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SYSTEM APPROACH TO BUSINESS MANAGEMENT IN THE DIGITAL ENVIRONMENT OF LOGISTIC OPERATIONS

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Lytvynenko A. O., Lytvynenko O. D., Misiura I. I., Malafieiev T. R. System Approach to Business Management in the Digital Environment of Logistic Operations

Ukrainian logistics networks are currently facing a number of interconnected challenges that significantly complicate effective supply chain management. One of the major problems is information fragmentation: data from different stages of the supply chain remain insufficiently integrated, which often leads to errors, delays, and difficulties in process control. The low responsiveness of managerial decision-making has become a serious barrier to business development. Managers are forced to spend a considerable amount of time verifying documents, coordinating procedures, and monitoring routine operations instead of focusing on strategic planning and process optimization. In addition, trust-related risks and regulatory constraints remain significant: uncertainty in the legal framework, insufficient transparency of processes, and the complexity of interaction between partners increase the likelihood of conflicts and reduce the overall efficiency of logistics systems. Taken together, these factors highlight the need for modern approaches to logistics management that combine technological solutions, data analytics, and practical managerial tools to ensure the reliability, speed, and transparency of processes, thereby underscoring the relevance of this study. The aim of this article is to determine how the application of a system approach in combination with digital technologies influences the improvement of logistic process management, promotes data transparency, and accelerates managerial decision-making in both national and international contexts. The study employs system and process approaches, as well as methods of analysis and synthesis, comparison, generalization, and elements of economic and statistical analysis based on secondary data from recent studies (2022–2025). The impact of digital technologies (ERP, WMS, IoT, BI, and DSS) on logistic process management and managerial decision-making has been examined. The results of the study identify key directions for the digital support of managerial decision-making and assess their impact on logistics efficiency. It has been found that the most effect is achieved through the comprehensive integration of digital tools into a unified management system, which ensures increased responsiveness, transparency, and soundness of decisions. The necessity of applying a system approach to the digital transformation of logistics as a foundation for enhancing business competitiveness has been substantiated. A phased approach to the implementation of digital solutions is proposed, which includes the identification of managerial problems, system integration, the development of staff digital competencies, and the assessment of the economic efficiency of digitalization.

Keywords: system approach, logistics digitalization, supply chain management, information integration, data analytics, managerial decision-making.

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Литвиненко А. О., Литвиненко О. Д., Місюра Є. Ю., Малафеев Т. Р. Системний підхід до управління бізнесом у цифровому середовищі логістичних операцій

Українські логістичні мережі сьогодні зіштовхуються з низкою взаємопов'язаних викликів, що значно ускладнюють ефективне управління постачанням. Існує серйозна проблема інформаційної розрізненості: дані з різних етапів ланцюга постачання не інтегровані, що часто призводить до помилок, затримок і труднощів у контролі за процесами. Низька оперативність управлінських рішень стає серйозним бар'єром для розвитку бізнесу. Менеджери змушені витратити значну частину часу на перевірку документів, узгодження процедур і контроль виконання рутинних операцій, замість того щоб концентруватися на стратегічному плануванні та оптимізації процесів. Також присутні ризики довіри та регуляторні обмеження: невизначеність у правовому полі, недостатня прозорість процесів і складність взаємодії між партнерами підвищують ймовірність конфліктів і знижують загальну ефективність роботи логістичних систем. У сукупності ці фактори підкреслюють потребу у сучасних підходах до управління логістикою, які поєднують технологічні рішення, аналітику даних і практичні управлінські інструменти для забезпечення надійності, швидкості та прозорості процесів, що підкреслює актуальність дослідження. Стаття має на меті визначити, як застосування системного підходу разом із цифровими технологіями впливає на вдосконалення управління логістичними процесами, сприяє відкритості даних і прискорює ухвалення управлінських рішень у національному та міжнародному контексті. У роботі використано методи системного та процесного підходів, а також аналізу і синтезу, порівняння, узагальнення та елементи економіко-статистичного аналізу на основі вторинних даних сучасних досліджень (2022–2025 рр.). Досліджено вплив цифрових технологій (ERP, WMS, IoT, BI, DSS) на управління логістичними процесами та прийняття управлінських рішень. За результатами дослідження визначено ключові напрями цифрової підтримки управлінських рішень і оцінено їхній вплив на ефективність логістики. Встановлено, що найбільший ефект досягається за умов комплексної інтеграції цифрових інструментів у єдину систему управління, що забезпечує підвищення оперативності, прозорості та обґрунтованості рішень. Доведено необхідність застосування системного підходу до цифрової трансформації логістики як основи підвищення конкурентоспроможності бізнесу. Запропоновано поетапний підхід до впровадження цифрових рішень, що передбачає ідентифікацію управлінських проблем, інтеграцію систем, розвиток цифрових компетенцій персоналу та оцінку економічної ефективності цифровізації.

Ключові слова: системний підхід; цифровізація логістики; управління ланцюгами постачання; інформаційна інтеграція; аналітика даних; управлінські рішення.

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At present, Ukrainian businesses operate under complex conditions of persistent uncertainty. Global supply chains remain disrupted, energy and transportation constraints directly affect logistics processes, and cyberattacks are increasingly becoming a real and systemic risk for companies. These factors force enterprises to search for new ways of organizing their operations, as traditional approaches to logistics management are no longer capable of ensuring a prompt response to changes, accurate demand forecasting, or the reliability and timeliness of data.

In this context, there is a clear need for a comprehensive systems approach. Such an approach involves the integration of modern digital technologies, analytical tools, and practical managerial solutions that enable not only the maintenance of operational stability but also the improvement of overall efficiency. It allows companies to adapt quickly to new conditions, minimize risks, and ensure the continuity of business processes even in crisis situations, while also creating a foundation for long-term development and market resilience.

Problem Statement. The contemporary business environment is characterized by an increasing complexity of operational management, driven by the dynamism of external conditions, the globalization of markets, and the active implementation of digital technologies. This is particularly evident in logistics processes, which play a critical role in ensuring business continuity, supply efficiency, and the formation of competitive advantages for enterprises. In the digital economy, the speed of information processing, the quality of managerial decision-making, and the level of data integration become key determinants of effective business performance [1].

At the same time, modern logistics systems face a number of significant challenges, among which information fragmentation occupies a central position, manifesting in the lack of data integration across different stages of the supply chain. This results in errors, operational delays, and increased difficulties in process control. In addition, the low responsiveness of managerial decision-making – caused by the large volume of routine operations and the need to process extensive datasets – hinders enterprise development and reduces their competitiveness [2].

For Ukraine, these challenges are particularly acute under conditions of martial law, which is accompanied by disruptions in logistics chains, constraints on transport infrastructure, increased risks, and heightened uncertainty in the economic environment. Additional challenges include growing requirements for business process transparency, the complexity of interaction between partners, and the presence of regulatory constraints, all of which complicate effective logistics management and reduce the level of trust among market participants.

Despite the active implementation of digital technologies such as ERP, WMS, IoT, and analytical systems, their use in many enterprises remains fragmented and does not ensure the creation of a unified information environment. The absence of a comprehensive approach to the integration of digital solutions limits the possibilities for full-scale data analysis, forecasting, and evidence-based managerial decision-making, thereby reducing the overall effectiveness of digital transformation [3].

The scientific problem lies in the need to substantiate and develop a systems approach to business management within the digital environment of logistics operations. Such an approach should ensure the integration of information flows, enhance the responsiveness and quality of managerial decision-making, and contribute to the formation of transparent, resilient, and efficient logistics systems. Addressing this problem is essential for improving enterprise com-

petitiveness, ensuring their adaptability to crisis conditions, and facilitating their integration into global economic processes.

Aim and Methods of the Study. The aim of this article is to study how a systems approach and digital technologies can transform the management of logistics operations, ensure data transparency, and enhance the responsiveness of managerial decision-making in complex Ukrainian and international environments.

The study employs systems and process approaches, which enable a comprehensive analysis of logistics process management in the context of digitalization. The following research methods are applied: analysis and synthesis, comparison, generalization, as well as elements of economic and statistical analysis to assess the effectiveness of digital solutions. The study also considers modern digital tools, including ERP, WMS, IoT, GPS, Business Intelligence (BI) systems, and Decision Support Systems (DSS), which ensure data integration, analytics, and support for managerial decision-making.

The research is predominantly qualitative in nature, supported by generalized quantitative indicators derived from secondary sources. The data sample is not empirically generated by the author but is based on the findings of recent studies (2022–2025), reflecting current trends in the digital transformation of logistics in Ukraine and globally. This approach ensures the relevance and representativeness of the conclusions obtained.

Literature Review. The issues of digitalization of logistics processes and the application of a systems approach to business management in the digital environment have been actively studied by both domestic and international scholars. Contemporary research focuses on the integration of information technologies into logistics systems, the improvement of managerial decision-making efficiency, and the development of resilient supply chains in the context of the digital transformation of the economy.

In particular, considerable attention has been paid to the role of logistics digitalization in enhancing the efficiency of enterprise management. In the works of M. Shtelmashchuk, it is emphasized that the digitalization of logistics contributes to the automation of operations, increases the speed of information processing, and reduces operating costs of enterprises, which is especially important in conditions of an unstable external environment [1]. Similar approaches are developed by N. Kantsedal, O. Leha, and Ye. Morozov, who substantiate the necessity of using modern digital technologies to optimize logistics processes and ensure effective resource management [4].

An important area of research is related to the use of enterprise information management systems. The study by I. Dmytryk and O. Zahorodniuk demonstrates that systems such as BPM, CRM, and ERP play a key role in business digital transformation by enabling data integration, increasing process transparency, and supporting managerial decision-making [3]. In turn, Yu. Radchenko emphasizes the importance of Warehouse Management Systems (WMS) as an effective tool for improving inventory accuracy and controlling warehouse operations [6].

A separate block of scientific research is devoted to the study of modern managerial decision-making in logistics management. In particular, V. Bokovets, I. Shvarts, O. Bezsmertna, and P. Verovkin emphasize that the efficiency of logistics activities largely depends on the speed of managerial decision-making and the use of digital tools for data analysis and forecasting [2]. In the works of O. Dyma, M. Martynenko, and V. Kryvshchenko, it is highlighted that the digital transformation of logistics creates new opportunities for optimizing supply processes, increasing productivity, and reducing enterprise costs [7].

An important role in contemporary research is played by the application of data analytics and intelligent technologies in logistics systems. In particular, Y. Rud and other researchers demonstrate that the use of artificial intelligence technologies in logistics processes makes it possible to significantly reduce delivery time, decrease inventory holding costs, and improve the accuracy of managerial decision-making [8]. Similar conclusions are presented in the study by S. Ramesh Chandra and co-authors, who substantiate the role of Internet of Things (IoT) technologies and data analytics in transforming managerial decision-making processes in business [10].

Particular attention in the scientific literature has been paid to the risks and limitations of the digital transformation of logistics. In particular, A. Barczak, I. Dembińska, and Ł. Marzantowicz note that the implementation of digital innovations in logistics is accompanied by an increase in technological and organizational risks, which requires a systems approach to the management of digital projects [12]. At the same time, O. Ptashchenko and O. Kurtsev emphasize the importance of developing a digital culture among personnel and enhancing employees' competencies as key factors for the successful digitalization of logistics processes [13].

In the works of M. Didenko and N. Potapova, the issue of cybersecurity in logistics systems is examined, highlighting the necessity of protecting information resources and ensuring the continuity of digital platform operations [14]. In addition, V. Kravets draws attention to the economic aspects of implementing

digital technologies, particularly the need to assess the costs and efficiency of logistics solutions [15].

At the same time, the analysis of scientific sources indicates that, despite the significant number of studies in the field of logistics digitalization, the issue of the comprehensive application of a systems approach to managing logistics processes in a digital environment requires further scientific substantiation. In particular, the identification of practical mechanisms for integrating digital technologies into logistics management systems remains especially relevant, taking into account contemporary risks, economic constraints, and the needs of managers.

Main Results of the Study. The digitalization of logistics in Ukraine is no longer merely a trend; it is becoming a key instrument of business management. Modern companies are actively implementing Enterprise Resource Planning (ERP) systems, Warehouse Management Systems (WMS), Internet of Things (IoT) solutions for transport monitoring, and Decision Support Systems (DSS) to support managerial decision-making based on data analytics. For managers, this means the ability to quickly assess operational situations, adjust routes, plan procurement, and control resources without constant involvement in routine document verification.

In practice, however, the level of digitalization varies significantly. Large manufacturers and logistics operators often integrate ERP and WMS systems to optimize warehouse and transportation processes. Small and medium-sized enterprises are more likely to implement individual digital solutions, such as mobile applications for transport monitoring or online platforms for inventory management. Although full integration remains relatively rare, even the partial use of such tools enables managers to save time, reduce the likelihood of errors, and improve process transparency.

Another noteworthy development is the application of blockchain technologies in supply chains, which enhances trust between partners and helps reduce regulatory risks, particularly in cooperation with international counterparts.

For the modern manager, the digitalization of logistics represents not merely the introduction of new technologies, but a practical instrument for improving efficiency and process transparency, enabling rapid decision-making, and strengthening business resilience under conditions of market instability. It allows managers to focus on core managerial tasks by reducing routine operations and operational risks, while creating a solid foundation for the company's strategic development [1].

Within logistics systems, the efficiency of a company largely depends on the speed and quality of

managerial decision-making. At the same time, not all decisions are equally critical – some can be made based on standard procedures, whereas others require prompt access to accurate data and analytical insights. These are precisely the decisions that benefit most from digital support.

The *key managerial decisions* that require the use of digital tools include the following:

1) *Inventory planning and management.* Managers must respond quickly to demand fluctuations, forecast product requirements, and control inventory levels in warehouses. The use of ERP and WMS systems enables real-time access to up-to-date data, automatic report generation, and the modeling of supply scenarios.

2) *Route and transportation optimization.* Decision-making regarding the most efficient routes, load management, and fuel consumption control requires the integration of data from GPS systems, IoT sensors, and transport monitoring systems. Digital platforms enable managers to promptly reroute shipments in the event of traffic congestion, delays, or changes in operational priorities.

3) *Risk management and partner interaction.* Under conditions of market instability, it is essential to assess the financial and reputational reliability of counterparties, forecast supply disruptions, and ensure compliance with regulatory requirements. In this context, digital tools (analytical dashboards, Decision Support Systems, and blockchain technologies for supply chain control) enhance transparency and reduce the impact of the human factor.

4) *Strategic decision-making.* The selection of suppliers, planning for business expansion, and investment in new logistics directions require comprehensive analysis of large volumes of data. Analytical systems enable managers to evaluate development scenarios, compare alternatives, and make decisions based on objective performance indicators rather than intuition [2].

Managers seeking to improve operational efficiency must clearly identify the areas in which digital systems deliver the greatest value – whether in planning, control, risk analysis, or interaction with counterparties. Such decisions not only enable the automation of routine tasks but also create a foundation for the strategic development of businesses under conditions of instability [3].

In contemporary conditions, logistics management increasingly relies not on managerial intuition but on high-quality data and rapid access to it. At the same time, digital support is not required to the same extent for all managerial activities. Digital tools provide the greatest impact in those decisions where re-

sponsiveness, information accuracy, and coordination between departments and partners are critical [2].

For greater clarity, the key managerial decisions, corresponding digital tools, and their practical impact for managers are summarized in *Tbl. 1*, which demonstrates that digital tools perform not only an automation function but, above all, a decision-support function [2].

They reduce the managerial workload associated with routine operations while simultaneously improving the quality of decisions at both tactical and strategic levels. The greatest effect is achieved when digital solutions are implemented not in a fragmented manner but as an integral component of the logistics management system. This enables managers to respond more rapidly to changes in the external environment, enhance process transparency, and ensure business resilience under conditions of instability [4–7].

A modern logistics manager must identify precisely those decisions in which digital tools deliver the greatest impact, namely by increasing the speed, accuracy, and transparency of managerial processes. The use of such tools enables not only the optimization of current operations but also enhances the company's strategic flexibility under conditions of market instability [2].

For a logistics manager, digital technologies have value only when they directly influence the quality and speed of decision-making. The integration of Internet of Things (IoT) solutions, data analytics, and Decision Support Systems (DSS) creates a unified information environment in which managers obtain not merely separate indicators but a comprehensive view of logistics processes in real time.

IoT sensors ensure the continuous collection of data on vehicle movement, cargo conditions, temperature, warehouse utilization levels, and actual delivery delays. For managers, this signifies a transition from reactive to proactive management, as problems are detected before they lead to supply disruptions. For example, in companies that use transport monitoring sensors, managers can promptly adjust routes or delivery schedules without the need to intervene in all operational processes [4].

Data analytics transforms large volumes of collected information into managerially relevant indicators. Instead of manually analyzing reports, managers gain access to analytical dashboards featuring key performance indicators, demand forecasts, and scenario projections. This enables well-informed decisions regarding procurement volumes, inventory optimization, and resource planning, thereby reducing reliance on subjective judgments.

Decision Support Systems (DSS) complement analytics by enabling the modeling of managerial de-

Table 1

The Impact of Digital Support on Managerial Decision-Making

Managerial Decision	Digital Tool	Practical Impact for Managers
Inventory planning and control	ERP, WMS	Up-to-date information on inventory levels in warehouses, automated reports, time savings on manual verification
Route optimization	GPS, IoT, TMS	Real-time transport monitoring, reduction of logistics costs, fewer delays
Risk management in supply chains	DSS, BI dashboards	Forecasting supply delays, risk assessment, support for strategic decision-making
Interaction with partners	Digital document management, blockchain	Fewer misunderstandings with suppliers, data transparency, compliance with regulatory requirements
Coordination of supply and cooperation with suppliers	ERP, electronic document management	Transparency of interactions, reduction of document errors, acceleration of coordination processes
Strategic logistics planning	BI systems, analytical platforms	Well-founded selection of development strategies, evaluation of alternatives, reduction of managerial uncertainty

Source: compiled by the authors based on [2; 4].

cisions. They allow managers to assess the potential consequences of various scenarios – such as changing suppliers, adjusting logistics routes, or reallocating warehouse capacities – before their actual implementation. In practice, this significantly reduces managerial risks and helps identify the most economically viable courses of action.

One of the practical confirmations of the effectiveness of digital solutions in logistics is provided by empirical studies conducted in 2025. In particular, research involving the use of artificial intelligence (as part of DSS approaches and data analytics) demonstrated that the implementation of intelligent systems in logistics processes reduced delivery time by 11.7%, decreased inventory holding costs by 16.3%, and lowered fuel consumption by 9.2% compared to traditional management methods. This indicates that decisions previously based on intuition or fragmented data become more accurate, efficient, and predictable due to the integration of IoT technologies and analytical data support into logistics management systems [8].

Corporate practices in 2025 also demonstrate a growing trend toward increased investment in the digital transformation of logistics processes. The share of enterprises planning to make substantial investments in logistics digitalization over the next three years has risen to nearly 29%, indicating a genuine readiness of businesses to utilize analytical data, IoT monitoring, and Decision Support Systems (DSS) in their managerial decision-making [9].

At the same time, the impact of digitalization on logistics processes is already evident in route optimi-

zation, warehouse automation, and enhanced supply chain transparency, providing companies with both qualitative improvements and measurable quantitative benefits.

The integration of IoT technologies, data analytics, and Decision Support Systems (DSS) is meaningful only when it directly influences specific managerial decisions. For managers, it is important to understand not merely the general benefits of digitalization, but precisely which decisions are improved and what managerial impact is achieved. The generalization of practical experience in implementing digital technologies in logistics makes it possible to systematize this impact by types of decisions, as presented in *Tbl. 2*, which demonstrates that digital technologies in logistics do not replace managers but significantly strengthen their role in the decision-making process [2; 3].

Through the integration of IoT solutions, data analytics, and Decision Support Systems (DSS), managers gain access to up-to-date, structured information and forecasts significantly faster than under traditional management approaches. This enables a transition from intuitive or situational decision-making to management based on real data and objective performance indicators.

At the same time, the impact of digitalization has a clearly measurable nature: companies that have implemented IoT monitoring demonstrate reductions in delivery time and improvements in planning accuracy, while the use of DSS and Business Intelligence (BI)

Managerial Impact of Implementing Digital Technologies in Logistics

Technology	Type of Managerial Decision	Managerial Impact
IoT (GPS trackers, cargo condition sensors)	Operational decisions related to transportation and execution	Reduction of delivery delays, prompt response to route changes
Data analytics (BI dashboards, forecasting)	Tactical decisions regarding inventory and resource planning	Accurate forecasts, optimization of inventory levels and resource allocation
DSS (Decision Support Systems)	Strategic decisions regarding suppliers and logistics structure	Risk reduction, scenario comparison, well-informed strategic decisions
IoT + analytics	Route and load optimization	Reduction of logistics costs, improved coordination between teams
IoT + analytics + DSS	Comprehensive managerial decisions in crisis situations	Increased logistics resilience, rapid response to changes

Source: compiled by the authors based on [2; 3].

tools provides more reliable strategic forecasts and reduces managerial risks. The greatest managerial effect is achieved not through the application of individual digital solutions, but through their comprehensive integration, where IoT ensures a continuous flow of data, analytical systems transform this data into clear managerial indicators, and DSS supports the selection of optimal courses of action [10].

Digital support for managerial decision-making significantly improves the efficiency of logistics processes and ensures business resilience even in complex and unstable operating environments. For managers, this means that the implementation of modern technologies is not an abstract trend but a practical instrument for enhancing the effectiveness of business decisions. Real-time access to data, analytics-based forecasting, and the modeling of alternative scenarios within DSS environments enable decision-making that substantially reduces costs, accelerates logistics processes, and increases the reliability of operational activities [11].

Despite the evident advantages of logistics digitalization, it is important for managers to recognize not only its potential but also the risks and limitations that arise during the implementation of digital solutions. In practice, the underestimation of these factors most often leads to a reduction in the expected benefits or to the inefficient use of technologies [12].

One of the key risks of logistics digitalization is the fragmented implementation of digital tools, when companies focus on individual technological solutions without establishing a comprehensive management system. In practice, digitalization often begins with local initiatives, such as the introduction of transport monitoring systems, warehouse accounting automation, or electronic document management, which address specific operational tasks but are not integrated

with each other. In the absence of a unified information environment, data remain fragmented, are updated at different intervals, and are not coordinated across organizational units [7].

Under such conditions, managers are forced to spend additional time reconciling information from different systems, manually verifying performance indicators, and identifying the causes of deviations, which reduces the responsiveness of managerial decision-making. Moreover, the lack of integration makes comprehensive analytical assessment and scenario planning impossible, as the available data do not provide a holistic view of the supply chain. As a result, digital tools, instead of improving management efficiency, merely automate individual processes without creating real managerial value. Therefore, to achieve sustainable outcomes, digitalization should be implemented as a coordinated managerial strategy focused on the integration of data, processes, and decisions, rather than as a collection of isolated technological projects.

A significant limitation of the digitalization of logistics processes remains the human factor, which in many cases has a decisive influence on the outcomes of technology implementation. Even the most advanced digital platforms fail to deliver the expected results in the absence of a well-established managerial culture oriented toward data-driven decision-making and an adequate level of staff training. In practice, the implementation of digital solutions is often accompanied by resistance to change, manifested in employees' reluctance to abandon established procedures, distrust of automated systems, or fear of losing control over processes.

An additional challenge is the insufficient level of digital competencies among both operational staff and managerial personnel. Managers do not always possess the necessary skills to interpret analytical data,

work with digital dashboards, or effectively use forecasting results for decision-making. Under such conditions, digital tools are perceived merely as auxiliary accounting systems, while their potential to support managerial decision-making remains underutilized.

It is also important to highlight the problem of unclear allocation of responsibilities for digital processes. The absence of clearly defined roles responsible for data quality, system administration, and the use of analytical information leads to operational disruptions and a decline in trust in digital solutions. As a result, digitalization slows down and its effectiveness significantly decreases, which underscores the necessity of a comprehensive approach that combines technological changes with the development of managerial competencies and organizational culture [13].

Particular attention should also be paid by managers to cybersecurity risks and data reliability, as digital supply chains are becoming increasingly interconnected with online services, IoT devices, and cloud platforms that process mission-critical information. Therefore, managers must not only implement digital tools but also ensure their protection at every level. This includes the use of modern encryption technologies, the establishment of access control mechanisms, regular data backup procedures, and the implementation of incident response protocols. Logistics companies in Ukraine can cooperate with both domestic and international IT partners, particularly firms specializing in cybersecurity consulting and the development of secure systems. Such an approach enables managers to reduce potential losses from cyberattacks, maintain operational continuity, and build a more reliable digital infrastructure within the supply chain [14].

Another significant limitation of digitalization is the economic aspect of its implementation and maintenance. The high costs associated with the acquisition, configuration, and maintenance of modern digital platforms, IoT devices, analytical systems, and DSS solutions can become a serious barrier, particularly for small and medium-sized enterprises (SMEs), where IT budgets are limited. Moreover, expenses are not confined solely to the purchase of software and equipment; additional resources must be allocated for staff training, system integration, technical support, and regular updates.

Without a prior economic assessment of the feasibility of implementing digital tools, companies risk facing situations in which projects fail to justify the invested funds and do not deliver the expected managerial benefits. For example, if the implementation of transport monitoring systems or warehouse automation is not integrated into existing processes, or if personnel are not properly trained to use analytical

dashboards effectively, the results may be limited. In such cases, companies may incur additional financial burdens, while managers may be unable to improve the accuracy of managerial decision-making or reduce operational costs [4].

Therefore, for effective digitalization, it is critically important to conduct a preliminary evaluation of the expected economic impact, assess the balance between anticipated benefits and costs, and plan phased implementation that allows organizations to achieve partial results and gradually scale the system. Such an approach helps prevent overspending, enhances budget control, and ensures that digital solutions deliver real managerial value rather than remain costly tools without tangible outcomes [15].

For managers, the digitalization of logistics should be viewed not as a universal solution, but as a tool that requires a balanced and well-considered approach. A clear understanding of risks and limitations enables managers to adapt their strategies in advance, minimize negative consequences, and ensure tangible benefits from the use of digital technologies in logistics processes.

The development of practical recommendations for applying a systems approach to the digital transformation of logistics should be based not on abstract concepts or generalized models, but on real managerial challenges faced daily by logistics managers and companies as a whole. In the Ukrainian context, where logistics operations are influenced by unstable demand, infrastructure constraints, and high operational risks, it is important for managers not merely to "digitalize processes," but to clearly understand which specific managerial problem is being addressed through the use of digital tools. Practical experience demonstrates that digital transformation produces meaningful results only when it is treated as a comprehensive managerial project with clearly defined objectives, responsible stakeholders, and expected outcomes, rather than as a collection of isolated IT solutions implemented without a coherent strategic framework.

For managers, a key priority is a clear understanding of which specific managerial decisions should be strengthened through digital technologies. These primarily include route planning and vehicle load management, inventory level management, real-time monitoring of transportation performance, assessment of operational risks, and demand forecasting. It is precisely in these areas that time losses, additional costs, and managerial errors most frequently occur due to the lack of up-to-date information. Therefore, digitalization should begin with the identification of bottlenecks in logistics processes, where decisions are made intuitively or with delays rather than on the basis of data.

Such an approach enables managers to develop a well-founded list of priority processes requiring digital support and to avoid the chaotic implementation of technologies. As a result, digital transformation ceases to be a formal modernization effort and becomes an effective instrument for improving the quality of managerial decision-making, directly influencing logistics efficiency, financial performance, and overall business resilience.

The next practical step in the digital transformation of logistics should be the phased implementation of digital solutions with mandatory integration both among these solutions and with existing management processes. The implementation of individual technologies – such as IoT-based transport monitoring, GPS tracking systems, or automated warehouse solutions – without their subsequent integration with analytical platforms and Decision Support Systems provides only a partial effect. In such cases, digital tools record events and indicators but do not transform them into actionable information suitable for both operational and strategic management [16].

For managers, it is essential not merely to receive individual indicators – such as vehicle arrival time, warehouse utilization levels, or inventory balances – but to obtain a comprehensive view of the logistics process. The integration of data from multiple sources makes it possible to assess the interconnections between transportation activities, warehouse operations, inventory levels, and costs, as well as to respond promptly to deviations from planned targets. When information from IoT devices, Warehouse Management Systems (WMS), Enterprise Resource Planning (ERP) systems, and analytical platforms is consolidated within a unified information environment, managers gain the ability to make decisions not intuitively but on the basis of reliable and up-to-date data [4].

A phased approach also reduces risks for businesses, as it allows organizations to gradually test solutions, evaluate their managerial impact, and adjust subsequent actions. For executives, this means greater control over the digitalization process, enhanced investment transparency, and the ability to scale only those tools that genuinely improve logistics efficiency. As a result, an integrated digital system becomes not an additional burden but a practical management instrument that ensures rapid access to data and supports decision-making in near real-time conditions [16].

Particular attention within a systems approach to the digital transformation of logistics should be paid to the role of personnel, as it is people who ultimately determine whether digital tools become an effective management mechanism or remain merely a formal element of modernization. Practical experi-

ence convincingly demonstrates that even the most advanced platforms – such as Enterprise Resource Planning (ERP) systems, Warehouse Management Systems (WMS), analytical dashboards, or Decision Support Systems (DSS) – do not deliver the expected results without an appropriate managerial culture and a team's readiness to work with data. In many companies, digital systems continue to operate in parallel with manual procedures because employees either lack trust in the data or do not fully understand how to use them in their daily work [13].

In this context, managers should invest not only in technologies but also in the development of digital competencies among personnel at all levels of management. The focus should not be limited to technical training; rather, it should include the development of skills in working with analytical information, understanding the logic of digital processes, and interpreting performance indicators for managerial decision-making. An important practical step is also the clear allocation of responsibilities related to data management – specifically, identifying who is responsible for data accuracy, who analyzes the indicators, and who makes decisions based on them.

In addition, managers should pay particular attention to change communication and the clear explanation of digitalization objectives. When employees understand that digital tools simplify work processes, reduce the number of routine operations, and help prevent errors, the level of resistance to change decreases significantly. As a result, digital solutions cease to be perceived as an additional burden and begin to function as full-fledged management instruments that enhance decision quality, strengthen staff accountability, and improve the overall efficiency of logistics processes.

An important element of a systems approach to the digital transformation of logistics is the economic and risk assessment of digital projects at all stages of their implementation. From a managerial perspective, it is practically advisable to begin digitalization with a preliminary analysis of the expected impact, which allows planned investments to be aligned with potential managerial and operational benefits. Such an analysis should include an assessment of the effects of digital solutions on cost reduction, increased order processing speed, decreased error rates, and improved quality of managerial decision-making. Without a clear understanding of these parameters, digital initiatives risk remaining technically successful but economically inefficient [12].

A practical instrument for managers is the identification of key performance indicators (KPIs) that are directly linked to the managerial objectives of logistics. Such indicators may include demand forecasting

accuracy, the rate of on-time delivery performance, inventory turnover, or the cost per logistics operation. Regular monitoring of these indicators enables organizations to assess the actual impact of digital solutions and to make timely adjustments to both technological and managerial approaches [17].

Particular attention should be given to planning cybersecurity and data protection measures, which constitute an integral component of the economic evaluation of digital projects. System failures, data breaches, or cyberattacks may undermine the expected benefits of digitalization and result in significant financial and reputational losses. Therefore, it is important for managers to anticipate the costs associated with information security, data backup, and the development of incident response scenarios in advance. Taken together, such an approach helps prevent situations in which digitalization becomes an additional financial burden without delivering tangible managerial outcomes, while simultaneously enhancing the resilience of logistics processes to both external and internal threats [14].

To achieve sustainable managerial outcomes, the digital transformation of logistics should be implemented in stages, with each stage clearly linked to specific managerial decisions and expected results (Tbl. 3) [16].

A systemic digital transformation of logistics for managers does not consist in the rapid implementation of individual technologies, but in the consistent integration of digital tools, managerial decisions, and the human factor. A phased approach enables managers to reduce the risks associated with digitalization, ensure the economic feasibility of implementation initiatives, and transform digital tools into an effective mechanism for supporting managerial decision-making rather than isolated technological solutions lacking systemic impact.

CONCLUSIONS

The study has established that the digital transformation of logistics under contemporary conditions is not merely a technological process, but rather a complex managerial challenge that requires a reconsideration of approaches to decision-making, process organi-

Table 3

Phased Implementation of Digital Transformation in Logistics

Stage of Digital Transformation	Content of Managerial Actions	Role of the Manager	Expected Practical Result
Identification of managerial problems	Analysis of logistics processes, identification of bottlenecks (delays, overloads, data errors)	Develops a list of key decisions requiring digital support	Clear understanding of digitalization objectives and priorities
Economic and risk assessment	Evaluation of costs, expected impact, risks, and constraints	Makes decisions regarding the feasibility and scale of implementation	Reduction of financial risks and avoidance of unjustified investments
Selection of digital tools	Selection of ERP, WMS, IoT, BI, and DSS solutions according to managerial tasks	Aligns technological solutions with business objectives	Technologies correspond to actual management needs
Pilot implementation	Deployment of digital solutions in selected logistics areas	Supervises testing and evaluates initial results	Identification of issues and adjustment before scaling
System integration	Integration of data from different sources into a unified information environment	Ensures consistency and reliability of managerial information	Transparency of logistics processes and improved operational control
Personnel training	Development of digital competencies among managers and employees	Builds a data-driven work culture	Reduced resistance to change and increased efficiency
Scaling and optimization	Expansion of solutions across departments and process optimization	Makes decisions based on analytical insights	Sustainable managerial impact and increased productivity

Source: compiled by the authors based on [16].

zation, and the allocation of responsibilities. The greatest impact of digitalization is achieved not through the implementation of individual software products or technical solutions, but when digital tools are purposefully applied to support key managerial decisions in areas such as logistics operations planning, real-time monitoring of transportation performance, demand forecasting, and operational risk management.

In such cases, digital technologies enable managers to work with up-to-date data, reduce the level of uncertainty, and transition from intuitive decision-making to analytics-based decisions. At the same time, the study has shown that the fragmented implementation of individual technologies without their integration into a unified management system does not ensure sufficient transparency of logistics processes and does not create a coherent information environment for management. Disparate systems generate separate datasets that are difficult to integrate, which complicates comprehensive analysis and limits managers' ability to make timely and well-informed decisions. As a result, digitalization loses its strategic character and fails to realize its full potential as a tool for improving logistics efficiency and enhancing the company's competitiveness.

The integration of IoT solutions, data analytics, ERP and WMS systems, as well as Decision Support Systems, creates fundamentally new opportunities for managers to manage logistics processes. The consolidation of data from transportation systems, warehouses, information systems, and analytical platforms enhances the responsiveness of management, improves the accuracy of planning and control, and enables the timely detection of deviations from planned performance indicators. In practical terms, this is reflected in reduced delivery times, optimized routes, decreased excess inventory, and more reliable demand forecasting, which directly contributes to cost reduction and improved overall logistics efficiency.

The study has also identified a number of significant constraints that hinder the realization of the full potential of digital transformation. First and foremost, this concerns the human factor, which remains critical even at a high level of technological readiness. Insufficient digital competencies among personnel, a formal approach to the use of analytical tools, and resistance to organizational change result in collected data not being fully utilized to support managerial decision-making.

A separate group of constraints is associated with cybersecurity risks and data reliability, which increase alongside the level of digitalization of logistics systems. Disruptions in the operation of information platforms, data breaches, or cyberattacks may not only reduce management efficiency but also result in significant

financial and reputational losses. Equally important is the economic dimension: the absence of a preliminary assessment of expected outcomes, clearly defined performance indicators, and a phased implementation approach may lead to situations in which digital projects fail to justify investments and do not produce tangible managerial results. Thus, even in the presence of advanced technological solutions, the potential benefits of digitalization may be undermined without adequate managerial support and a systemic approach.

The systemic and phased approach to the digital transformation of logistics proposed in this study makes it possible to reduce risks, ensure investment control, and transform digital tools into practical mechanisms for improving the quality of managerial decision-making. Such an approach is particularly relevant for Ukrainian businesses operating under conditions of high turbulence, limited resources, and elevated operational risks.

Prospects for further research lie in conducting a more in-depth quantitative analysis of the economic impact of digital transformation in logistics across companies of different sizes and industries, as well as in examining the influence of managers' digital competencies on the effectiveness of managerial decision-making. Another promising direction for future research is the development of practical models for assessing digital logistics maturity and the analysis of the role of artificial intelligence and predictive analytics in supporting strategic managerial decisions within logistics systems. ■

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УПРАВЛІННЯ ІННОВАЦІЙНОЮ ДІЯЛЬНІСТЮ ПІДПРИЄМСТВ У СИСТЕМІ ЗАБЕЗПЕЧЕННЯ ЇХНЬОЇ КОНКУРЕНТОСПРОМОЖНОСТІ

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Сотник В. В., Голік В. В. Управління інноваційною діяльністю підприємств у системі забезпечення їхньої конкурентоспроможності

У статті досліджено теоретико-методичні та прикладні аспекти управління інноваційною діяльністю підприємств у контексті забезпечення їхньої конкурентоспроможності в умовах посилення глобальної конкуренції, цифрової трансформації та динамічних змін зовнішнього середовища. Узагальнено сучасні наукові підходи до управління інноваціями, зокрема процесний, ресурсний, стратегічний, маркетинговий та інституційний, що дало змогу обґрунтувати доцільність інтеграції їх у єдину систему управління. Розкрито механізм управління інноваційною діяльністю підприємства, який охоплює етапи ідентифікації інноваційних можливостей, формування інноваційної стратегії, реалізації інноваційних проєктів та оцінювання їхньої результативності із забезпеченням зворотного зв'язку. Доведено, що ефективне функціонування такого механізму сприяє підвищенню інноваційної активності, раціоналізації використання ресурсів та узгодженості управлінських рішень. Визначено основні напрями впливу інноваційної діяльності на конкурентоспроможність підприємства, серед яких продуктивний, технологічний, управлінський, маркетинговий, організаційний та інституційний. Обґрунтовано, що системне впровадження інновацій забезпечує підвищення ефективності діяльності підприємства, зниження витрат, розширення ринків збуту та формування стійких конкурентних переваг. Окреслено ключові проблеми управління інноваційною діяльністю, зокрема недостатній рівень фінансового забезпечення, низьку інноваційну культуру, фрагментарність інноваційних