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DIGITAL TRANSFORMATION IN LOGISTICS: REALITY AND PROSPECTS

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Abstract. In the modern global economy, the logistics sector is an important provider of business competitiveness as a key component of supply chain management. Digital transformation is of strategic importance for optimizing logistics processes, increasing transparency in the supply chain, and strengthening the country's position in global trade. The development of digital technologies plays an important role in optimizing logistics operations, reducing costs, and increasing customer satisfaction.

Keywords: Logistics, technology, supply, innovation, automation, integration

Introduction. Nowadays, logistics has become one of the main factors of competitiveness of companies. It is no longer perceived as simply the transportation of goods from one point to another, but as a complex system that meets customer expectations, ensures financial efficiency and creates value throughout the entire supply chain. Now the development of any industry is impossible without technology. Market demands for accuracy and customer expectations regarding services further increase the role of the human factor for the efficiency and reputation of companies. Logistics and supply chain require new approaches to business management. The number and variety of factors that must be taken into account for effective strategic planning significantly complicate calculations based on existing algorithms. Advances in artificial intelligence and robotics provide the industry with tools to solve problems of various nature and complexity, including supply chain security.

Conceptual foundations of digital transformation in logistics. Digital transformation, recognized as the process of integrating non-technical areas with information technologies, is currently at the forefront of the sector’s trend list. It is not just the automation of existing processes, but also organizational changes using technology to innovate business models and improve customer experience. In terms of logistics, this means optimizing and making operations transparent throughout the supply chain. As noted in Adullayev et al., “…the introduction of digital innovations, such as cargo tracking, warehouse and transport management systems, can improve the transparency and manageability of logistics processes” [6, p.1292].

Digital transformation in logistics allows companies to create agile and operational operations, ensure resilience in the face of challenges, and maintain sustainable competitiveness

in a dynamic market environment. This is not just a technological upgrade, but a fundamental change in organizational culture, business processes, and business strategy [1, p.73].

The goals of digital transformation in logistics and supply chain are to identify, solve, and, if possible, eliminate existing and potential industry problems. These goals include the following:

- *Increasing operational efficiency*: This goal can be achieved primarily through automation and optimization of operational processes through more complete data analysis.
- *Reducing costs*: This can be achieved by reducing operational costs through more efficient use of resources and optimizing processes.
- *Increasing transparency in the supply chain*: Achieving this goal creates the basis for real-time accessibility to necessary information, as well as improving performance at all stages of the supply chain.
- *Improving the customer experience* is aimed at increasing customer satisfaction by demonstrating faster and more accurate delivery, as well as a higher service culture.
- *Sustainability and security*: This goal covers all processes required to ensure the safety, quality and integrity of the product or service, starting from the identification and calculation of risks, to the management of logistics security.

Artificial intelligence is revolutionizing logistics. The AI logistics market is expected to reach $348.62 billion by 2032, growing at a compound annual growth rate of 45.93%. This growth is due to the benefits that AI brings to the industrial sector of the economy, including cost reduction and improved service levels. In general, the main applications of AI in logistics today are as follows:

- Demand forecasting: AI analyzes historical sales data, market trends, and external factors to optimize resource allocation and inventory levels.
- Route optimization: AI algorithms analyze real-time traffic data, weather conditions, and other variables to determine the most efficient shipping routes.
- Predictive maintenance: AI-based predictive maintenance reduces equipment downtime by 45% and maintenance costs by up to 30%.
- Automated decision-making: Artificial intelligence systems help make fast and accurate decisions by analyzing large amounts of data to determine data-driven strategies.

The current state of digital transformation in logistics. Digital transformation in the logistics sector is rapidly developing and has a significant impact on a global scale. According to an analysis by the World Economic Forum, digital transformation will bring an additional

1.5 trillion US dollars to the logistics industry in the next 2-3 years and create an additional 2.4 trillion US dollars in positive externalities for society. According to McKinsey, 70% of logistics enterprises are currently adopting digital transformation and are achieving significant results as a result.

Leading logistics companies are successfully implementing digital transformation strategies. FedEx is a leading player in logistics innovation, using digital transformation to overcome the challenges of supply chain management. Traditionally, the company has faced problems with databases and mechanical processes that limit efficiency and efficiency. However, the launch of FedEx Dataworks was a significant change, focusing on the integration of artificial intelligence and machine learning to create a sustainable, data-driven supply chain.

Henkel's Bowling Green facility was struggling with outdated systems that were not keeping up with the increasing complexity of its operations. Processing delays, inefficiencies in resource allocation, and rising operating costs were beginning to impact profitability and customer satisfaction. To address these issues and scale efficiently, Henkel launched a $70 million transformation initiative aimed at modernizing its logistics operations. As a result, Henkel's facility is delivering faster turnaround times and reduced delays. Ultimately, the company's forward-thinking approach has positioned it as a leader in modern logistics.

Barriers and challenges of digital transformation in logistics. The technological barriers that logistics companies face in the process of digital transformation are diverse and complex. Many logistics companies have difficulties updating outdated systems that do not keep up with the increasing complexity of operations. These systems hinder the efficient management of daily operations and make it difficult to implement digital innovations. In addition, one of the challenges faced by logistics service providers is the complexity of logistics networks and related processes. This is especially characteristic of the implementation of digital transformation and requires effective cooperation between all participants in the supply chain.

Weak technological knowledge also poses a serious obstacle to the digital transformation of logistics companies. Scientific studies show that the lack of technological know-how in the field of logistics, the low level of education of the workforce and difficulties in the transfer of innovation between retail branches of logistics service providers slow down digital transformation. This is especially important in an era when highly qualified personnel are required for the implementation of digital solutions.

Digital transformation is more of an organizational change than a mere technological upgrade, and cultural barriers are not excluded in this process. Resistance to change is a

common problem. For many employees, change creates a sense of uncertainty and anxiety, as a result of which personnel who are accustomed to existing technical processes do not strive to adopt new technologies and working methods. The feeling of complacency created by past successes can also be perceived as a serious obstacle. In the logistics service industry, management often expresses ideas such as "We are successful. Why should we spend money to change a process or type of activity that works normally?" In other words, companies fall into a "competence trap", thinking that the factors that led to past successes will also bring success in the future. This creates a barrier to innovation and change and slows down the digital development of companies.

Lack of leadership support also makes successful transformation impossible. Lack of proper support from top management significantly reduces the effectiveness and sustainability of digital transformation initiatives. Without strong leadership and strategic goals, digital projects often remain aimless and disconnected, leading to fragmented innovations instead of continuous and integrated transformation.

The high capital requirements for digital transformation are one of the main obstacles to transformation efforts in the logistics sector. This creates serious financial constraints for small and medium-sized enterprises, including the acquisition of technology, the establishment of the necessary infrastructure, ongoing maintenance and upgrades, the uncertainty of the rate of return on investments, and the risk of technological obsolescence. Completely revamping the existing logistics infrastructure can be both financially and operationally challenging, especially for large and complex systems. This forces companies to settle for small upgrades to existing systems or implement digital transformation in stages. This sometimes prevents the expected efficiencies from being achieved.

Ensuring information security and protecting privacy are also serious challenges for logistics companies in the process of digital transformation. The nature of digital systems and the interconnected supply chain creates numerous potential vulnerabilities for cyber attacks. If the weakest link in the supply chain is attacked, malicious programs or other cyber threats can quickly spread throughout the entire connected network and affect not just one company, but the entire ecosystem.

Cybersecurity risks are constantly increasing, and logistics companies must fight against increasingly sophisticated and sophisticated cyber attacks. The protection of sensitive business data, customer information, trade secrets and operational data requires special attention.

Financial problems occupy a special place among the obstacles to digital transformation in logistics. They are mainly related to high initial investment costs, technology obsolescence and the need for continuous renewal, difficulties in making investment decisions due to uncertainty about the rate of return, as well as the high cost of replacing existing logistics infrastructure.

When developing strategies for successful digital transformation in logistics, the issue of creating a digital transformation Roadmap should be brought to the forefront. To create an appropriate Roadmap, synchronized workflows and effective communication between logistics management systems, warehouse operations and transportation networks should be ensured. In addition, real-time schedules should be drawn up to adapt to market changes and operational challenges, and to maintain flexibility.

No matter how technological digital transformation is, the human factor is always the basis of the successes achieved or to be achieved. In this regard, employees should be explained the benefits of digital transformation, and a safe environment should be created for them to learn and adapt.

Digital transformation is not a one-time project, but an ongoing process. In order to evaluate its results, performance indicators such as delivery accuracy and cost-effectiveness should be monitored. At the same time, digital initiatives that have been proven to be effective in practice should be expanded throughout the entire logistics network, ensuring that they are adaptable and sustainable.

Digital transformation in logistics in Azerbaijan. The logistics sector in Azerbaijan benefits from the country's strategic geographical location and transit potential. Infrastructure projects such as the Baku-Tbilisi-Kars railway line and the Baku International Sea Trade Port have significantly increased the country's logistics capabilities. As noted in the studies of Abdullayev et al., Azerbaijan has recorded an 86% increase in transit traffic between China and other countries in the past year, and according to officials, "this is just the beginning" [5, p.706].

Hasanov A., Ibrahimov I. and Mammadov S., in their study on the regulation of the digital economy in modern competitive conditions, emphasized that the digitalization of the logistics sector plays an important role in increasing the country's economic competitiveness [2, p.37].

In recent years, Azerbaijan has taken significant steps towards digital transformation in logistics. The Asian Development Bank's project on the digitalization of Azerbaijan Railways CJSC supports the digitalization of key processes, including railway transport management, asset management, investment planning and management, customer service system, and

corporate functions[7]. At the same time, paper-based operations in the field of digital transformation still continue, the adoption of digital solutions among small and medium-sized logistics companies is limited, the problems of system integration have not been fully resolved, and the transparency of the supply chain is limited

It should be noted that there are significant opportunities for digital transformation in the Azerbaijani logistics sector. According to the analysis of the World Economic Forum, Azerbaijan prioritizes the development of a strong digital ecosystem and infrastructure, emphasizing the promotion of innovation in its strategy towards digital excellence [8]. Our country is no longer just a transit point in the Belt and Road Initiative, but aims to become a hub for business, innovation and investment. Thus, in the current period, the support of "Digital Azerbaijan" and other state initiatives for digital transformation in logistics, the growing trade along international transport corridors, the adoption of digital solutions by a technology-adapted population, and the competition to become a regional logistics hub stimulating digital innovation should be seen as key opportunities for digital transformation in the logistics sector.

In the process of digital transformation, the work carried out by Azerbaijan towards building a competitive economy is of particular importance. In the digital transformation strategy of Azerbaijan, attracting foreign investments and developing human capital have been identified as important factors.

In order to accelerate the digital transformation in logistics in Azerbaijan, we have formulated appropriate proposals and recommendations, referring to the works of local and foreign scientists and researchers, world experience, and most importantly, existing opportunities. They generally consist of the following:

- ✓ Expanding education in the field of information and computer technologies and organizing courses to improve digital skills;
- ✓ Expanding and financing state initiatives to support the adoption of digital technologies among logistics companies;
- ✓ Supporting digital transformation in small and medium-sized companies based on a phased approach;
- ✓ Promoting cooperation between stakeholders to create a digital logistics ecosystem.

Conclusion. Digital transformation in logistics is not just a technological innovation, but a fundamental change that is shaping the future of the sector. Technologies such as artificial intelligence, blockchain and big data analytics increase efficiency in logistics operations, reduce

costs and enhance customer satisfaction. However, technological challenges, organizational and cultural barriers, financial constraints and security issues that exist in the field of successful digital transformation must be overcome.

It is believed that in the coming period, supply chain sustainability, the evolution of management technologies, sustainability, “green logistics” and modern technologies will play a significant role in the development of the sector. In this regard, logistics companies should be ready to accept and adapt to the relevant changes.

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LOGISTIKADA RƏQƏMSAL TRANSFORMASIYA: REALLIQ VƏ PERSPEKTIVLƏR

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Xülasə. Müasir qlobal iqtisadiyyatda logistika sektoru təchizat zəncirinin idarə edilməsinin əsas komponenti olaraq biznes rəqabətinin mühüm təminatçısıdır. Rəqəmsal transformasiya logistika proseslərinin optimallaşdırılması, təchizat zəncirində şəffaflığın artırılması və ölkənin qlobal ticarətdə mövqeyinin gücləndirilməsi üçün strateji əhəmiyyət daşıyır. Rəqəmsal texnologiyaların inkişafı logistika əməliyyatlarının optimallaşdırılmasında, xərclərin azaldılmasında və müştəri məmnuniyyətinin artırılmasında mühüm rol oynayır.

Açar sözlər: logistika, intellekt, texnologiya, təchizat, innovasiya, avtomatlaşdırma, inteqrasiya