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ORIGINAL

Enhancing competitive advantage through digital innovation and organisational culture in the logistics sector

Mejora de la ventaja competitiva mediante la innovación digital y la cultura organizativa en el sector logístico

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ABSTRACT

Introduction: the modern logistics sector is rapidly changing under the influence of digital technologies. The use of innovative digital technologies can significantly increase efficiency, reduce costs and improve customer service.
Objectives: formation of a comprehensive theoretical approach to the impact of innovation transfer and organizational culture on improving logistics processes and achieving sustainable competitive advantages in the context of digital transformation.
Method: empirical research methods include analysis and synthesis, SWOT analysis, grouping method, abstraction, and generalisation.
Results: the study analyses the impact of digital transformation on logistics processes, examines the main trends and technologies that promote the digital transformation of logistics chains, assesses the impact on the efficiency and productivity of logistics processes, determines the significance of innovation in developing logistics strategies and enhancing companies' competitiveness, and outlines the factors that contribute to innovative activity in logistics companies. The influence of technological changes on digital competitiveness is substantiated based on the IMD World Digital Competitiveness Ranking indicators for 2023. Countries worldwide are grouped according to their level of digital competitiveness, the impact of education, the implementation of innovations, and their readiness for transformational changes. The impact of innovation transfer on the competitive advantages of the logistics company Amazon is studied. Critical aspects of the organisational culture of digital transformation in modern conditions are outlined. A SWOT analysis of digital transformation in the logistics business is presented using the example of "Nova Poshta." Opportunities and threats to logistics entrepreneurship regarding competitive advantages in digital transformation are identified.
Conclusions: the main directions of digital transformation for a logistics company are highlighted.

Keywords: Organisational Culture; Logistics Entrepreneurship; Logistics Chain; Digital Transformation; Innovative Activity.

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RESUMEN

Introducción: el sector logístico moderno está cambiando rápidamente bajo la influencia de las tecnologías digitales. El uso de tecnologías digitales innovadoras puede aumentar significativamente la eficiencia, reducir los costos y mejorar el servicio al cliente.
Objetivos: formación de un enfoque teórico integral sobre el impacto de la transferencia de innovación y la cultura organizacional en la mejora de los procesos logísticos y la consecución de ventajas competitivas sostenibles en el contexto de la transformación digital.
Método: los métodos de investigación empírica incluyen análisis y síntesis, análisis FODA, método de agrupación, abstracción y generalización.
Resultados: el estudio analiza el impacto de la transformación digital en los procesos logísticos, examina las principales tendencias y tecnologías que promueven la transformación digital de las cadenas logísticas, evalúa el impacto en la eficiencia y la productividad de los procesos logísticos, determina la importancia de la innovación en el desarrollo de estrategias logísticas y la mejora de la competitividad de las empresas, y describe los factores que contribuyen a la actividad innovadora en las empresas de logística. La influencia de los cambios tecnológicos en la competitividad digital se fundamenta en los indicadores del IMD World Digital Competitiveness Ranking para 2023. Los países de todo el mundo se agrupan según su nivel de competitividad digital, el impacto de la educación, la implementación de innovaciones y su preparación para los cambios transformacionales. Se estudia el impacto de la transferencia de innovación en las ventajas competitivas de la empresa de logística Amazon. Se describen los aspectos críticos de la cultura organizacional de la transformación digital en las condiciones modernas. Se presenta un análisis FODA de la transformación digital en el negocio logístico utilizando el ejemplo de "Nova Poshta". Se identifican las oportunidades y amenazas para el emprendimiento logístico en relación con las ventajas competitivas en la transformación digital.
Conclusiones: se destacan las principales direcciones de la transformación digital para una empresa de logística.

Palabras clave: Cultura Organizativa; Emprendimiento Logístico; Cadena Logística; Transformación Digital; Actividad Innovadora.

INTRODUCTION

In today's world, where digitalisation encompasses all aspects of business, logistics chains are no exception. The digital transformation of logistics processes is critical for increasing the efficiency, speed, and accuracy of goods and services delivery. This study focuses on the importance of innovative activity and organisational culture in ensuring competitive advantages in the logistics sector. The constant updating of technologies requires companies to adapt and implement new solutions to maintain competitiveness. Expanding global markets and increasing competition compel companies to optimise their logistics chains using modern digital tools. Modern consumers expect fast and transparent delivery, which drives companies to adopt digital innovations in logistics management. Digital technologies significantly enhance the efficiency of logistics processes by reducing costs and increasing the accuracy of operations. Organisational culture supports innovative approaches and facilitates rapid adaptation to new technologies. Companies that successfully implement digital transformations in their logistics chains gain significant competitive advantages, reflected in increased customer satisfaction, reduced costs, and faster service delivery.

This research is significant for understanding how innovative activity and organisational culture influence the success of digital transformation in logistics chains and ensuring competitive advantages in modern market conditions.

Forming a comprehensive understanding of how innovative activity and organisational culture can be used to improve logistics processes and achieve sustainable competitive advantages in digital transformation.

DEVELOPMENT

The digital transformation of supply chains is critical in ensuring companies' efficiency, flexibility, and competitiveness in a fast-changing business environment. Several publications highlight the main trends in the digitalisation of the economy in the context of restructuring processes in various countries and the specific advantages and disadvantages.[1,2] Researchers address the methodology of digital transformation in supply chains [3] and the effectiveness of implementing sustainable logistics 4.0 to improve the productivity of supply chains.[4,5]

A significant number of studies are dedicated to the issues of innovative activity [6,7] and organisational culture,[8,9,10,11] which play an essential role in this process as they facilitate adaptation to new technologies

and the implementation of advanced practices and cost optimisation. The main elements influencing the digital transformation process, regardless of the business sector, include staff competence, educational level, career growth opportunities, business strategy, leadership style, cloud services, and integrated organisational innovations. [12-14] In the context of a circular economy, digitalisation is crucial for ensuring the balance of the market for environmentally friendly products, adjusting public demand, and changing consumer habits.[15] Research focuses on reducing multimodal transport's carbon footprint and improving supply chains' economic performance under digital transformation conditions.[16,17]

Research by scientists from various countries shows that the digital transformation of the supply chain is essential in ensuring companies' competitive advantages [11] and plays a critical role in this process by promoting the adoption of new technologies and adaptation to changes in the business environment. The connection between "digitalisation – logistics – grain market – agricultural development" has been proven to be a significant factor in the socio-economic development of Ukraine under transformational conditions.[18]

METHOD

The following methodological approaches were employed in the research: analysis and synthesis for the analytical assessment of specific cases of implementing digital technologies in the logistics sphere of companies [19, 20] to understand how these technologies affect their efficiency and competitiveness; SWOT analysis for the assessment of the strengths and weaknesses of companies regarding digital transformation, as well as the identification of opportunities and threats in terms of competitive advantages. Comparative analysis was employed to compare the experiences and practices of digital transformation of the logistics chain in different companies and sectors. This allowed for the identification of successful approaches and best practices. The grouping method was used to determine the influence of factors such as educational level, technology development, and the readiness level of companies for innovation transfer. Abstraction and generalisation were employed to structure complex systems and identify the main patterns of digital transformation.

The abovementioned research permitted a more profound examination of the interrelationship between innovative activity, organisational culture, and competitive advantages in the digital transformation of companies' logistics chains.

RESULTS

Over the last two decades, as the Internet revolution has swept the world, our daily lives have become increasingly digital. With email overshadowing "snail mail" and digital downloads replacing physical products, this could have dealt a devastating blow to the logistics industry. However, something remarkable happened: more parcels are now being sent than ever before. An astounding 85 million parcels and documents are delivered worldwide every day.

Demographic and digital trends combine to drive growth, but logistics companies cannot afford to rest on their laurels and enjoy the fruits of this global delivery boom.

Logistics is adopting digital innovations more slowly than some other industries. This slow pace of digital technology adoption creates enormous risks that, if ignored, could be catastrophic even for the most significant known players in the business.

As other industries closely linked to logistics, such as retail, undergo revolutions thanks to digital technologies, the chances of a digital disruption sweeping the logistics industry increase. For instance, the rise of e-commerce has led to the emergence of new digital players in the last-mile delivery market.

More importantly, digital platforms will become increasingly vital in the logistics industry, enabling small companies to have a global reach and compete with well-known sector giants. Over the next few years, the race to create a dominant global platform will transform the customer experience in logistics and become a central issue in determining which businesses will win and losers in a genuinely digital logistics industry.

Digitalisation threatens to disrupt logistics fundamentally but can also help the industry reduce inefficiencies and lessen its environmental impact.

With the logistics industry suffering from significant inefficiencies—for example, 50 % of trucks return empty after delivery—the digital transformation can also bring significant social and environmental benefits by increasing efficiency and reducing energy consumption and emissions.

Analysis shows that by 2025, the digital transformation of the industry will create $1,5 trillion in value at stake for logistics players and an additional $2,4 trillion in societal benefits. In other words, industry stakeholders must pay attention and unite to prioritise digital transformation initiatives, which have the potential to create significantly more value for society than for the industry. We have identified five themes that will be central to the digital transformation of the logistics industry over the next decade.[21]

The IMD World Digital Competitiveness Ranking is an annual ranking created by the IMD World Competitiveness Center that assesses countries' ability to develop and implement digital technologies. The ranking measures countries' digital competitiveness based on various indicators covering technological, scientific, and innovation

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capabilities. The ranking is based on objective indicators (statistical data) and expert surveys. Statistical data are collected from official sources such as international organisations, government agencies, and scientific research. Expert surveys include opinions from business executives, academic specialists, and other professionals. The goals of the ranking are to identify the strengths and weaknesses of different countries in the field of digital technologies, provide governments, businesses, and academic institutions with information for informed decision-making, and help countries improve their positions on the global stage by implementing effective digital strategies.[22]

The ranking is based on three main components, each consisting of several subcomponents and indicators: knowledge (talent, training, scientific concentration), technology (regulatory framework, capital, technological changes), and future readiness (business adaptability, IT integration, societal adaptability). The annual ranking results reflect the overall level of digital competitiveness of each country, as well as its positions in individual components and subcomponents. Countries that rank highly typically demonstrate strong positions in all three main components: knowledge, technology, and future readiness (figure 1).

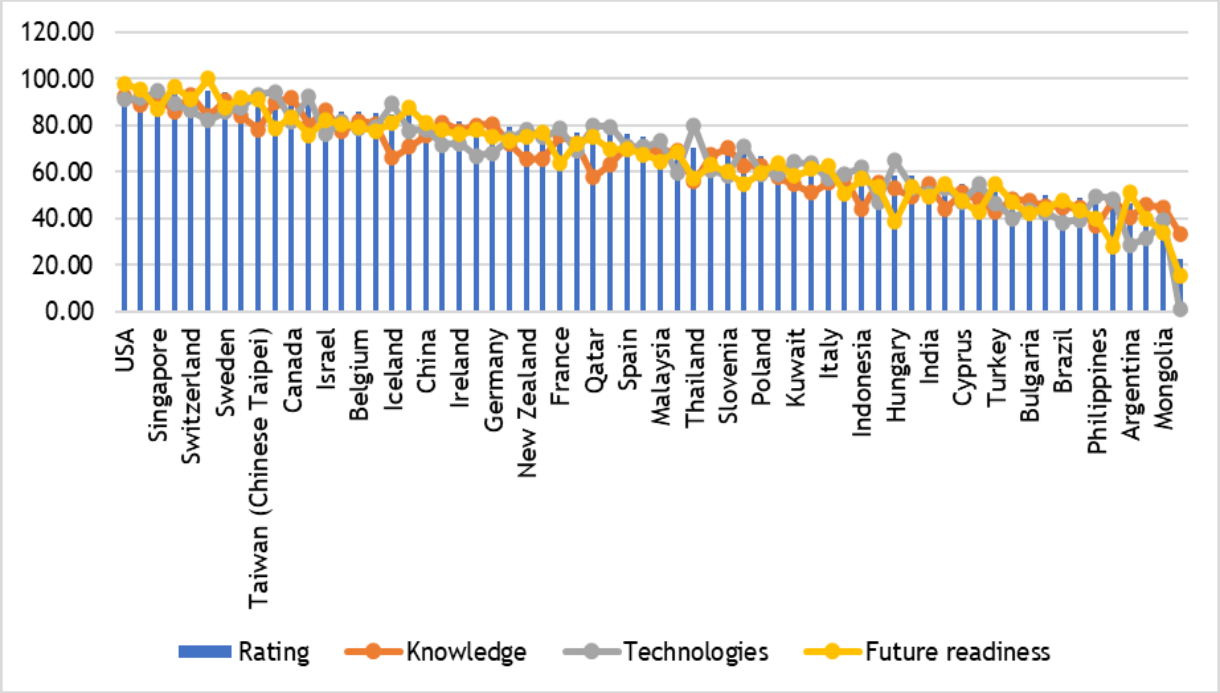

Figure 1. Global Digital Competitiveness Index in 2023, %
Source: IMD [22]

The countries included in the ranking can be divided into five groups (figure 2).

Typically, the leading positions in the ranking are occupied by countries that have strong positions in all three components (Group I), a high level of innovation and technological development (USA), a high level of business adaptability and technological infrastructure (Singapore), a solid scientific base and investments in digital technologies (Sweden), and a high level of digital literacy among the population and ICT integration into business processes (Denmark). The most significant number of countries in the ranking belongs to Group II, while the smallest number belongs to Group V (Venezuela). The lower the level of innovation implementation, the lower the ranking (table 1).

Table 1. Average Level of Digital Competitiveness Ranking Indicators in 2023

Indicator	Group				
	I	II	III	IV	V
Rating	91,9	76,8	60,2	48,1	22,6
Knowledge	84,1	70,1	52,1	44,7	33,7
Technologies	86,3	71,9	56,2	40,1	1,1
Future readiness	87,0	70,0	54,0	41,8	15,7
Number of countries	18	20	15	10	1

Source: compiled by the authors based on IMD [22]

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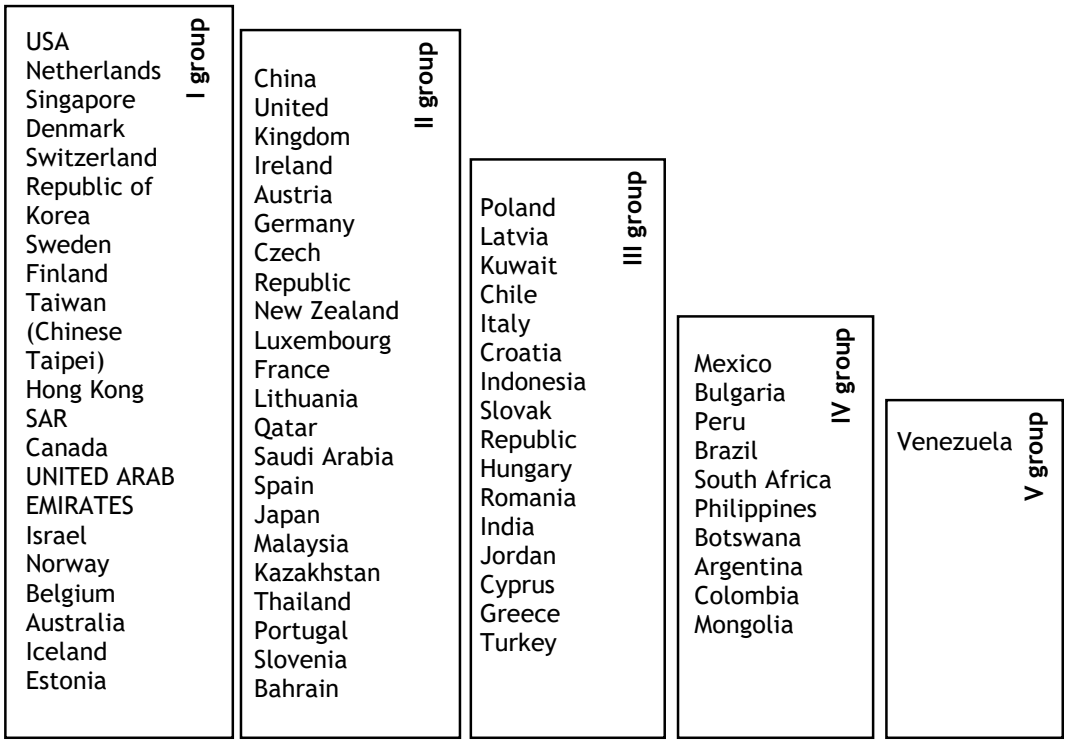

Figure 2. Grouping of Countries by Digital Competitiveness Ranking in 2023
Source: compiled by the authors based on IMD [22]

The ranking results also highlight the main challenges countries face and opportunities for improvement. For example, some countries may have solid technological infrastructure but need education and workforce training improvements.

The IMD World Digital Competitiveness Ranking is essential for assessing and comparing countries' digital competitiveness. It provides valuable information for governments, businesses, and academic institutions, helping to identify strengths and weaknesses and develop strategies to improve digital transformation. Digital competitiveness is a critical factor for economic growth, innovation, and overall societal development in the modern world.

Amazon, one of the largest companies in the world, actively uses digital technologies to transform its logistics processes. Its experience is an excellent example of how digital transformation can provide significant competitive advantages (table 2).

Table 2. Implemented Technologies and Their Impact on Amazon's Competitive Advantage

Scope	Technology	Impact
Automated warehouses and robots	Amazon uses Kiva robots in its warehouses to automate the picking and packing of goods	It significantly reduces order processing time, reduces employee costs, and increases order fulfilment accuracy. As a result, Amazon can deliver goods to customers faster and cheaper while providing a high-quality service.
Transport management systems (TMS)	Using transport management systems to optimise delivery routes and fleet management	Optimised routes reduce fuel costs, shorten delivery times, and increase vehicle efficiency. This increases delivery speed and reliability, which has a positive impact on customer satisfaction.
Real-time tracking	Using RFID, GPS and other technologies to track the condition and location of goods in real-time	Customers can receive up-to-date information on their orders' status, increasing their satisfaction and trust in the company. It also allows you to respond quickly to any problems during delivery.
Demand analytics and forecasting	Using artificial intelligence and analytical tools to forecast demand for goods	Accurate demand forecasting allows for efficient inventory management, reducing storage costs and avoiding stock-outs. This helps the company maintain high order fulfilment readiness and meet customer needs.
Automated inventory management	Use of inventory management systems to automate the replenishment and storage of goods	It reduces storage costs, reduces inventory volumes and increases the efficiency of their use. This helps to reduce costs and increase the company's profitability.

Source: compiled using data from Amazon [19]

The digital transformation of logistics processes has enabled Amazon to secure significant competitive advantages, such as increasing the speed and accuracy of deliveries, reducing logistics operation costs, enhancing customer satisfaction through transparency and reliable service, and optimising inventory and transportation management. This example demonstrates how implementing digital technologies can significantly improve logistics processes and give a company sustainable competitive advantages in the market.

Amazon is one of the leaders in the digital transformation of logistics processes. The company actively uses advanced technologies to optimise all aspects of the logistics chain, ensuring high efficiency, fast delivery, and improved customer service. Amazon uses Kiva robots to automate order sorting, picking, and packing, significantly reducing order processing time and operational costs. Integrated Warehouse Management Systems (WMS) provide automated inventory tracking and optimisation of warehouse operations. Using IoT sensors to monitor real-time storage and transportation conditions helps reduce transportation costs and increase delivery speed. Analytical tools improve the analysis of historical data and the forecasting of future product demand. Proprietary AWS cloud services for data storage and processing ensure the smooth operation of logistics processes and support business flexibility, providing real-time data access for all participants in the logistics chain, from suppliers to end consumers. The use of blockchain technology promotes transparency and security in all operations within the logistics chain. Mobile applications are used for tracking shipments, order management, and customer communication.

The digital transformation of Amazon's logistics chain is an example of the successful implementation of advanced technologies to optimise logistics operations. Integrating automation, IoT, big data analytics, cloud technologies, blockchain, and mobile technologies enables Amazon to ensure high efficiency, reduce costs, improve customer service, and provide transparency in all processes. The company continues to invest in new technologies to remain a market leader and provide the best service to its customers.

Innovative activity is critical to creating and maintaining competitive advantages in the modern digitalisation environment. [23] It includes processes that contribute to creating new products, services, and business models and can significantly improve a company's efficiency. Organisational culture is another crucial element that facilitates the successful implementation of innovations and enhances a company's competitiveness in digitalisation. Critical aspects of organisational culture include innovative thinking, leadership and management, learning and development, and employee engagement (figure 3).

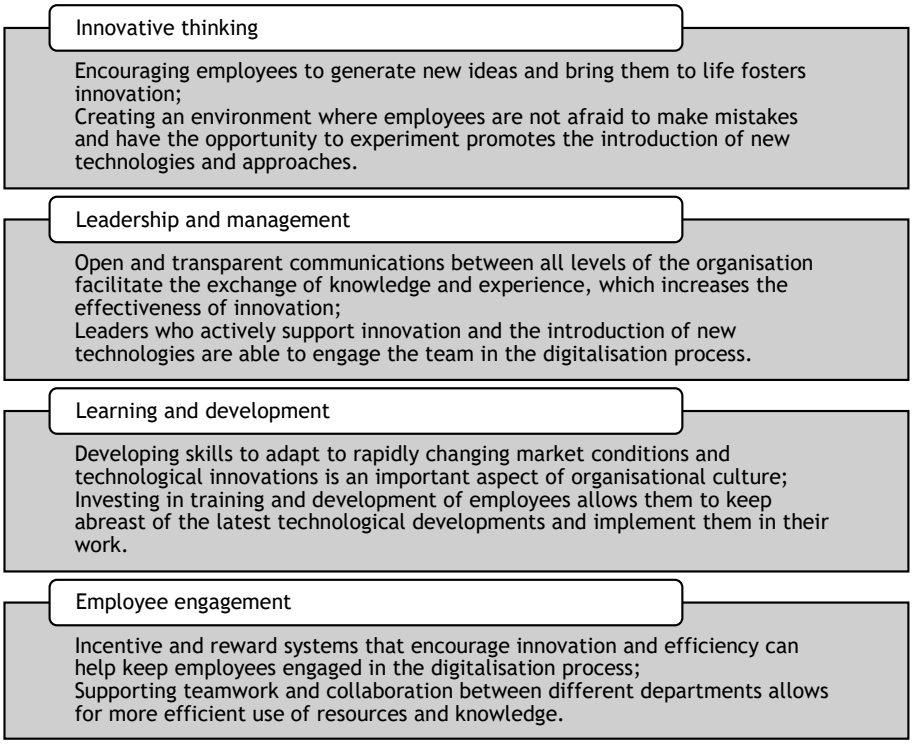

Figure 3. Critical aspects of organisational culture for digital transformation

Innovative activity and organisational culture are key factors contributing to creating and maintaining a company's competitive advantages in digitalisation. They are interconnected and complement each other, creating an environment where innovations can thrive and deliver accurate results. Companies that actively implement innovative technologies and develop a positive organizational culture can achieve significant success and maintain their competitiveness in the market.

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This system allows for the optimisation of inventory and reduction of storage costs, as well as improving the accuracy of demand forecasting and the efficiency of the company's logistics processes.

A SWOT analysis of the logistics company "Nova Poshta" in the context of digitalisation shows significant potential for implementing digital technologies and enhancing competitiveness (table 3).

Table 3. SWOT analysis of digital transformation at Nova Poshta

Strengths	**Opportunities**
1. Open organisational culture: the company actively supports innovation and new technologies, which creates a favourable environment for digital transformation. 2. Management support: the company's management is actively involved in the digital transformation process and supports innovation. 3. Developed IT infrastructure: the company has a modern IT infrastructure that allows it to integrate new technologies quickly. 4. Highly qualified staff: the company's employees have the necessary knowledge and skills to work with new technologies. 5. A vast network of branches and partners: many branches and partner outlets nationwide, allowing us to implement new solutions quickly.	1. Growth in demand for digital services: the market is constantly evolving, and the demand for digital logistics solutions is growing. 2. Partnership with technology companies: the possibility of cooperation with IT companies to develop and implement new technologies. 3. Entering new markets: using digital technologies to expand into new markets and segments. 4. Improving customer service: using new technologies to improve the quality of service and customer interaction. 5. Attracting investment: attracting additional investment to finance digital transformation.
Weaknesses	**Threats**
1. Resistance to change: some employees may resist innovation due to fear of change and lack of awareness. 2. Internal bureaucracy: complex internal procedures can slow the adoption of new technologies. 3. Limited resources: there are not always enough financial and technical resources for full-scale implementation of digital technologies. 4. Systems integration: problems integrating new digital solutions with existing systems can slow transformation.	1. Competition: increasing competition from other companies rapidly adopting digital technologies. 2. Technological changes: rapid technological changes may make some investments obsolete. 3. Cyber threats: risks related to cyber security can threaten the security of data and operations. 4. Regulatory barriers: changes in legislation and regulatory requirements can complicate the digital transformation process. 5. Implementation costs: the high initial costs of implementing digital technologies can affect a company's financial stability.

Source: compiled by the authors based on analysis of data from Nova Post [20,24]

The digital transformation of logistics entrepreneurship opens up new opportunities for increasing efficiency, improving customer service, and ensuring competitive advantages. However, companies face several opportunities and threats that require careful management and adaptation (figure 4).

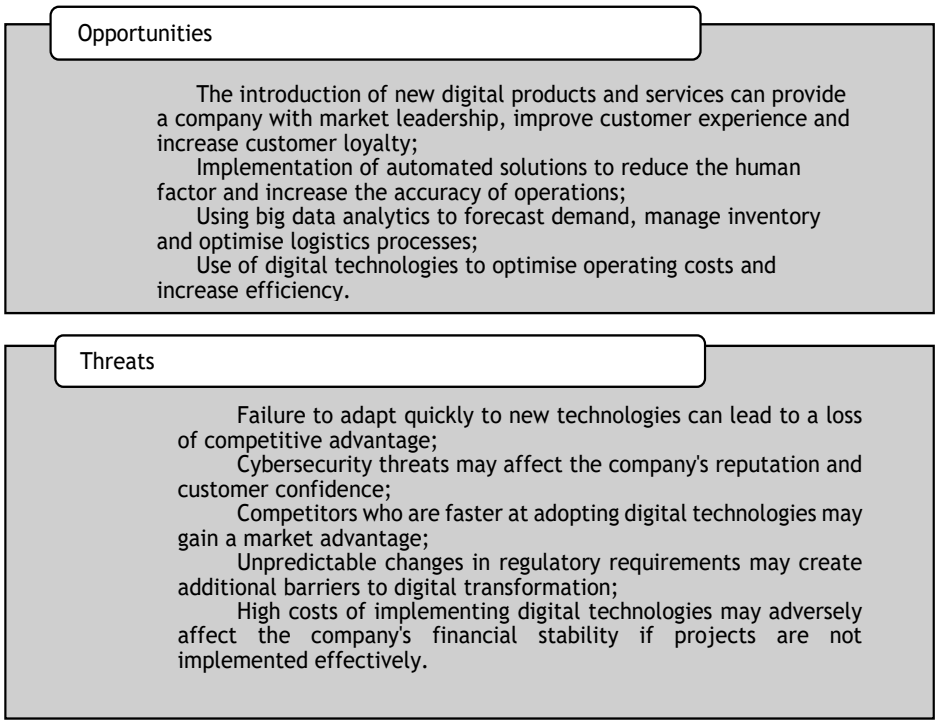

Figure 4. Opportunities and Threats to Logistics Entrepreneurship in terms of Competitive Advantage in the Digital Transformation

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Digital transformation fundamentally changes how the logistics business operates, creating new opportunities for development and generating significant challenges and threats.[25,26] Competitive advantages in digital transformation depend on an enterprise's ability to adapt to new technologies and changing market conditions. Successful digital transformation requires strategic planning, investment in new technologies, continuous market trends and risk monitoring.

DISCUSSION

The digital transformation of logistics businesses is an important aspect of modern business that helps companies increase efficiency, reduce costs and improve customer service. The introduction of modern technologies, such as the Internet of Things (IoT), blockchain, artificial intelligence (AI) and big data, allows companies to automate routine operations, improve the accuracy and speed of information processing, and ensure the transparency and security of all logistics processes.

Digital transformation also helps to optimize logistics routes and manage inventory in real time, which allows companies to respond more flexibly to changes in demand and reduce the cost of storing and transporting goods. The use of machine learning algorithms and big data analytics helps to predict demand, which contributes to better planning and reduces the risks of shortages or surpluses.

One of the key aspects of digital transformation is improving customer service. Using digital platforms to track goods in real time, ensure fast and accurate delivery, and provide customers with access to up-to-date information about their orders increases customer satisfaction and strengthens their trust in the company. In addition, digital technologies allow for the creation of personalized solutions for customers, which increases customer loyalty and contributes to business growth.

However, digital transformation also brings with it certain challenges. First of all, it requires significant investments in new technologies and staff training. Companies must be prepared to adapt their organizational structures and processes to make the most of new technologies. In addition, cybersecurity issues are becoming increasingly relevant as the amount of digital data and connected devices grows, requiring the implementation of reliable information security measures.

Digital transformation also requires a change in corporate culture to support innovation and flexibility. Company leaders should play an active role in shaping the digital transformation strategy, ensuring that employees at all levels of the organization are supported and motivated.

To summarize, the digital transformation of logistics business is a key success factor in today's market conditions. It provides companies with the opportunity to increase the efficiency of operations, reduce costs, improve customer service, and strengthen their competitiveness. However, successful implementation of digital technologies requires taking into account both technical and organizational aspects, while ensuring reliable data protection and maintaining an innovative corporate culture (figure 5).

Automation of routine tasks reduces time and avoids human error, which significantly improves overall efficiency. Thanks to automation, processes such as order processing, inventory management, sorting, and shipping are faster and more accurate, minimizing the risk of errors that can lead to delays or additional costs. This allows employees to focus on more strategic tasks that drive business development.

Optimization of logistics processes with the help of modern technologies helps to reduce the cost of transportation, storage, and inventory management. The use of advanced algorithms for route planning allows you to find the most optimal delivery routes, which reduces fuel costs and reduces vehicle wear and tear. Automated warehouse management systems (WMS) allow for efficient resource allocation, reducing storage costs and increasing warehouse productivity.

Digitalization ensures fast and accurate delivery of goods,[27,28] allowing companies to more effectively coordinate all stages of the logistics process from order receipt to delivery to the customer. Integration of transportation management systems (TMS) with ERP systems ensures uninterrupted exchange of information between all participants in the supply chain, which significantly improves the accuracy and speed of order fulfillment.

The ability to track shipments in real time increases customer confidence, as they can receive up-to-date information about the location of their orders and the estimated delivery time. This reduces the number of customer service requests and increases customer satisfaction, which in turn leads to increased loyalty and repeat business.

The use of the Internet of Things (IoT) and blockchain technologies provides transparency across the entire supply chain, allowing you to track every stage of the movement of goods from the manufacturer to the end consumer. IoT sensors can collect data on the condition of the cargo, such as temperature, humidity, and vibration levels, which is critical for sensitive goods. Blockchain technology ensures data integrity and security, which prevents fraud and forgery.

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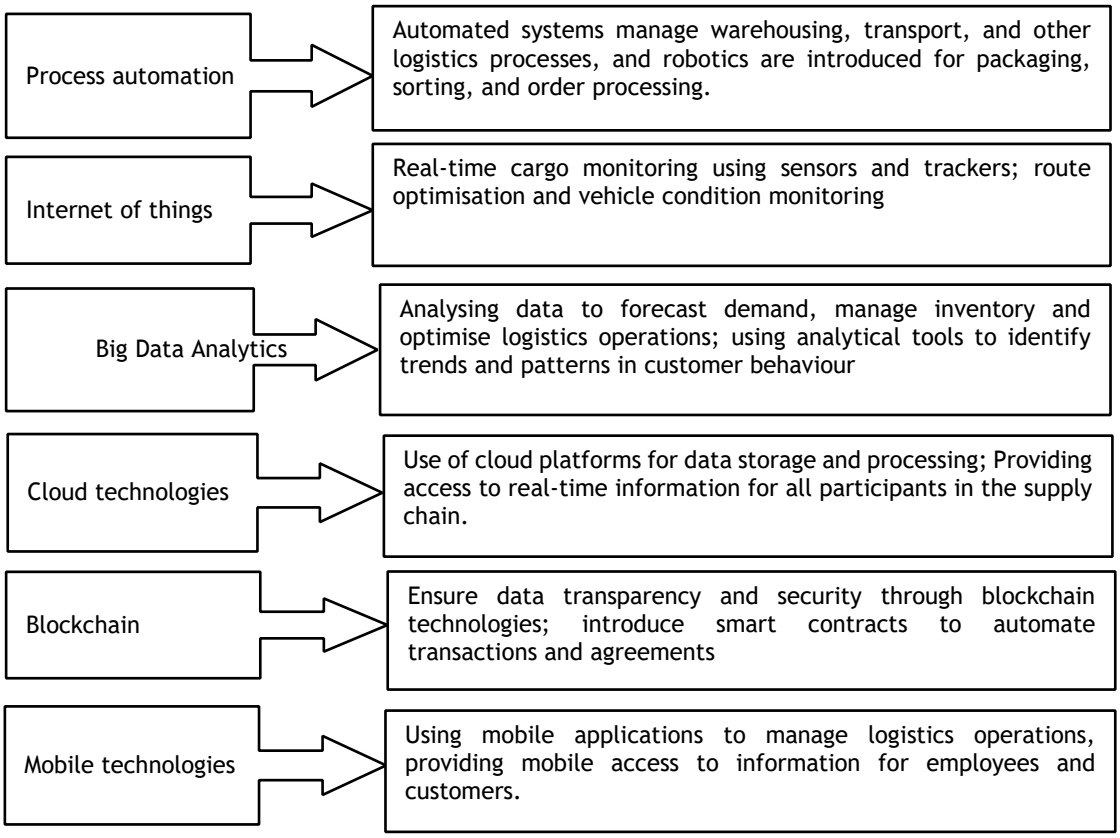

Figure 5. Main areas of digital transformation of a logistics company

Monitoring and controlling the condition of goods prevents loss and damage, which is especially important for goods with a limited shelf life or those that require special transportation conditions, such as food or pharmaceuticals. This helps to reduce the number of returns and complaints, reducing related costs and improving the quality of customer service.

The use of big data analytics allows you to quickly respond to market changes and customer needs, providing the company with the ability to predict demand and optimize inventory management. Analytical tools help to identify trends and patterns, which allows you to make more informed decisions, reduce risks, and increase business efficiency.

Cloud technologies enable businesses to scale to meet growing demand, providing flexibility and adaptability in changing market conditions. They allow companies to quickly integrate new solutions and technologies, reduce IT infrastructure costs, and provide access to data and applications from anywhere and at any time. This helps to increase productivity, improve collaboration between departments and partners, and ensure rapid response to changes in the market environment. The ability to track shipments in real time increases customer trust. The use of IoT and blockchain technologies ensures transparency throughout the entire logistics chain. Monitoring and controlling the condition of goods prevents losses and damage. The use of big data analytics allows for quick responses to market changes and customer needs. Cloud technologies provide the ability to scale the business according to growing demand.

CONCLUSION

The digital transformation of the logistics chain is a crucial step for modern companies striving to remain competitive in the market. Implementing advanced technologies optimises logistics operations, increases efficiency, reduces costs, and improves customer service. Companies that successfully implement digital transformation gain significant competitive advantages and can better adapt to market changes.[29] The digital transformation of logistics processes significantly changes how supply chains are managed, ensuring higher efficiency, transparency, and adaptability.

Digital transformation dramatically impacts all logistics processes, providing increased efficiency, transparency, flexibility, and cost reduction. Companies that successfully implement digital technologies in logistics gain significant competitive advantages, such as better customer service, optimised operations, and cost reduction.[30] Digital transformation opens up vast opportunities for improving the efficiency and competitiveness of logistics enterprises. However, it also generates significant threats and challenges, such as

cybersecurity, dependency on technology, and high implementation costs. To successfully leverage opportunities and overcome threats, enterprises must invest in data protection, personnel training, adaptation to new conditions, and active collaboration with other organisations.

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CONFLICT OF INTEREST

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