Gurman, O., Leskova, S., Tyagunova, Z., and Lubetska, M. (2022), "Analysis of the modern personnel management system under the influence of digitalization of business processes: Experience of international companies, Ukrainian realities", *Financial and Credit Activity Problems of Theory and Practice*, vol. 1(42), pp. 484—492.

4. Papinko, A., Kudinov, V.V. and Kolodiy, Kh. (2025), "Economic efficiency of strategies for optimizing logistics processes", *Acta Academiae Beregsasiensis. Economics*, vol. 11. pp. 164—178.

5. Karabacak, E., and Kutlu, H.A. (2024), "Evaluating the Efficiencies of Logistics Centers with Fuzzy Logic: The Case of Turkey", *Sustainability*, vol. 16(1). <https://doi.org/10.3390/su16010438>

6. Lyulchak, Z.S., and Danyltsev, O.I. (2014), "Logistics centers in Ukraine — current state and problems of creation", *Hlobal'ni ta natsional'ni problemy ekonomiky*, vol. 2, pp. 603—608.

7. Hosseini, Shekarabi S., Kiani, Mavi R., and Romero, Macau F. (2025), "Supply Chain Resilience: A Critical Review of Risk Mitigation, Robust Optimisation, and Technological Solutions and Future Research Directions", *Glob J Flex Syst Manag*, vol. 26, pp. 681—735.

8. Hurman, O., Kostenko, D., Runcheva, N., Bocharova, N., and Khytrova, O. (2023), "Corporate management in the economic sphere under martial law: a response to the challenges of the times", *Amazonia Investiga*, vol. 12 (65), pp. 246—255.

Отримано редакцією журналу / Received: 07.02.26

Процеженовано / Revised: 12.02.26

Схвалено до друку / Accepted: 17.02.26