From a practical point of view, automation of cargo flow management will increase the capacity of international transport corridors, reduce the downtime of wagons; reduce operating costs; and improve the safety and environmental friendliness of transportation operations. Thus, the development and implementation of automated technology for managing cargo flows in international transport corridors is a strategically important area for improving logistics efficiency, integration into the global transport network, and ensuring sustainable development of the transport industry.

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INTELLIGENT LOGISTICS SYSTEM FOR THE SUPPLY OF CONSTRUCTION MATERIALS BY RAIL TO RESTORE THE DESTROYED INFRASTRUCTURE

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The total amount of direct damage to Ukraine's infrastructure as a result of the full-scale invasion is about $170 billion, which is $12.6 billion more than in early 2024. The housing stock, energy, and transportation sectors have suffered the most. The amount of damage to the transport infrastructure reaches USD 38.5 billion, including more than 26 thousand kilometers of roads, bridges and road structures. The losses of the railroad industry are separately estimated at $4.3 billion [1]. This has led to a decrease in the capacity of railways and roads, increased downtime of rolling stock and vehicles, disruption of cargo delivery schedules, and, accordingly, more difficulties in supplying materials to reconstruction sites.

Given the scale of the task of restoring damaged facilities, one of the key issues is ensuring massive and uninterrupted transportation of construction materials. Given the need to transport significant volumes of cargo over long and medium distances at minimal cost, rail transport is the most efficient and rational solution. However, the current logistics system of rail transportation in Ukraine is not flexible and efficient enough in the face of damaged infrastructure, unstable freight flows and limited rolling stock resources. Therefore, there is an urgent need to apply modern intelligent technologies that can adapt logistics processes to the current conditions of the railway network.

A promising area is the introduction of an intelligent logistics system for the supply of construction materials by rail, which uses digital technologies for analysis, monitoring and forecasting. The use of artificial intelligence algorithms allows for the simultaneous formation of optimal delivery routes and prompt

adjustment of logistics scenarios in accordance with changes in the technical condition of the infrastructure, availability of traction and railcar fleets, workload of logistics hubs and priority of reconstruction projects. An important component of such a system is automated transportation management systems that continuously monitor cargo movement and ensure dynamic route reorganization and adaptation of delivery schedules in accordance with the current state of the network. This approach helps to minimize delays, improve the accuracy of logistics solutions and ensure a stable supply of construction materials in difficult operating conditions.

Given the increased technical burden that arises during the transportation of construction materials, the introduction of intelligent technical condition monitoring systems is becoming particularly relevant. Modern digital platforms equipped with sensors, telemetry devices and remote diagnostic systems allow real-time monitoring of the railway infrastructure and rolling stock. Timely fault diagnosis prevents emergencies, avoids unscheduled shutdowns and creates the preconditions for the stable functioning of the supply chain.

Forecasting cargo flows based on the analysis of large amounts of historical and operational data using Big Data technologies is an important component of an intelligent logistics system. This approach ensures high accuracy in determining the need for transportation of construction materials depending on the pace of recovery, criticality of facilities and seasonal dynamics, which helps to avoid overloading logistics hubs and maintain continuous and balanced supply.

Thus, the proposed intelligent logistics system allows not only to respond promptly to current challenges in the operation of the railway network, but also to significantly improve the overall efficiency of transportation. The introduction of such technologies can significantly reduce transportation costs, reduce rolling stock downtime, stabilize transportation schedules and guarantee timely and uninterrupted supply of construction materials to rebuild Ukraine's damaged infrastructure. This will be an important practical step in ensuring the reconstruction and recovery of the country's economy.

[1] Direct infrastructure losses in Ukraine due to the war have reached $170 billion. Kyiv School of Economics. URL: https://kse.ua/ua/about-the-school/news/pryami-zbitki-infrastrukturi-ukrayini-cherez-viynu-zrosli-do-170-mlrd-otsinka-kse-institute-stanom-na-listopad-2024-roku/ (accessed: 19.05.2025).