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**APPLIED SCIENTIFIC AND  
TECHNICAL RESEARCH**

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KING DANYLO UNIVERSITY  
UKRAINIAN STATE UNIVERSITY OF RAILWAY TRANSPORT  
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# APPLIED SCIENTIFIC AND TECHNICAL RESEARCH

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## **APPLIED SCIENTIFIC AND TECHNICAL RESEARCH**

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Road in 2000, the issue in Ukraine regarding the publication of relevant literature was not addressed.

Other urgent problems in the organization of transportation of dangerous cargoes are the following:

- insufficient development of the unified transport system of Ukraine;
- low level of equipment of transportation with modern machinery and technologies, low rate of updating of rolling stock;
- insufficient application of advanced methods of transportation of dangerous cargoes,
- decentralized road transport, a large number of non-productive downtime, empty car runs etc.

**Conclusion.** Dangerous cargoes are objects that require special care when transporting them, as any emergency can result in considerable damage. That is why the problems associated with the transportation of dangerous cargoes need to be addressed by the state and society, as well as by the enterprises involved in their transportation.

#### Reference.

1. Дубовіч І.А. Сучасні еколого-економічні проблеми транспортування небезпечних вантажів Львівською залізницею. Науковий вісник НЛТУ України. 2012. Вип. 22.9. С. 66–71.
2. Офіційний сайт Міністерства інфраструктури України. 2019. Режим доступу: <https://mtu.gov.ua/content/statistichni-dani-pro-ukrainski-zaliznici.html>
3. Гуржій А.В. Підстави адміністративної відповідальності за порушення правил перевезення небезпечних, великовагових і великогабаритних вантажів. Наука і правоохорона. 2012. № 1. С. 181–188
4. Гуржій А.В. Проблеми встановлення суб'єкта порушень правил перевезення небезпечних, великовагових і великогабаритних вантажів у процесі адміністративно-правової кваліфікації. Вісник Запорізького національного університету. Серія: Юридичні науки. 2012. № 1. Ч. 2. С. 111–117.

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### AREAS OF EFFECTIVE ORGANIZATION OF SUPPLY CHAINS OF GRAIN CARGOES BY RAIL CARS TO PORTS

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**Introduction.** Ukraine is one of the leading grain exporting countries in the world market. Grain logistics in Ukraine is actively developing [1], which is why it requires research into the problems of grain infrastructure and transport and logistics support in supply chains.

**Presentation of the material.** The analysis of practical experience revealed the shortcomings of the process of supplying grain cargoes by rail to ports [2].

Studies [3, 4] show that forwarding routing is one of the most important areas for improving the system of organization of carriages. Implementation of routing provides acceleration of delivery of goods to consumers, more efficient use of shunting means, reduction of downtime of wagons at technical stations, during transportation.

In order to increase the efficiency of grain transportation from supplier to consumer, including in mixed traffic, it is recommended that:

- apply modern technologies of loading and unloading works on elevators and ports to reduce the idle time of vehicles under cargo operations and, consequently, to accelerate their rotation;
- apply optimization methods in planning and organization of grain transportation in the presence of technological restrictions on the network of railways and highways;
- to make the choice of rational technological parameters in the organization of wagon flows by technological routes in the logistics chain of supply of grain cargo;

- to coordinate technological processes in supply chains and junction modules of different modes of transport in order to prevent inter-operative and non-standard downtime of vehicles and transport and storage resources;
- coordinate the activities of agro suppliers, elevators, carriers, terminals, ports and other market participants in order to achieve synergistic effects throughout the logistics system of grain supply.

**Conclusion.** Ukraine has significant export potential for the supply of grain cargo. This necessitates the further development of transport and grain infrastructure in the country, as well as improving the efficiency of the organization of supply of grain cargo, especially in the export connection, which will allow to reduce the cost of grain and, consequently, to increase its competitiveness in the world market.

#### **Reference.**

1. Shramenko N., Muzylyov D. Forecasting of Overloading Volumes in Transport Systems Based on the Fuzzy-Neural Model. In: Ivanov V. et al. (eds) *Advances in Design, Simulation and Manufacturing II. DSMIE 2019. Lecture Notes in Mechanical Engineering. (Springer, Cham), (2020) - pp. 311-320.*
2. Problems and optimization of grain freight logistics in Ukraine. [Virtual resource]. - Access mode: <http://uga.ua/meanings/problemy-optimizatsiya-logistiki-zernovyh-gruzov-v-ukraine/>
3. Shramenko, N. Y. and Shramenko, V. O., 2018. Mathematical model of the logistics chain for the delivery of bulk cargo by rail transport. *Scientific Bulletin of National Mining University, Vol. 5 (167), pp. 136-141.*
4. Shramenko, N. Y. and Shramenko, V. O., 2019. Optimization of technological specifications and methodology of estimating the efficiency of the bulk cargoes delivery process. *Scientific Bulletin of National Mining University, Vol. 3, pp. 146-151.*

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### **ARTIFICIAL INTELLIGENCE IN TRANSPORT LOGISTICS AND IN SUPPLY CHAIN MANAGEMENT**

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**Introduction.** Artificial intelligence is taking up the pace when it comes to global logistics and supply chain management. The on-going evolution in the areas of technologies like artificial intelligence, machine learning, and similar new technologies is said to possess the potential to bring in disruption and lead innovation within these industries.

**Presentation of the material.** Today, transport logistics solves a set of tasks related to the organization of the movement of goods by public transport. One of the tasks of transport logistics is the creation of transport systems, corridors and chains, in which the use of artificial intelligence approaches is of particular importance and is, even, necessary to support decision-making by the operational staff of the transportation industry [1].

The relationship between material and information flows is obvious, but the responsibility of one stream to another is conditional, since the content of the material flow, as a rule, reflects the data of the information stream, but they may not coincide in terms of time. Material and information streams can be both unidirectional and multidirectional, and this feature allows artificial intelligence to control transport processes [2]. The path in which the information flow moves may generally not coincide with the flow path of the material flow, which significantly complicates the flow control of vehicles.

Talking about artificial intelligence means using robotics. They are used to track, locate and move inventory within the warehouses. Apart from robots, artificial intelligence is also about big data. When the insights of Big Data are used along with artificial intelligence, it helps to improve different areas of supply chain like supply chain transparency and route optimization [2].

Advantages of artificial intelligence for Supply Chain Management [2]:

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