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PROSPECTS FOR THE IMPLEMENTATION OF THE «DIGITAL TWIN» TECHNOLOGY IN THE LOGISTICS HUBS OF THE REPUBLIC OF BELARUS

Перспективы внедрения технологии «цифровой двойник» в логистических узлах Республики Беларусь

The geostrategic position of Belarus as a logistics bridge between the EU and the EAEU requires modern approaches to managing traffic flows. Digital twin technology is not just a 3D model, but a dynamic virtual copy of a physical object connected to it in real time through IoT sensors, GPS, and other data sources. For logistics hubs, this means creating a holistic digital environment where all processes can be modeled, analysed and optimised – from truck traffic to warehouse processing and route planning.

The purpose of this study is to explore the prospects of this technology for Belarus. The key advantage of the technology is the ability to conduct scenario modeling. The management of the node can test in a virtual environment the consequences of changes in cargo flow, reconstruction of the terminal or introduction of new equipment, choosing the best option before real investment. For Belarus, this is especially relevant in the context of increasing the capacity of hubs in Minsk, Brest and Smolevichi without capital construction, reducing traffic congestion on access roads due to the intelligent distribution of flows, as well as increasing transparency for all participants in the supply chain – from carriers to customs authorities.

The main barriers to implementation are significant investment costs, a shortage of specialists in the field of Data Science and IoT, as well as the lack of a developed regulatory framework. Solving these problems requires a step-by-step approach: launching a pilot project based on one terminal, developing public-private partnerships for financing, cooperation with IT universities for personnel training, and developing standards for the use of digital twins [1].

In conclusion, the introduction of this technology is a strategic necessity to strengthen the position of Belarus as a competitive logistics hub. The digital twin allows you to move from reacting to problems to proactive management, increasing not only economic efficiency, but also the environmental sustainability of logistics by optimizing routes and reducing downtime.

Reference

1. *Notteboom, T. Port Economics, Management and Policy / T. Notteboom, A. Pallis, J.-P. Rodrigue. – London ; New York : Routledge, 2022.*