

Таким чином, цифровізація суспільства та бізнес-середовища не тільки стимулює економічне зростання, а й сприяє стійкому розвитку, інноваціям та створенню сприятливого цифрового середовища для майбутнього.

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Innovative logistic information technologies in optimal management of high education

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Abstract. *The educational sector develops under digital transformation, globalization, and growing uncertainty. Traditional management models often lack flexibility in crisis conditions. Logistics information technologies provide integrated control of material, information, personnel, and service flows, ensuring system coherence. Their combination with AI, big data, cloud platforms, cyber-physical systems, and blockchain enables forecasting, resource optimization, and adaptability. As a result, these technologies improve educational quality, increase transparency, and support the training of competitive specialists.*

Keywords: *logistics information technologies, educational management, digital transformation, uncertainty, crisis conditions.*

Introduction.

The service sector in the modern economy occupies a leading position, acting as one of the key drivers of social development [1], [2]. Its growth is accompanied by the globalization of markets, increasing customer expectations for speed and quality of

service, as well as increasing the level of competition [3], [4]. In these conditions, the improvement of logistics, which is considered not only as the management of material flows, but also as the organization of information, financial, personnel and digital processes that ensure the integrity and effectiveness of service systems, becomes crucial. Innovative information solutions (including in the field of logistics) open up new prospects for effective management of the service sector [5], [6]. First, they create opportunities for comprehensive control of all flows - material, financial, personnel and information [7]. Second, thanks to digital technologies and smart algorithms, the system's adaptability to dynamic market changes increases, which is critically important in conditions of uncertainty [8-10]. Thirdly, their use contributes to improving the quality of services [11], individualizing service and strengthening customer trust, which is especially relevant in crisis conditions [12], [13].

Therefore, innovative logistics information technologies are becoming an effective tool for optimizing cybernetic management of multi-component structures [14], [15], including in the service sector. These tools become especially relevant in situations of instability, when service enterprises are forced to quickly restructure their activities in accordance with new environmental conditions [16], [17]. Due to this, innovative logistics information technologies become the basis for long-term sustainability and increasing the competitiveness of the service industry [18].

The Main Part.

The educational sphere today is developing in a complex and changing environment, where digital transformations, global trends and rapid socio-economic changes are accompanied by increasing uncertainty and the emergence of crisis phenomena. Traditional methods of managing educational institutions and processes often lose their effectiveness, as they do not provide the necessary flexibility, mobility and resilience to unforeseen challenges.

In such circumstances, the use of logistics information technologies becomes particularly important, allowing to optimize the allocation of resources, organize data flows, personnel and educational services. Logistics in education goes beyond the classical understanding and covers the integrated management of all key flows that guarantee the stability of the functioning of the educational ecosystem.

The integration of logistics information solutions with advanced digital tools - artificial intelligence, big data analytics, cloud technologies, cyber-physical complexes and blockchain solutions - creates qualitatively new approaches to management. This provides the ability to forecast needs for educational services, adjust educational programs and schedules, effectively use material and technical resources and human resources, and also increases the openness and reliability of educational processes in crisis conditions.

The use of logistics information technologies in educational management in conditions of uncertainty and crisis situations creates long-term benefits for educational

institutions. Firstly, it provides systematic management of material, personnel, information and service flows, which supports the coherence and integrity of the educational system. Secondly, the use of analytical and cognitive tools makes it possible to make timely forecasts and quickly adapt to changes in the external environment. Thirdly, the digital transformation of logistics processes reduces costs, accelerates data exchange and strengthens trust in educational institutions.

Thus, logistics information technologies are becoming a strategic tool for the development of the educational sector. They allow for a transition from fragmented and static approaches to dynamic, integrated and flexible management models that remain effective even in crisis circumstances. In the future, their implementation will contribute to improving the level of education, expanding access to knowledge and forming competitive specialists for the future economy.

Conclusions and Discussion.

As noted earlier, the modern educational sphere is developing in the conditions of digital transformation, global integration processes and increasing uncertainty of the external environment. The effectiveness of educational process management increasingly depends on the efficiency of logistics - the integrated management of material, information, personnel and service flows that ensure the coordinated functioning of the educational ecosystem. In this context, logistics goes beyond the traditional interpretation and includes, in particular, the organization of digital educational resources, infrastructure administration, academic mobility management and optimization of personnel distribution. The author emphasizes that hybrid information technologies that combine the capabilities of classical management systems, cloud platforms, artificial intelligence tools, big data analysis, cyber-physical solutions and decentralized registry technologies are of decisive importance in increasing the efficiency of these processes [19], [20]. Their combination creates a synergy effect and provides adaptability, which allows to increase the flexibility and stability of complex systems [21] (for example, logistics subsystems) in the service sector, including educational ones. This contributes to reducing costs, accelerating data processing and increasing the transparency of communications.

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