of agriculture, forestry and transport). Х.: ХНТУСГ,2019. Вип. 18. С.70-79.
17. Medvediev I., Muzylyov D., Montewka, J. A model for agribusiness supply chain risk management using fuzzy logic. Case study: Grain route from Ukraine to Poland. Transportation Research Part E: Logistics and Transportation Review, Vol. 190, 2024. P. 103691.
18. Bieletska O., Liubyi Ye., Ocheretenko S., Muzylyov D., Ivanov V., Pavlenko I. 2023. Approach to determine transport delays at unsignalized intersections. Communications - Scientific Letters of the University of Zilina, 25(3), 124-136.
19. Павленко О.В., Великодний Д.О. Формування раціональної схеми обслуговування замовлень на доставку вантажів транспортно-експедиторським підприємством. Комунальне господарство міст. 2020. № 154 (1). С. 223-230.
20. Malucelli F., Tresoldi E. Delay and disruption management in local public transportation via real-time vehicle and crew re-scheduling: a case study. PUBLIC TRANSPORT, 2019. №11 (1). P. 1–25.
21. Pavlenko O., Muzylyov D., Trojanowska J., Ivanov V. Rational Logistics of Engineering Products to the European Union. International Conference on Intelligent Systems in Production Engineering and Maintenance. Springer. 2023. P. 25-38.
22. Dhawan K., Tookey J.E., GhaffarianHoseini A., Poshdar M. Using Transport to Quantify the Impact of Vertical Integration on the Construction Supply Chain: A New Zealand Assessment. Sustainability, 2023. 15(2), 1298.

PROSPECTS FOR THE DEVELOPMENT OF FURNITURE DELIVERY TECHNOLOGY IN THE INTERNATIONAL COMMUNITY

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The furniture market in Ukraine has shrunk by about 30% since the start of the war. The share of Ukrainian producers is growing, and demand is increasing [1]. Prior to the full-scale invasion, experts estimated the size of the domestic furniture market at approximately USD 1-1.2 billion. According to their various estimates, the domestic furniture market in 2023 is estimated to be in the range of USD 700 to 800 million. The 20-35% decline in the product market is in line with the data from suppliers of raw materials (chipboard, polyurethane foam). At the same time, retailers such as Epicenter, Jysk, and MebelOK.com claim that in some months they have reached or surpassed pre-war levels, at least in hryvnia terms. In 2022-2023, Ukrainian manufacturers gained

a larger market share by using their own products instead of expensive imports. Imports of furniture products decreased from USD 582.3 million in 2021 to USD 316.6 million in 2022, and in the first 11 months of 2023, products worth USD 315.4 million were imported [1].

In 2024, Ukrainian furniture makers achieved export growth amid a shortage of personnel (by 30-40%, according to manufacturers). Grant support from both the government and international donors helped furniture makers optimize costs and maintain competitive prices, as they changed equipment at their factories and increased their productivity. About 50 of the most active producers (out of about 11,000 companies) received state aid, and a significant number of them were moving from small to medium-sized businesses in order to scale up. As for microbusinesses, they actively chose narrow specialization and sought partnerships [2].

When it comes to organizing the delivery of furniture and related products, planning plays a significant role for manufacturers. It allows them to create reliable storage systems at all stages of product delivery, develop efficient transportation routes, and optimize the rolling stock in line with actual demand. For products such as furniture, transportation costs have a significant impact on the final price for consumers. In addition, competition in the Ukrainian furniture market is intense. Therefore, it is necessary to create new solutions in the furniture transportation system, taking into account the specifics of operations at each stage of the transportation process.

The development of the furniture market depends mainly on the volume of consumption by Ukrainian residents. Personal consumption takes into account a number of factors, such as per capita income, household debt and consumer expectations. Steady growth of disposable income and, as a result, improved living standards are the basis for stable market growth and stable demand for furniture. Stable market growth and stable demand for furniture are the basis for stable market growth and stable demand for furniture.

This study investigates the effects of freight pooling strategies on urban crowdsourcing logistics, focusing on economic, social, and environmental outcomes

[3]. Utilising a mixed-integer linear programming model with an adaptive large neighbourhood search algorithm, our goal is to optimise the cost-efficiency of the freight pooling system. Real-world delivery and driver trajectory data from a major Chinese crowdsourcing logistics platform, along with high-resolution vehicle telematics data, validate our model in five scenarios, each defined by distinct cost coefficients reflecting diverse stakeholder priorities. Results show potential for up to a 21.3% reduction in carbon emissions, a 28.3% decrease in truck activity spatial coverage, and a 7.6% increase in available drivers. However, deadheading trips, due to order consolidation into fewer vehicles without an increase in overall demand, could offset maximum carbon reduction benefits by 16.4%. Other effects on customers' and drivers' welfare are explored for a comprehensive quantitative assessment of freight pooling strategies' sustainability benefits [3].

Based on the three-pillar conception of (social, economic and environmental) sustainability, city logistics is widely acknowledged as a crucial part of a city's sustainable development, owing to its capability to stimulate economic growth by facilitating last-mile delivery, playing a pivotal role in mitigating the negative environmental impacts associated with freight vehicle operations, and simultaneously meeting social needs by providing delivery jobs to drivers. Since road freight will continue to dominate surface goods transportation, these impacts are expected to become increasingly prominent in the urban area. The freight pooling strategy, also known as consolidation strategy, which is a commonly used term in the traditional logistics industry, has gained recognition as an intelligent approach to mitigate adverse environmental effects while sustaining economic growth levels. Traditionally, consolidation strategies have been favoured by smaller shippers who possess their own vehicles. However, with the emergence of digital freight matching platforms, a broader pool of vehicles can now be accessed. This enables vehicles that would otherwise be idle with one shipper to be utilised by other shippers as needed. As a result, these strategies can effectively address underutilisation or overutilisation issues in urban freight logistics, ultimately reducing empty space in trucks, unnecessary vehicle mileage and deadheading, and the associated emissions without sacrificing economic

benefits [3].

Having analyzed the results of scientific foreign developments on improving the technology of delivery of various types of cargo in international traffic, we formulate the main conclusions regarding these achievements: a reliable supply logistics has been formed, taking into account the rational use of relevant resources [4-6]; reasonable and reliable technologies for the delivery of various types of cargo have been identified, taking into account the limitations [7-11]; modern technologies for ordering services in logistics companies have been introduced [12-15]; effective supply chains have been developed, taking into account the risk [16-20].

References.

1. Матеріал статті: Вітчизняні виробники меблів збільшили частку на внутрішньому ринку – представник галузевої асоціації : веб-сайт. URL: https://interfax.com.ua/news/economic/954874.html (дата звернення: 16.04.2025).
2. Матеріал статті: Експорт меблів з України виріс на 15,5% у 2024 році : веб-сайт. URL: https://interfax.com.ua/news/economic/1048887.html (дата звернення: 16.04.2025).
3. Hu, S., et al. Sustainable impact analysis of freight pooling strategies on city crowdsourcing logistics platform. Transportation Research Part D: Transport and Environment. 2024. Vol. 130. P. 104167.
4. Павленко О. В., Нефьодов В. М., Великодний Д. О. Побудова логістики поставки консолідованих вантажів з України в Європу. Комунальне господарство міст. 2021. № 161. С. 191–198
5. Нефьодов В.М. Павленко О.В. Побудова моделі системи автомобільних перевезень партіонних вантажів в містах. Комунальне господарство міст. 2021. 161. С. 187-190
6. Orozonova A., Gapurbaeva S., Kydykov A., Prokopenko O., Prause G., Lytvynenko S. Application of smart logistics technologies in the organization of multimodal cargo delivery. Transportation Research Procedia. 2022. Vol. 63. P. 1192–1198.
7. Павленко О.В., Шрамепко Н.Ю., Северін О.О., Горбачов П.Ф., Калініченко О.П. Математичні методи оптимізації транспортних процесів: навчальний посібник. – Харків: Видавництво ХНАДУ, 2008. – 204 с.
8. Waqas M., Honggang X., Khan S.A.R., Ahmad N., Ullah Z., Iqbal M. Impact of Reverse Logistics Barriers on Sustainable Firm Performance via Reverse Logistics Practices. LogForum, 2020. № 17 (2), P. 213–230
9. Нефьодов, В.М. Побудова моделі системи перевезення партіонних вантажів у міжміському сполученні / В.М. Нефьодов, О.В. Павленко, О.П. Калініченко // Комунальне господарство міст. 2018. № 142. С. 103-107
10. Sładkowski A., Utegenova A., Kolga A. D., Gavrishev S. E., Stolpovskikh I.

Taran I. Improving the efficiency of using dump trucks under conditions of career at open mining works. Naukovyi Visnyk Natsionalnoho Hirnychoho Universytetu, 2019, №2. P. 36–42.
11. Павленко О.В., Музильов Д.О., Медведєв Є.П. Модель функціонування логістики для постачання спеціалізованих транспортних засобів в контейнерах із підприємств Північної Америки в Україну. Комунальне господарство міст, Т. 1, Вип. 182, 2024, С. 248-253.
12. Muzylyov, D., Shramenko, N.: Mathematical Model of Reverse Loading Advisability for Trucks Considering Idle Times. In: Karabegović I. (eds) New Technologies, Development and Application III. NT 2020. Lecture Notes in Networks and Systems, vol 128. Springer, Cham, 612 620 (2020).
13. Muzylyov D. Medvediev I. Pavlenko O. Risk factor assessment in agricultural supply chain by fuzzy logic. IOP Conference Series: Earth and Environmental Science 2024, Vol. 1376 (1), 012038.
14. Shramenko N., Muzylyov D., Shramenko V. Rationalization of Grain Cargoes Transshipment in Containers at Port Terminals: Technology Analysis and Mathematical Formalization. Lecture Notes in Mechanical Engineering. Springer, Cham. 2021. P. 96-105.
15. Shramenko N., Muzylyov D., Manukian A. Analysis of the grain market in Ukraine and the directions of the development of grain cargo transportation logistics // Technical service of agro-industrial, forest and transport complexes (Technical service of agriculture, forestry and transport). Х.: ХНТУСГ,2019. Вип. 18. С.70-79.
16. Medvediev I., Muzylyov D., Montewka, J. A model for agribusiness supply chain risk management using fuzzy logic. Case study: Grain route from Ukraine to Poland. Transportation Research Part E: Logistics and Transportation Review, Vol. 190, 2024. P. 103691.
17. Bieletska O., Liubyi Ye., Ocheretenko S., Muzylyov D., Ivanov V., Pavlenko I. 2023. Approach to determine transport delays at unsignalized intersections. Communications - Scientific Letters of the University of Zilina, 25(3), 124-136.
18. Павленко О.В., Великодний Д.О. Формування раціональної схеми обслуговування замовлень на доставку вантажів транспортно-експедиторським підприємством. Комунальне господарство міст. 2020. № 154 (1). С. 223-230.
19. Pavlenko O., Muzylyov D., Trojanowska J., Ivanov V. Rational Logistics of Engineering Products to the European Union. International Conference on Intelligent Systems in Production Engineering and Maintenance. Springer. 2023. P. 25-38.
20. Dhawan K., Tookey J.E., GhaffarianHoseini A., Poshdar M. Using Transport to Quantify the Impact of Vertical Integration on the Construction Supply Chain: A New Zealand Assessment. Sustainability, 2023. 15(2), 1298.

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