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ПЕРСПЕКТИВИ ПОВОЄННОЇ ВІДБУДОВИ ЛОГІСТИЧНИХ СИСТЕМ У КИЇВСЬКОМУ РЕГІОНІ.

Мета. Метою статті є аналіз логістичних систем Київського регіону після початку повномасштабного вторгнення російської федерації та оцінка наслідків воєнних дій для логістичного розвитку та бізнесу.

Методика. Під час написання статті були використані метод аналізу і синтезу, аналітичний, системний та графічний. Інформаційною основою дослідження є наукові доробки вітчизняних та іноземних науковців, а також власні спостереження і спогади авторів, що стосуються перших днів російсько-української війни та шкоди, яка була завдана логістичним хабам.

Результати. Досліджено вплив воєнних дій на порушення елементів логістичних систем. На прикладі найбільших логістичних хабів України, розкрито важливість складових логістичних послуг та необхідність їх збереження для забезпечення збалансованого розвитку території міста. Окреслено основні зміни та наслідки російської агресії, що вплинули на склади, залізничну логістику. Проаналізовано одну з основних логістичних проблем регіону – розташування ядра логістичних систем у одному регіоні, та необережна деверсифікація логістики у цілому. Розглянуто логістичний потенціал як вектор роботи.

Наукова новизна. До повномасштабного вторгнення росії в Україну, більша частина найбільших логістичних систем на території України знаходилися у Київській області. Крім того, Київська область була і є важливим логістичним центром України завдяки своєму географічному розташуванню, розвиненій інфраструктурі та потужному економічному потенціалу.

Практична значимість статті визначається можливістю використання результатів дослідження під час освітньої та просвітницької діяльності для підвищення рівня логістичного бізнесу та освіченості населення.

Ключові слова: логістичні системи, склади, логістичні хаби, розвиток логістичного простору.

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POST-WAR RECONSTRUCTION OF LOGISTICS SYSTEMS IN THE KYIV REGION

Purpose: The purpose of the article is to analyze the logistics systems in the Kyiv region at the beginning of the full-scale invasion of the Russian Federation and to assess the consequences of hostilities for logistics development and business.

Methodology: The methods of analysis and synthesis, analytical, systematic and graphical methods were used in writing the article. The information base of the research is the scientific works of domestic and foreign scientists, as well as the authors' own observations and memories related to the first days of the Russian-Ukrainian war and the damage that was caused to logistics hubs.

Results: The impact of hostilities on the disruption of elements of logistics systems was investigated. Using the example of the largest logistics hubs in Ukraine, the importance of components of logistics services and the need for their preservation to ensure the balanced development of the city territory are revealed. The main changes and consequences of the Russian aggression that affected warehouses and railway logistics are outlined. One of the main logistics problems of the region is the location of the core of logistics systems in one region and the lack of diversification of logistics in general. The logistics potential is considered as a vector of work.

Scientific Novelty: Before the full-scale invasion of Russia into Ukraine, most of the largest logistics systems in Ukraine were located in the Kyiv region. In addition, the Kyiv region was and is an important logistics center of Ukraine due to its geographical location, developed infrastructure and powerful economic potential.

Practical significance: The practical significance of the article is determined by the possibility of using the research results in educational and educational activities to improve the level of logistics business and public awareness.

Keywords: logistics systems, warehouses, logistics hubs, development of logistics space.

Problem Statement. In the modern economic context and amid a full-scale war, enterprises in the Kyiv region of Ukraine face extraordinarily complex challenges and problems in the restoration and further development of logistics systems. The transition to a state of war has significantly altered operational

conditions for businesses, necessitating an urgent review and adaptation of logistical strategies. Specifically, one of the primary challenges is the need for rapid restoration and stabilization of logistics networks that have suffered extensive damage or defects due to the full-scale invasion by Russia. This requires not only the restoration of physical infrastructure but also a reassessment of supply strategies, diversification of logistics hub locations, distribution of goods, and security of transportations. Furthermore, the full-scale invasion by Russia significantly impacts global logistics chains and international trade relations, placing enterprises before the task of adapting to new realities and changes in external trade and logistics relations. These circumstances create a necessity to analyze and address these issues, which become critically important in the context of Russia's full-scale invasion, thereby facilitating the recovery and further development of logistics systems in the Kyiv region and ensuring the stability and effectiveness of business operations under extraordinary conditions.

Analysis of Previous Research and Publications. Given that the majority of Ukraine's logistics systems were located in the Kyiv region, which was a central target of hostile forces, Ukrainian and international scholars have paid significant attention to this subject. On February 8, 2024, an article was published in the Journal of European Economy titled "Organizational and Methodological Approaches to the Post-War Restoration of Ukraine's Transport and Logistics [2]," which includes an analysis and characteristics of Ukraine's transport infrastructure. Many foreign researchers have focused on studying logistics in Ukraine both before and during the full-scale war. Additionally, many universities in Kyiv have explored this topic: The State University of Infrastructure and Technologies investigated ways to restore national transport in the Kyiv region. [6] Over the past two years, the Ukrainian case has attracted the interest of both domestic and international scholars such as I. Kosse [3], V. Piontkivska [7], O. Bondar-Pidhurska, Y. Husak, S. Baklanov, D. Kurzantsev [1], and V.O. Rudenko [14] [11].

Considering the brief period of crisis caused by the war, the volume of scholarly work remains modest. Specifically, experts such as R. Buda [5], Ya. Holoborodko [5], and K. Horova [5] have dedicated their research to the importance of Ukrainian grain exports. A. Nitsevych [5] and V. Tkachov [5] noted the potential reopening of Ukrainian ports and changes in logistics within Ukraine. M. Horbachov [8], A. Polyanska [8, pp. 112–127], O.V. Kaban [8, pp. 112–127], and V. Martynets [8, pp. 112–127] have argued the need to study supply chain logistics in the wartime conditions of Ukraine. They pointed out that the war has added risks to international supply chains, of which domestic enterprises are a part. Supply chains, destroyed or partially damaged by military actions, face many problems which, if unresolved, could hinder economic recovery and long-term growth; they also explored key indicators of the efficiency of logistics chains' operation. As the analysis of scientific sources dedicated to logistics issues shows, significant attention has been given to developing and substantiating effective logistics chains upon the introduction of new products, and there are specific aspects of the problem that remain under-researched, especially during the conduct of military operations on the country's territory.

Presentation of the Main Research Material. Prior to the full-scale invasion of Russia into Ukraine, the majority of the largest logistics systems were located in the Kyiv Oblast [9]. The Kyiv region, as a powerful core of economic growth with its inherent capital functions, has long been and remains a decisive factor in economic development [10].

With the aim of integrating Ukrainian transport infrastructure into the international transport system, a network of logistics centers was established in the Kyiv Metropolitan Region, located near internationally significant transport routes and airports (Figs. 1.1, 1.2).

<i>№</i>	<i>Warehouse</i>	<i>Location</i>	<i>Area, m²</i>
1	RLC-Kvitneve logistics center	Kvitneve, Kyiv Oblast	129 400
2	BF Terminal warehouse complex	Martusivka, Kyiv Oblast	128 336
3	MLP-Chaika logistics complex	Chaiky, Kyiv Oblast	115 000
4	AMTEL PROPERTIES logistics complex	Bilohorodka, Kyiv Oblast	100 208
5	Kalynivka logistics center	Kalynivka, Kyiv Oblast	100 000
6	West Gate Logistic logistics center	Stoyanka, Kyiv Oblast	96 455
7	Unilogic Park warehouse complex	Brovary, Kyiv Oblast	75 000
8	Protec Zymna Voda warehouse complex	Zymna Voda, Lviv Oblast	73 000
9	Raben Ukraine warehouse complex	Velyka Dymerka, Kyiv Oblast	70 000

10	Komodor logistics complex	Kalynivka, Kyiv Oblast	69 000
11	Odesa Logistic Park logistics complex	Dachne, Odesa Oblast	64 600
12	Makarovskyi logistics complex	Kolonschchyna, Kyiv Oblast	61 992
13	EAST GATE LOGISTIC logistics complex	Boryspil, Kyiv Oblast	49 716
14	RLC-Odesa logistics center	Dachne, Odesa Oblast	36 000

Figure 1.1 14 largest warehouses in Ukraine ranked by WareTeka. [9]



Figure 1.2: Map Diagram of the Largest Logistics Centers in the Kyiv Region [9]

The warehouse complex plays a significant role in the operations of the modern distribution network. The efficiency of the complex and its developed infrastructure directly influence the success of corporate policies and their competitiveness in the market. [10] An important criterion is the general statistics of goods turnover. Data from the Main Statistical Office in the Kyiv Oblast allow for the following conclusions: Over the past 10 years, road transport has demonstrated stability. Analyzing the period from the 2008 crisis to 2020, one can observe rapid development in automotive transport. Unfortunately, precise data for the period from 2022 to 2024 is unavailable; however, according to information from CBRE Ukraine as of June 2022, due to military events in the Kyiv Oblast, warehouse and logistics complexes were damaged. The total area of damages was approximately 382,000 square meters, including office spaces and other buildings within the warehouse complexes. [16] Almost 340,000 square meters of pure warehouse space was partially or completely destroyed, which constitutes 22% of the total volume of warehouse premises in the Kyiv region. Additionally, we consider it necessary to create forecast data for the years 2022-2024; therefore, the table below is provided (Fig. 1.3). [4]

Modeling the dynamics of the volume of goods transported by road from 2022 to 2024 allowed us to present a pattern of changes in the quantity of goods turnover transported by freight transport; the forecast demonstrated a decline of 30%. However, the war introduces adjustments to any forecasting, and we believe that the decline was much more substantial. [12] The largest logistics center (comprising 70-80% of professional warehouse space) was located in the Kyiv Oblast. With the onset of hostilities, companies were forced to relocate their goods to western Ukraine, where, unfortunately, there were no warehouse facilities of comparable size. [2] In recent years, demand for warehouse space remained high. The destruction of 22% of warehouse space in the Kyiv region led to the forced relocation of the logistics and

warehouse hub to other regions of Ukraine. These regions offer competitive conditions: quality infrastructure for warehouse placement, competitive real estate prices, and active support from local authorities that stimulate and encourage tenants to relocate. Due to the significant reduction in the supply of warehouse premises in the Kyiv Oblast because of military actions, ensuring all stakeholders planning to return to the de-occupied region becomes an important task. Popular alternatives to the western region include Vinnytsia, Khmelnytskyi, Ternopil, and other oblasts. [5]

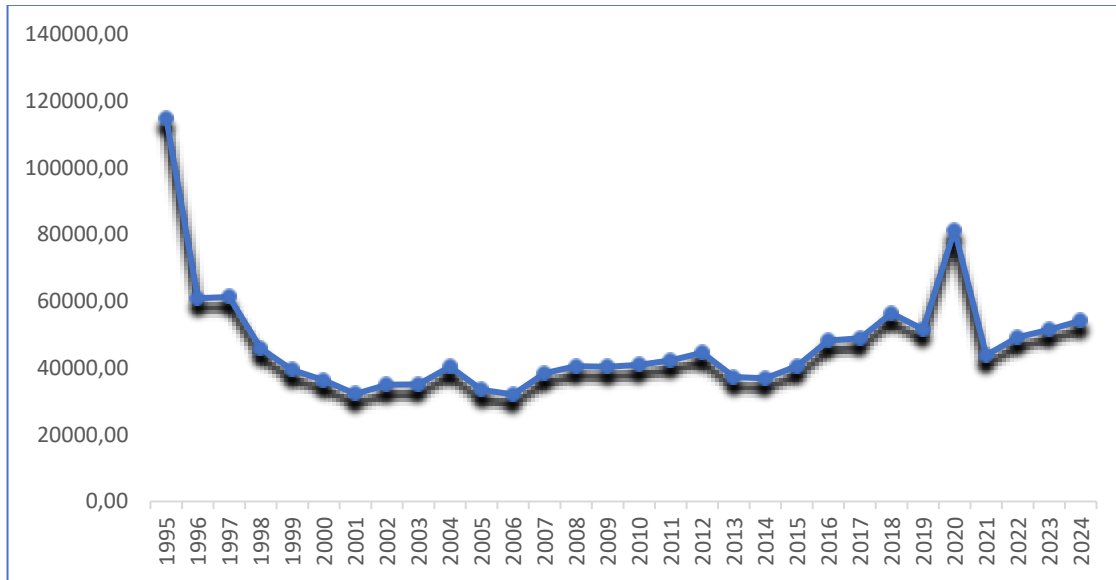


Figure 1.3: Forecasted Volume of Goods Transported by Road Transport from 2022 to 2024 Based on Past Years. [4]

Focusing on the incidents of shelling, it is noted that the largest logistics center of the Ukrainian company LLC "RLC," located in the village of Kvitneve, became a target of the occupiers on March 12, 2022. The next target was the MLP-Chaika logistics center, where on March 3, a projectile hit a warehouse, causing a fire in both the warehouse and the administrative building. The fire covered an area of 10,000 square meters and spread to an eight-story administrative building. West Gate Logistic also became a target of shelling, suffering significant damage amounting to €45.8 million. A similar situation occurred with a warehouse in Kalynivka, owned by "Komodor," where the damages amounted to €43.6 million. For clarity, a map of the shelling of logistics centers in the Kyiv region is presented (Fig. 1.4). [12].

When focusing on logistics systems in the Kyiv region, it should be noted that as a result of shelling targeted at the warehouses of the company "Nova Poshta," where the company's goods were stored, delivery volumes decreased by twentyfold. A similar situation was observed with Ukrposhta. [16]

New Trends and Development Directions of Logistic Systems in the Kyiv Region. Business activity in the Kyiv Oblast has begun to gradually recover. Currently, it is challenging to provide clear trends in the warehouse real estate market; however, it should be noted that warehouse owners are showing a desire to remain in this business. Regarding ordinary food products, they continue to be supplied, although the location of warehouses has shifted from the Kyiv Oblast to western Ukraine. Previously, there were no issues with transport and drivers, but now difficulties in finding them have arisen. [5] All of this leads to an increase in prices for end consumers. For example, the average price of goods in the Kyiv region has risen by 1-3%. This is explained by the fact that logistics account for approximately 12-15% of the cost of goods (global average data). However, this increase is not as significant as, for example, during inflation.

Now, as the threat has receded from the Kyiv direction, logistics have begun to recover. However, the destruction of about 400,000 square meters of warehouse real estate near Kyiv has been a significant loss for the Ukrainian market, as it accounts for approximately 20% of all professional warehouse real estate in the country.

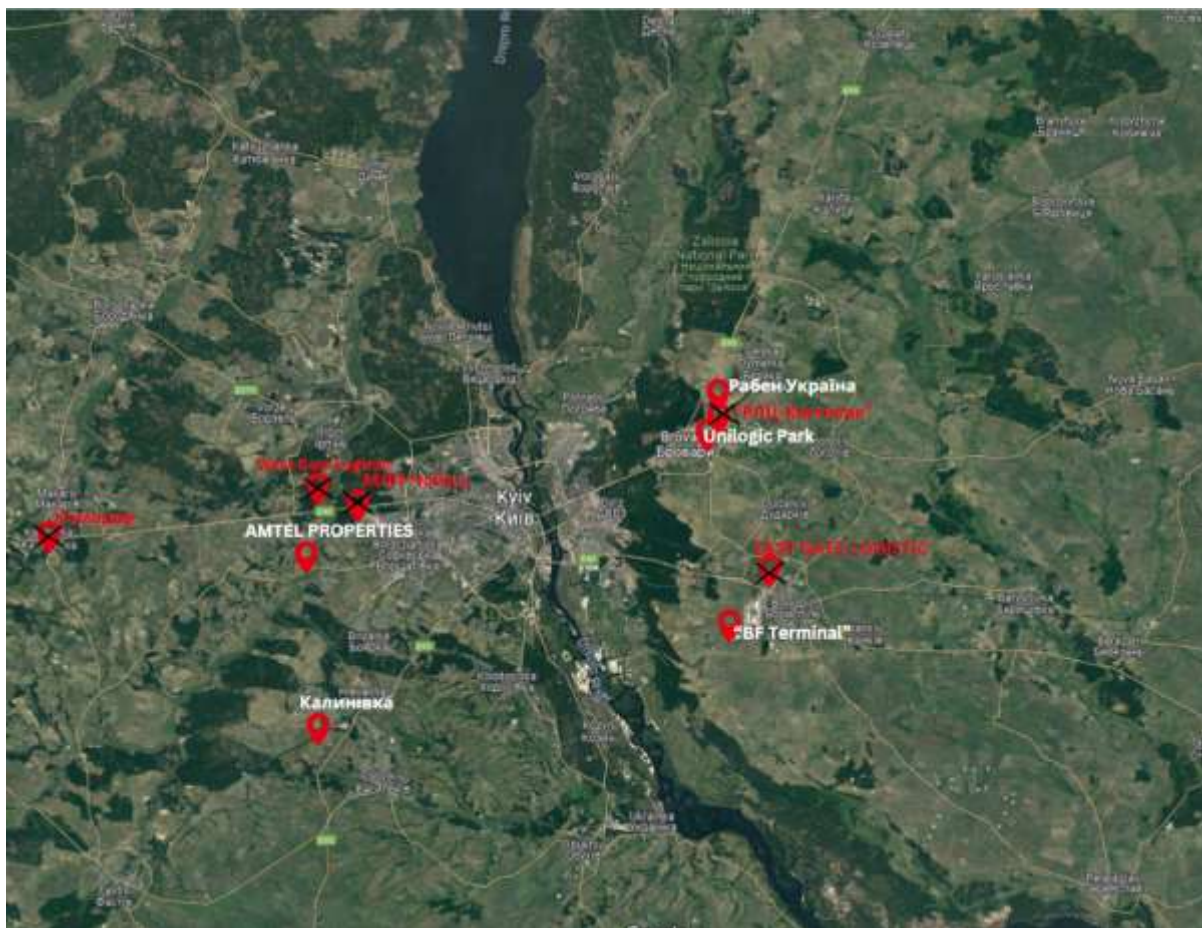


Figure 1.4: Map Diagram of Shelling at Logistics Centers in the Kyiv Region [9]

The center of gravity for building new warehouses will change significantly. Whereas previously most warehouses were located in the Kyiv Oblast, companies are now inclined to shift the focus to the southern part of the Kyiv Oblast and the southwest of Ukraine, considering them safer areas. Regarding locations near Kyiv, there is now greater interest in searching for warehouse real estate and placing goods in the Bilotserkivskiyi direction. This is associated with many companies that lost warehouses in the north of Kyiv not wishing to return there. [6] Companies understand that placing infrastructure in one location, as was done in Ukraine, was impractical: up to 80% of all warehouses were located in the Kyiv Oblast. Therefore, it is necessary to distribute warehouses across the entire territory of the country and create a certain reserve to maintain them. It is also important to have state reserve warehouses, as organized in large European countries such as Germany, Czech Republic, and Poland.

Conclusions. Before the full-scale invasion of Russia into Ukraine, the majority of the largest logistics systems were concentrated in the Kyiv Oblast. Due to the full-scale war in the Kyiv region, a significant portion of the warehouse infrastructure was damaged (22% of the total area), leading to the forced relocation of logistics complexes to other regions of Ukraine such as Vinnytsia, Khmelnytskyi, Ternopil, etc. The most affected logistics centers include LLC "RLC" (Kvitneve village), MLP-Chaika, West Gate Logistic, and "Komodor" warehouse (Kalynivka city). Thus, the restoration of transport and logistics activities in the post-war period is a complex and multifaceted process. Based on the experience of rebuilding world states, we can say that its success is determined by numerous important factors such as a clear and consistent recovery plan based on existing experience and developer competence, the readiness of relevant sectors to adapt, a comprehensive approach to solving problems, and the availability of international financial and technical support, among others.

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