

BULLETIN

THE NATIONAL TRANSPORT UNIVERSITY

VOL. 30 | №1 | 2026

<https://ntu-bulletin.com/en>

ISSN 2308-6645, e-ISSN 2523-496X

Received: 01.11.2025. Revised: 21.02.2026. Accepted: 26.03.2026. Published: 05.04.2026.

UDC 656.073.7

DOI: 10.33744/2308-6645-2026-1-30-109-119

The role of freight forwarding activities in the recovery of Ukraine's economy

Georgii Prokudin*

Doctor of Technical Sciences, Professor
National Transport University
01010, 1 M. Omelyanovych-Pavlenko Str., Kyiv, Ukraine
<https://orcid.org/0000-0001-9701-8511>

Petro Poliak

Postgraduate Student
National Transport University
01010, 1 M. Omelyanovych-Pavlenko Str., Kyiv, Ukraine
<https://orcid.org/0009-0002-4750-0064>

Ihor Melnykov

Postgraduate Student
National Transport University
01010, 1 M. Omelyanovych-Pavlenko Str., Kyiv, Ukraine
<https://orcid.org/0009-0004-3439-0956>

Oleksandr Tsukanov

PhD in Technical Sciences, Professor
National Transport University
01010, 1 M. Omelyanovych-Pavlenko Str., Kyiv, Ukraine
<https://orcid.org/0009-0007-1433-4668>

Abstract. The article provided a comprehensive analysis of the role of freight forwarding activities in supporting Ukraine's economic recovery under the conditions of a full-scale war. The primary objective of the study was to analyse the dynamics of Ukraine's trade balance and to develop a forecast for its development in 2025-2026. To achieve this objective, economic and mathematical modelling methods were applied, in particular various types of trend approximation, including exponential, linear, logarithmic, polynomial, and power models. This methodological approach allowed for comparing different functional dependencies and selecting the most suitable models under conditions of high uncertainty. The findings demonstrated a stable negative trade balance (USD -33,390.9 million in 2025 and USD -37,679.1 million in 2026), characterised by a decline in exports and a simultaneous increase in imports. This imbalance is largely driven by the growing need for energy resources, machinery, equipment, and other essential goods required to sustain the economy during wartime and recovery. Given the risks associated with a persistent trade deficit, the article proposed a set of strategic measures aimed at stabilising the economic situation. These included the restoration and modernisation of transport infrastructure, diversification of export markets, promotion of high value-added production, expansion of multimodal transport systems, and the implementation of digital technologies in logistics. Additionally, the study highlighted the strategic importance of Ukraine's integration into the Trans-European Transport Network and the need to attract investment in logistics infrastructure and hubs. Overall, the research confirmed the crucial role of efficient logistics and transport systems in ensuring economic resilience and

Suggested Citation: Prokudin, G., Poliak, P., Melnykov, I., & Tsukanov, O. (2026). The role of freight forwarding activities in the recovery of Ukraine's economy. *Bulletin of the National Transport University*, 30(1), 109-119. doi: 10.33744/2308-6645-2026-1-30-109-119.

*Corresponding author



Copyright © The Author(s). This is an open access article distributed under the terms of the Creative Commons Attribution License 4.0 (<https://creativecommons.org/licenses/by/4.0/>)

strengthening Ukraine's position in international markets. The results of the study can be used in the development of national logistics strategies, policy-making, and support programmes for exporters

Keywords: foreign trade; logistics; transport infrastructure; TEN-T; export; import; trade balance; forecasting

Introduction

Martial law in Ukraine has created significant challenges for the functioning of the transport and forwarding industry, necessitating the intensification of international cooperation. In wartime conditions, disruptions in logistics chains, port closures, infrastructure destruction, and increased transportation risks have created a demand for new solutions at the international level. Cooperation with European and global partners is crucial for ensuring the stability and efficiency of freight forwarding. Determining the role of freight forwarding in the recovery of Ukraine's economy and developing recommendations for its optimisation is a topical subject for academic research. Numerous studies have explored the challenges of transport and forwarding activities (TFA) in crisis conditions. J. Gnap *et al.* (2021) and A.I. Kiiko (2024) emphasised the crucial role of transport infrastructure for the national economy, stressing the importance of its restoration to facilitate effective freight forwarding operations. K.M. Razumova *et al.* (2023) analysed the impact of globalisation and integration on the development of transport and forwarding enterprises, as well as the challenges faced by the industry in the context of contemporary economic realities. V. Prokhorova *et al.* (2025) identified the key factors influencing the intensity of economic recovery, as well as the construction and evaluation of possible development scenarios for Ukraine after the "hot" phase of the war. For the study of the peculiarities of Ukraine's economic development, they used the tools of non-parametric regression spline functions. The feasibility of using scenario modelling in conditions of high uncertainty about Ukraine's future development was substantiated. R. Subačienė *et al.* (2023) developed organisational and methodological issues related to monitoring the contribution of the corporate sector to achieving sustainable development goals during the post-war reconstruction phase in Ukraine. The work uses methods of analysis and synthesis (to study the consequences of Russia's military aggression on Ukraine's economic development and the achievement of sustainable development goals), comparison (in analysing the requirements of international regulations on the structure, stages of formation, and set of reporting indicators), and a process approach (for developing recommendations on the creation of a repository). Institutional mechanisms to strengthen the harmonisation and comparability of sustainability reporting at the international level in the context of achieving sustainable development goals were substantiated. V. Sanduhei *et al.* (2025) and P. Vesco *et al.* (2025) substantiated the directions and potential for using human capital as a driver of forming the country's competitive advantages in the post-war period. They determined how the quality of human capital in Ukraine aligns with the potential for acquiring competitive advantages, identified factors of

positive and negative impact of war and crisis on human capital, and examined trends in changes to the quality of human capital under the influence of these factors.

Despite the availability of research, insufficient attention has been given to integrating TFA into Ukraine's economic recovery process and the impact of this activity on the sustainable development of the national economy. The goal of this article was to assess the role of transport and TFA in Ukraine's economic recovery, identify the main challenges faced by the transport sector, and propose strategies for improving its operational effectiveness. Also, in this context, it is crucial to underscore the development of public-private partnerships in the transport and logistics sector, which will allow for attracting additional investment into the transport industry, improving the quality of logistics services, and ensuring the stability of transport flows in European and global foreign economic markets. In line with the established objective, the following tasks were defined for the research:

- analysis of problems caused by Russia's aggression in the field of TFA in the country;
- development of recommendations to overcome the issues caused by Russia's aggression in the field of TFA in Ukraine to restore its economy.

Materials and Methods

The empirical basis of the research consisted of statistical data on Ukraine's exports and imports of goods for the period 2020-2024, obtained from official sources of the State Statistics Service (n.d.a; n.d.b). The selection of this period was justified by the need to cover both pre-war and wartime stages, which allows identifying structural breaks and transformations in foreign trade dynamics. The object of the study was Ukraine's foreign trade under martial law conditions, while the subject is the dynamics and trends in export and import volumes, as well as the possibilities of their forecasting considering the influence of transport and logistics factors. The least squares method was used to find an approximate solution to the overdetermined system and to estimate the parameters of the linear regression. The application of the least squares method is justified by the following example. Suppose that as a result of some research, four data points (x, y) were obtained: (1, 6), (2, 5), (3, 7), and (4, 10) (shown as dots in Figure 1). The task was to find the line that best fits these points (to determine the values of a and b that approximately solve the system of linear equations):

$$\begin{cases} \beta_1 + 1 \cdot \beta_2 = 6 \\ \beta_1 + 2 \cdot \beta_2 = 5 \\ \beta_1 + 3 \cdot \beta_2 = 7 \\ \beta_1 + 4 \cdot \beta_2 = 10, \end{cases} \quad (1)$$

where β_1 – the intercept; β_2 – the slope coefficient.

The least squares approach to solving this problem was to try to make the sum of the squared errors between the right and left sides of this system as small as possible, that is, it is necessary to find the minimum of the function:

$$S(\beta_1, \beta_2) = [6 - (\beta_1 + 1 \cdot \beta_2)]^2 + [5 - (\beta_1 + 2 \cdot \beta_2)]^2 + [7 - (\beta_1 + 3 \cdot \beta_2)]^2 + [10 - (\beta_1 + 4 \cdot \beta_2)]^2. \quad (2)$$

The minimum was determined by calculating the partial derivative of $S(\beta_1, \beta_2)$ of β_1, β_2 and setting them to zero:

$$\begin{cases} \frac{\Delta S}{\Delta \beta_1} = 0 = 8 \cdot \beta_1 + 20 \cdot \beta_2 - 56 \\ \frac{\Delta S}{\Delta \beta_2} = 0 = 20 \cdot \beta_1 + 60 \cdot \beta_2 - 154. \end{cases} \quad (3)$$

This resulted in a system of two equations with two unknowns, known as the normal equations. The solution to the system of linear algebraic equations provides the equation of the line that best fits the four given points. The minimum sum of squared errors is:

$$S(3.5, 1.4) = 1.1^2 + (-1.3)^2 - (0.7)^2 + 0.9^2 = 4.2.$$

It should be noted that the form of the linear function obtained analytically coincides exactly with the equation of the linear trend (Fig. 1).

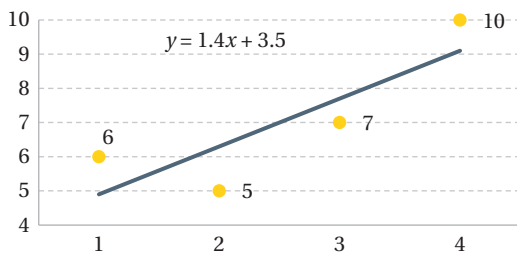


Figure 1. Linear regression example

Source: developed by the authors

Based on Figure 1, it was confirmed that the least squares regression line captured the overall trend of variation in the data, as the obtained linear trend equation closely fit the majority of data points while minimising the deviations from the observed values. This indicated a good fit of the model and supported the appropriateness of using a linear specification for data approximation. At the first stage of the research, general scientific methods of analysis and synthesis were applied to assess the state of freight forwarding activities and their impact on the national economy. At the second stage, economic and mathematical modelling methods were used, in particular trend analysis. Five types of trend models were constructed: linear, exponential, logarithmic, polynomial, and power. This approach was chosen to compare different functional forms and identify the model that best fits the available data under conditions of high uncertainty. The selection of the exponential trend for exports ($R^2 = 0.4092$) and the power trend for imports ($R^2 = 0.2269$) is justified not by the absolute value of the coefficient of determination, but by their relative superiority among the tested models. The relatively low R^2 values are explained by the high volatility

of the data caused by exogenous shocks such as war, port blockades, and infrastructure destruction, which disrupt traditional economic patterns. Under such conditions, trend models serve primarily as indicative rather than precise forecasting tools. Preliminary data processing included aggregation and consistency checks; however, no additional smoothing techniques (such as moving averages) were applied, which may have affected the accuracy of approximation. All calculations and model constructions were performed using Microsoft Excel.

Results and Discussion

Following the outbreak of the full-scale war, Ukraine has suffered significant losses in the logistics and transportation sectors. The blockade of seaports, destruction of transport routes, and shifts in international trade have profoundly impacted the economic situation. Under such conditions, TFA are crucial in stabilising economic processes, particularly during post-crisis recovery. TFA facilitates the uninterrupted supply of goods, ensures availability in domestic and international markets, and stimulates investment in infrastructure modernisation. Economic recovery largely depends on the efficient operation of the logistics sector, which supports international trade and helps adapt the transportation system to new challenges (Ivanov *et al.*, 2025). However, the war has led to the destruction of key infrastructure, including bridges, roads, and railway hubs, creating additional obstacles to transporting critically essential goods (Maliuta *et al.*, 2023). Due to the blockade of seaports, businesses have been forced to seek alternative routes, leading to the rapid expansion of railway transportation, the development of land corridors through Ukraine's western borders, and an increase in cargo flows through Danube ports. At the same time, these changes require substantial investments in upgrading the transport network and enhancing its capacity. A separate challenge remains the rising cost of logistics. The war has resulted in increased insurance payments, higher fuel prices, elevated transportation maintenance costs, and rising wages, all of which complicate business operations. Additionally, the shortage of skilled personnel, caused by mobilisation and migration, negatively impacts freight transport efficiency and cargo handling speed (Myskyv *et al.*, 2025). A serious challenge for the economy remains the negative balance of foreign trade, indicating that imports exceed exports, leading to currency risks, increased debt burden, and the devaluation of the hryvnia, as noted by A. Nepran (2025). The war has significantly complicated the sale of Ukrainian products in foreign markets due to the destruction of production facilities, reduced export capabilities, and logistical constraints. At the same time, the demand for imports of energy resources, machinery, and essential goods remains high. Moreover, the significant share of raw material exports makes the economy vulnerable to fluctuations in global prices, further exacerbating the financial system's instability. An attempt was made to forecast the volume of Ukraine's foreign trade in goods for 2025 and 2026

using five trend models – exponential, linear, logarithmic, polynomial, and power. This was achieved through the application of mathematical tools and smoothing

functions (Prokudin *et al.*, 2024). The forecast was based on statistical data for the years 2020, 2021, 2022, 2023, and 2024, as presented in Table 1.

Table 1. Volume of Ukraine's foreign trade in goods, 2020-2024

Year	Exports, million USD	Imports, million USD	Trade balance, million USD
2020	49,191.8	54,336.1	-51,44.3
2021	68,072.3	72,843.1	-47,70.8
2022	44,135.6	55,295.7	-11,160.1
2023	36,182.9	63,567.0	-27,384.1
2024	41,733.0	70,709.1	-28,976.1

Source: State Statistics Service of Ukraine (n.d.a; n.d.b)

The data in Table 1 reveals a consistent negative trade balance for Ukraine from 2020 to 2024, with imports consistently exceeding exports. The trade deficit widened significantly from USD 5.14 billion in 2020 to USD 28.98 billion in 2024, reflecting a growing imbalance in foreign

trade over the period. Notably, the export value fluctuated, while imports showed a general upward trend, particularly in 2023 and 2024, contributing to the increasing trade deficit. The forecast of foreign trade volume, built on an exponential trend, is presented in Figure 2.

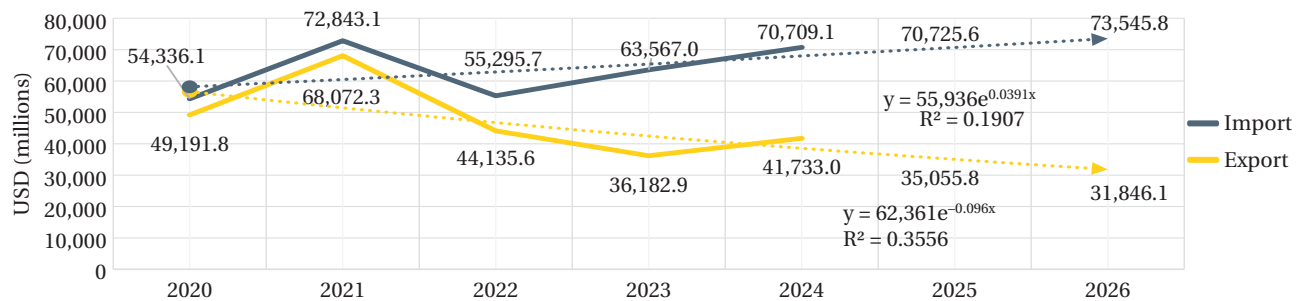


Figure 2. Forecast of foreign trade volume using the exponential trend

Source: developed by the authors

The exponential model indicates a rapid divergence between imports and exports. By the end of the forecast period, the gap reaches roughly USD 40-42 billion, reflecting the compounding nature of exponential growth. Imports expand at an increasing rate, while exports decline proportionally, which amplifies the imbalance over time. From an economic perspective, such dynamics may reflect asymmetric recovery conditions: strong domestic demand and import dependence (e.g., energy, machinery, consumer goods) combined with structural constraints

on exports, such as damaged infrastructure, limited production capacity, and restricted access to external markets. Compared to other models, the exponential trend produces one of the most aggressive divergence scenarios, as it assumes constant percentage growth/decline rates. This makes it less conservative than the linear and power trends and more extreme than the logarithmic model, which incorporates deceleration effects. The forecast of foreign trade volume, built on a linear trend, is presented in Figure 3.

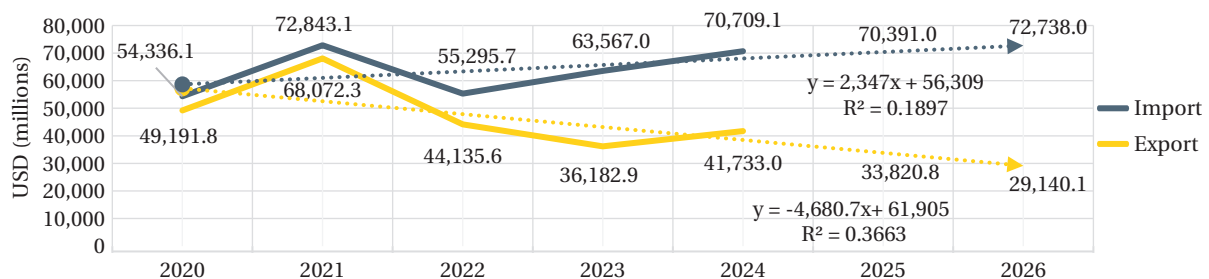


Figure 3. Forecast of foreign trade volume using the linear trend

Source: developed by the authors

The linear model shows a steady and predictable widening of the trade gap, reaching approximately

USD 40-43 billion by the final years. The difference grows at a nearly constant absolute rate, reflecting stable but

opposing trends in imports and exports. Economically, this suggests a gradual normalisation of trade flows, where imports increase due to recovering consumption and investment, while exports fail to keep pace due to persistent competitiveness issues. The linear assumption implies no major structural shifts, only continuation of current tendencies. In comparison, this model is

more conservative than the exponential and polynomial trends, as it avoids acceleration effects. However, it is less nuanced than the logarithmic model, which captures slowing dynamics, and less flexible than the power model, which reflects nonlinear adjustment. The forecast of foreign trade volume, built on a logarithmic trend, is presented in Figure 4.

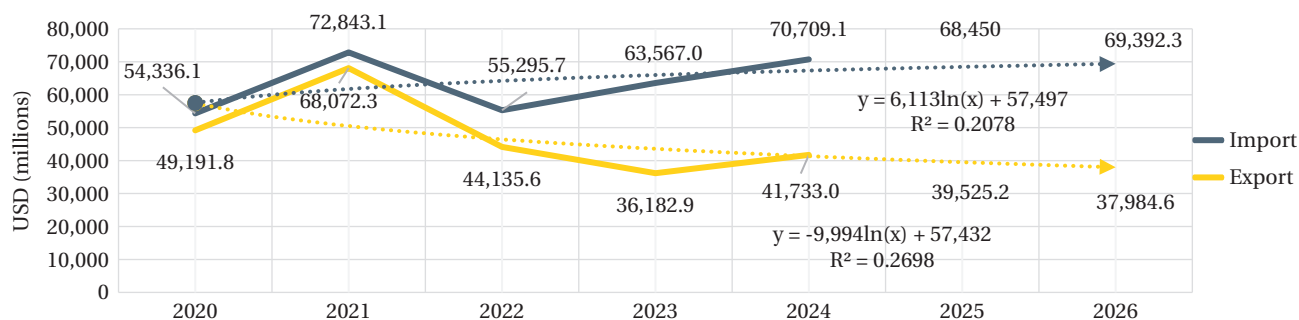


Figure 4. Forecast of foreign trade volume using the logarithmic trend

Source: developed by the authors

The logarithmic model points to a moderate and stabilising gap, estimated at around USD 30-32 billion toward the end of the period. The divergence grows initially but then decelerates, reflecting diminishing marginal changes. This behaviour can be explained by market saturation and adaptive mechanisms. Imports grow more slowly as demand stabilises, while exports, despite declining, begin to adjust to constraints, possibly through market

diversification or partial recovery of production. Compared to other models, the logarithmic trend is the most optimistic and balanced scenario. Unlike exponential and polynomial models, it does not imply runaway divergence. It also improves upon the linear model by incorporating nonlinear slowing, making it more realistic in conditions of economic stabilisation. The forecast of foreign trade volume, built on a polynomial trend, is presented in Figure 5.

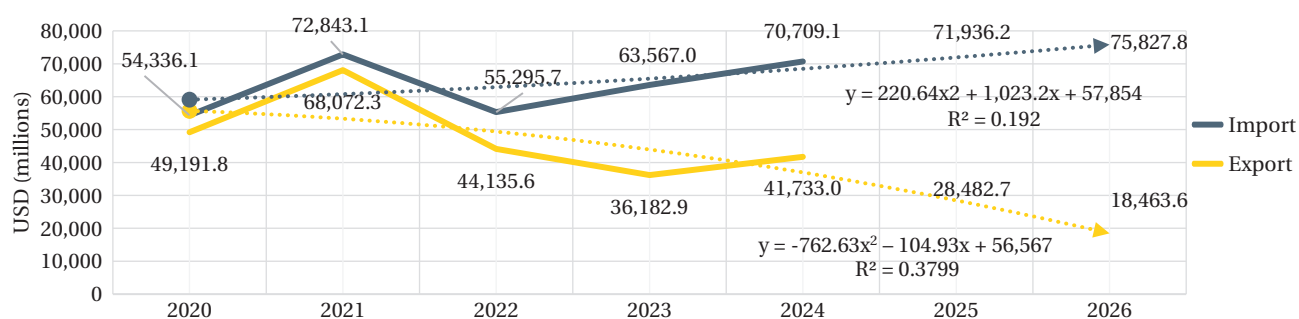


Figure 5. Forecast of foreign trade volume using the polynomial trend

Source: developed by the authors

The polynomial model produces the most pronounced divergence, with the trade gap potentially exceeding USD 55-57 billion by the end of the forecast horizon. Imports accelerate significantly, while exports decline at an increasing rate, creating a sharp imbalance. Economically, this reflects a high-risk scenario characterised by deepening structural asymmetry: strong reliance on imports combined with deteriorating export capacity. This may be linked to prolonged war impacts, deindustrialisation, or loss of key export sectors. Compared to all other models, the polynomial trend is the most pessimistic, as it captures nonlinear acceleration in opposite directions. Unlike the exponential model,

which assumes proportional change, the polynomial specification allows for turning points and sharper curvature, leading to more extreme outcomes. The forecast of foreign trade volume, built on a power trend, is presented in Figure 6.

The power model suggests a moderate but persistent gap, reaching approximately USD 30-35 billion. Imports grow steadily but without sharp acceleration, while exports decline gradually, resulting in a smoother divergence. This reflects a scenario of controlled imbalance, where economic agents partially adapt to constraints. Imports remain necessary for recovery and modernisation, while exports face structural but not catastrophic

limitations. In comparison, the power trend occupies a middle position between models. It is less extreme than the exponential and polynomial scenarios, but also less optimistic than the logarithmic one. Relative to the linear

trend, it better captures non-constant growth rates, making it more flexible and potentially more realistic in transitional economic conditions. The results of the approximation for all five trends are summarised in Table 2.

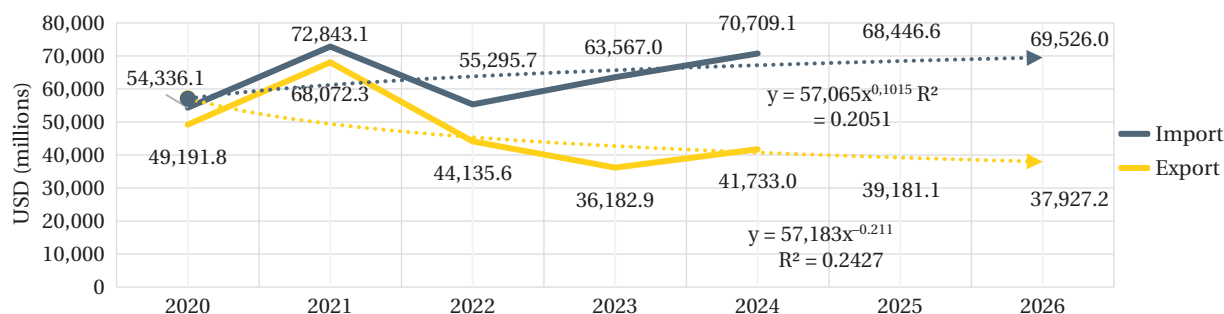


Figure 6. Forecast of foreign trade volume using the power trend

Source: developed by the authors

Table 2. Results of approximation of the volumes of foreign trade in goods of Ukraine for 2020-2024

Type of trend	R ²	
	Export	Import
Exponential	0.4092	0.2079
Linear	0.3663	0.1897
Logarithmic	0.2698	0.2078
Polynomial	0.3799	0.192
Power	0.3173	0.2269

Source: developed by the authors

For the forecast for 2025-2026, the trends with the highest R² values closest to 1 are selected. The exponential trend (R² = 0.4092) is used for exports, while the power trend (R² = 0.2269) is applied for imports. The obtained results are presented in Table 3. According to Table 3, the forecast for Ukraine's foreign trade in goods for 2025 and 2026

indicates a further decline in exports and a steady increase in imports. The trade deficit is projected to rise significantly, from USD 28.98 billion in 2024 to USD 33.39 billion in 2025 and USD 37.68 billion in 2026, showing a growing imbalance in foreign trade. The obtained forecasting results are presented in the resulting graph in Figure 7.

Table 3. Forecast of Ukraine's foreign trade volume in goods for 2025-2026

Year	Exports, million USD	Imports, million USD	Trade balance, million USD
2020	49,191.8	54,336.1	-51,44.3
2021	68,072.3	72,843.1	-47,70.8
2022	44,135.6	55,295.7	-11,160.1
2023	36,182.9	63,567.0	-27,384.1
2024	41,733.0	70,709.1	-28,976.1
2025	35,055.8	68,446.6	-33,390.9
2026	31,846.9	69,526.0	-37,679.1

Source: developed by the authors

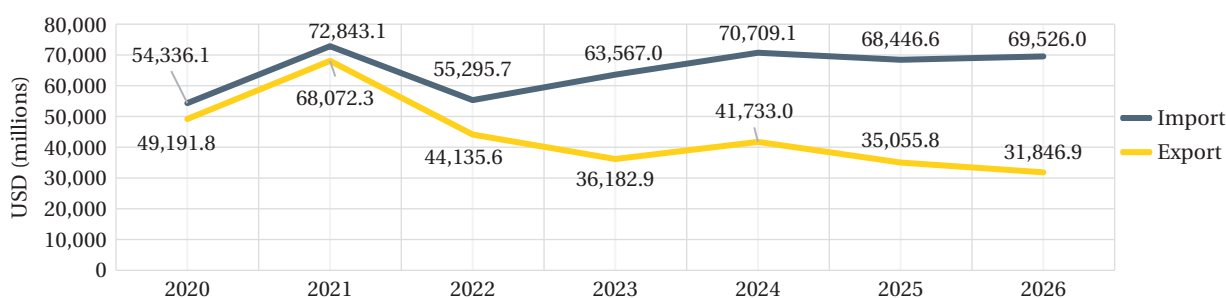


Figure 7. Forecast of Ukraine's trade turnover for 2025-2026

Source: developed by the authors

The results indicate significant fluctuations in export and import volumes and a persistently negative trade balance, which significantly deteriorated between 2022 and 2024. While in 2020-2021, the trade balance remained relatively stable, 2022 witnessed a sharp decline in exports (by 35.2% compared to 2021), leading to an increased deficit of USD -11.16 billion. The situation worsened further in 2023, as exports declined, and the negative balance reached USD -27.38 billion. In 2024, exports partially recovered; imports also increased, further expanding the trade deficit to USD -29.13 billion. The contraction of exports in 2022-2023 was primarily driven by military actions, disruptions in logistics routes, and loss of access to key markets. The slight recovery in 2024 indicates business adaptation and the gradual restoration of economic activity. Despite financial difficulties, the rise in imports during 2023-2024 may be attributed to the necessity of importing critically essential goods, such as energy resources, equipment for production recovery, and military-related supplies. According to the results of the trend analysis, exports are expected to show a declining tendency in 2025-2026, potentially reaching around USD 35.1 billion. Meanwhile, imports are projected to rise, reaching USD 68.4 billion in 2025 and USD 69.5 billion in 2026. This will further exacerbate the trade balance deficit, which is expected to reach USD -33.4 billion in 2025 and USD -37.7 billion in 2026. Despite these challenges, TFA play a key role in economic recovery. Their efficient functioning contributes to maintaining and expanding Ukraine's trade relations with external partners, ensuring the timely delivery of goods and creating new jobs. Given this, it is necessary to implement a series of measures to improve the sector's efficiency. Firstly, priority should be given to restoring transport infrastructure, including reconstructing destroyed facilities and constructing new logistics hubs and freight terminals. Secondly, support for exporters should be provided through state financing programmes for enterprises. Offering long-term preferential loans will enable businesses to invest in expanding production, purchasing equipment, and improving product quality. Thirdly, export diversification is essential through market expansion and enhanced cooperation. Beyond Europe, strengthening trade relations with Asian and Middle Eastern countries is crucial. These regions demonstrate high demand for agricultural products, metallurgy, and engineering goods. Strengthening cooperation with China, India, Saudi Arabia, and Turkey opens up new opportunities for export growth and reduces dependency on European markets. Additionally, the digitalisation of transport and logistics processes is a crucial development direction. This transformation will reduce the time required for processing transport documentation, enhance cargo tracking, and improve overall efficiency in managing material flows. Another key task is the training and retraining of logistics professionals, as a shortage of qualified personnel may hinder the transport sector's growth. Expanding public-private partnerships in transport and logistics is also essential. Cooperation between the state and businesses will help attract additional

investments into the transport industry, improve the quality of logistics services, and ensure transport flow stability.

The European Union is developing the Trans-European Transport Network (TEN-T) to connect Europe from west to east and north to south through a network of highways, railways, airports, and waterways. The development of the transport system is planned in two stages: the "core" network is expected to be completed by 2030, while the "comprehensive" network is scheduled for completion by 2050. Ukraine joined TEN-T in 2017. According to Strategy for the EU integration... (2023), projects worth EUR 4.45 billion are planned for implementation in Ukraine by 2030. This represents the most significant investment allocation among all Eastern Partnership countries of the EU. The European Commission for Transport has introduced modifications to the indicative maps of the TEN-T network, incorporating Ukrainian logistics routes. This decision represents a strategic step toward Ukraine's integration into the EU. It will facilitate the implementation of the "Solidarity Lanes" initiative, which aims to support the export of Ukrainian agricultural products and the delivery of humanitarian aid to Ukraine (Hoi *et al.*, 2025). The following changes have been introduced to enhance Ukraine's transportation network: the North-Baltic Corridor has been extended through Lviv and Kyiv to Mariupol, while the Baltic-Black-Aegean Corridor has been expanded through Lviv and Chernivtsi (Romania and Moldova) to Odesa. Furthermore, the Baltic-Adriatic Sea Corridor and the Rhine-Danube Corridor will now pass through Lviv. Additionally, new routes have been designated, including Odesa – Berezynе – Basarabeasca (towards Chişinău and Reni, Republic of Moldova), Zhytomyr – Vinnytsia – Yampil (towards Rîşcani, Republic of Moldova), Chop – Uzhhorod – Sambir – Lviv, and Krasnohrad – Poltava, Krasnohrad – Kharkiv, Krasnohrad – Dnipro. The inclusion of these logistics routes in the TEN-T network brings several significant benefits (Strategy for the EU integration..., 2023). It eliminates existing barriers in logistics operations, improving transportation efficiency and streamlining processes. Additionally, it opens the door for attracting European investments focused on modernising the country's transport infrastructure. Moreover, integration into the TEN-T network grants access to European Union assistance instruments that support the development of Ukraine's segment of the network. It also contributes to the expansion of multimodal transportation capabilities, allowing for more flexible and diversified logistics solutions. Furthermore, this inclusion can lead to a reduction in overall logistics costs while simultaneously improving the quality and reliability of freight transportation services. Additionally, the European Commission has excluded Russian and Belarusian routes from the TEN-T network and downgraded the status of routes within the EU that intersect with these aggressor countries.

The comparison with other publications confirms that the reconstruction of Ukraine's transport infrastructure and the adaptation of logistics systems, including the implementation of European norms, digitalisation,

and international partnerships, are crucial for overcoming wartime challenges and ensuring economic recovery (Kiiiko, 2024). As emphasised by Y. Korniiiko *et al.* (2024), the problems of the transport sector of Ukraine have become more acute as a result of the armed aggression of the Russian Federation. A general assessment of the damage caused to the infrastructure of Ukraine during the war is presented, where the second largest category of damaged assets is precisely the transport infrastructure. It is revealed that despite the existing challenges, there is a positive trend in the restoration of freight traffic volumes and the reconstruction of infrastructure facilities, namely: transshipment complexes, warehouse hubs, car parks, port terminals and private fleets. In the article S. Tkachenko (2024) the role of logistics in the process of post-war economic recovery of Ukraine was investigated, taking into account international experience and the involvement of foreign partners. Strategic directions for the development of logistics infrastructure were identified, which ensure the accelerated recovery of production and trade chains. Modern obstacles and limitations that affect the efficiency of logistics systems in the conditions of reformatting the economic system were considered. Attention was focused on the need to coordinate the actions of state bodies, business and international donors to form an effective supply mechanism, resource allocation and support for the critical infrastructure of the state. The possibilities of implementing foreign logistics approaches and tools in the domestic economy were analysed, taking into account institutional specifics. The conceptual principles of strategic partnership with international structures in the field of logistics were identified in order to strengthen economic stability and ensure the regenerative growth of the national economy of Ukraine. V. Kuranovič *et al.* (2025) stated that the growth of the global freight forwarding market is rapid due to the rapid development of international trade, the expansion of the e-commerce industry worldwide, and the increase in the number of free trade agreements between countries. Enterprises that engage forwarders to organise foreign trade operations in the international trade market can receive a number of advantages in organising cargo delivery and minimising transportation costs. The introduction of information technologies allows forwarders to be prepared for large-scale disruptions and unforeseen risks when organising international freight transportation (Abideen, *et al.*, 2023; Cariou *et al.*, 2025). Even in times of uncertainty, data analytics and automation are becoming the main way to improve the activities of leading freight forwarding companies.

R. Kersys & P.G. Pererva (2025) noted that logistics began to play one of the decisive roles in restoring the economy of Ukraine under martial law. Despite significant losses since the beginning of the war due to such problems as the closure of Ukrainian ports, air traffic, instability of railway transportation, lack of infrastructure and external factors, the Ukrainian transport and logistics system gradually coped with the challenges and began to increase the volume of export-import and domestic supplies.

However, a significant part of the logistics infrastructure still needs to be restored and there is a need to accelerate the movement of goods. Therefore, to solve the outlined problems, the spread of digitalisation, which will improve the movement of information and financial flows through the use of reliable technologies and information systems, the restoration of the transport and logistics infrastructure by searching for companies and investors capable of doing this in the shortest possible time, including through privatisation processes, which is no less relevant today than before. Taken together, this will determine the development of logistics in Ukraine in the near future. V. Yanovska *et al.* (2025) and K.M. Prytula *et al.* (2025) examined the transformation of Ukraine's export cargo flows in 2022-2026 amid wartime shocks and structural changes in the transport and logistics system. Authors synthesised theoretical and practical aspects of three key logistics subsystems: the seaports of the Odesa region, the Danube cluster, and land border crossings. The study highlights patterns of flow reorientation during shock periods, institutional turbulence, and the emergence of a new multimodal balance. The trends in sea, rail and road transport rates have been analysed, and their impact on the structure of transport and logistics costs has been assessed. The article further elaborates the mechanism through which changes in logistics costs are transmitted into export price formation under Incoterms (Delivered at Place; Carriage Paid to; Free on Board; Cost, Insurance, and Freight). V. Yanovska *et al.* (2025) also examined how institutional decisions, inspection restrictions, infrastructure congestion, and security risks reshape route configurations. Competitive advantages of alternative export channels are evaluated under capacity constraints and heightened uncertainty. A multicriteria route assessment framework is proposed, incorporating cost, logistics cycle time, reliability, security, and environmental parameters. Finally, key directions for strengthening export logistics resilience are identified based on a multimodal export logistics architecture, and recommendations are offered for transport and technological solutions and infrastructure development under prolonged instability.

Conclusions

The study confirmed that, despite the challenging environment, TFA play a decisive role in sustaining and restoring Ukraine's economy. They help stabilise trade flows, support market diversification, and create conditions for attracting investment into transport and logistics infrastructure. The resilience of foreign trade increasingly depends on the efficiency and adaptability of logistics systems under external shocks. The results indicated a persistent trade deficit (USD 33,390.9 million in 2025 and USD 37,679.1 million in 2026), driven by declining exports and rising imports, largely due to increased demand for energy, machinery, and other essential goods during wartime and recovery. Priority directions for further development should include the modernisation of logistics hubs, deeper integration into the European TEN-T, expansion

of multimodal transportation, and comprehensive digitalisation of logistics processes. At the same time, state support for exporters remains essential and should focus on improving access to preferential financing, simplifying customs procedures, and stimulating the development of high-value-added production. Particular attention should also be given to import optimisation through the gradual reduction of dependence on critical goods by strengthening domestic production capacities. In this context, Ukraine's integration into TEN-T opens significant opportunities for removing logistical bottlenecks, enhancing connectivity with European markets, and attracting long-term investment. Overall, the results demonstrate that the future trajectory of Ukraine's foreign trade will largely depend on the effective implementation of TFA-related measures, infrastructure development, and the strategic

adaptation of logistics routes to current challenges. The consistent implementation of these priorities will contribute to economic stabilisation, improved competitiveness, and the sustainable long-term development of Ukraine. The econometric modelling of the relationship between logistics costs, supply conditions, and export competitiveness is promising.

Acknowledgements

None.

Funding

None.

Conflict of Interest

None.

References

- [1] Abideen, A.Z., Sorooshian, S., Sundram, V.P.K., & Mohammed, A. (2023). Collaborative insights on horizontal logistics to integrate supply chain planning and transportation logistics planning – a systematic review and thematic mapping. *Journal of Open Innovation: Technology, Market, and Complexity*, 9(2), article number 100066. [doi: 10.1016/j.joitmc.2023.100066](https://doi.org/10.1016/j.joitmc.2023.100066).
- [2] Cariou, P., Jia, H., & Wolff, F.-C. (2025). Price discrimination between freight forwarders and carriers: Evidence from the container shipping industry. *Transport Policy*, 170, 1-11. [doi: 10.1016/j.tranpol.2025.05.005](https://doi.org/10.1016/j.tranpol.2025.05.005).
- [3] Gnap, J., Senko, Š., Kostrzewski, M., Brídžiková, M., Czödörövá, R., & Říha, Z. (2021). Research on the relationship between transport infrastructure and performance in rail and road freight transport – a case study of Japan and selected European countries. *Sustainability*, 13(12), article number 6654. [doi: 10.3390/su13126654](https://doi.org/10.3390/su13126654).
- [4] Hoi, N., Zhuk, O., & Nagornyyak, M. (2025). The main mechanisms for implementing the state policy of developing rail freight transport in the context of Ukraine's European integration. *Philosophy and Governance*, 7-8(11-12). [doi: 10.70651/3041-248X/2025.7-8.08](https://doi.org/10.70651/3041-248X/2025.7-8.08).
- [5] Ivanov, Y.V., Nahai, D.R., & Sokhan, T.D. (2025). Logistics in modern conditions of economic development. *Scientific Notes of V.I. Vernadsky Taurida National University. Series: Economics and Management*, 36((75)1), 72-77. [doi: 10.32782/2523-4803/75-1-11](https://doi.org/10.32782/2523-4803/75-1-11).
- [6] Kersys, R., & Pererva, P.G. (2025). [Current trends in the development of logistics in Ukraine](#). In *Sustainable development: Modern theories and best practices: Materials of the monthly international scientific and practical conference* (pp. 61-65). Tallinn: Teadmus OÜ.
- [7] Kiiko, A.I. (2024). Essence and features of transport & forwarding activities of enterprises: Modern aspect. *Herald of Lviv University of Trade and Economics. Economic Sciences*, 79, 106-112. [doi: 10.32782/2522-1205-2024-79-14](https://doi.org/10.32782/2522-1205-2024-79-14).
- [8] Korniiiko, Y., Valyavska, N., & Mikheiev, O. (2024). Analysis of the current state of Ukraine's transport industry in the context of freight transportation. *Economics and Society*, 70. [doi: 10.32782/2524-0072/2024-70-70](https://doi.org/10.32782/2524-0072/2024-70-70).
- [9] Kuranovič, V., Ustinovichius, L., Nowak, M., Bazaras, D., & Sokolovskij, E. (2025). Improving the freight transportation system in the context of the country's economic development. *Sustainability*, 17(14), article number 6327. [doi: 10.3390/su17146327](https://doi.org/10.3390/su17146327).
- [10] Maliuta, L., Rudan, V., & Balushevskyj, K. (2023). Problems and perspectives of the development of transport logistics in Ukraine under the conditions of martial state. *Economic Analysis*, 33(3), 153-164. [doi: 10.35774/econa2023.03.153](https://doi.org/10.35774/econa2023.03.153).
- [11] Myskyv, H., & Kladko, A.-I. (2025). International logistics of Ukraine in the context of military aggression. *Economics and Society*, 79. [doi: 10.32782/2524-0072/2025-79-107](https://doi.org/10.32782/2524-0072/2025-79-107).
- [12] Nepran, A. (2025). Statistical analysis of the impact of “terms of trade” on the trade balance of Ukraine. *Bulletin of V.N. Karazin Kharkiv National University Economic Series*, 108, 107-121. [doi: 10.26565/2311-2379-2025-108-10](https://doi.org/10.26565/2311-2379-2025-108-10).
- [13] Prokhorova, V., Kravchenko, O., Shkurenko, O., Babichev, A., & Polivantsev, A. (2025). Study of priority directions of economic recovery of Ukraine based on scenario modelling. *Economics of Development*, 24(1), 26-34. [doi: 10.63341/econ/1.2025.26](https://doi.org/10.63341/econ/1.2025.26).
- [14] Prokudin, G.S., Kapronenko, A.V., Dzenko, A.O., & Korol, N.P. (2024). Forecasting freight transportation in Ukraine. In *The 9th International scientific and practical conference “Perspectives of contemporary science: Theory and practice”* (pp. 373-379). Lviv: SPC “Sci-conf.com.ua”.
- [15] Prytula, K.M., Kalat, Y.Y., Tomashyk, L.S., & Kyryk, I.M. (2025). Logistical challenges of realizing Ukraine's export potential in wartime conditions. *Regional Economy*, 117(3), 136-146. [doi: 10.36818/1562-0905-2025-3-12](https://doi.org/10.36818/1562-0905-2025-3-12).

- [16] Razumova, K.M., Novalska, N.I., & Klymenko, V.V. (2023). Features of modern transport forwarding business. *Systems and Technologies*, 65(1), 124-130. doi: [10.32782/2521-6643-2023.1-65.15](https://doi.org/10.32782/2521-6643-2023.1-65.15).
- [17] Sanduhei, V., Bila, I., Shevchenko, O., Manzhula, I., & Iliukhina, V. (2025). Human capital as a driver of the formation of Ukraine's competitive advantages in the post-war period. *Scientific Bulletin of the National Mining University*, 1, 157-163. doi: [10.33271/nvngu/2025-1/157](https://doi.org/10.33271/nvngu/2025-1/157).
- [18] State Statistics Service of Ukraine. (n.d.a). *Foreign trade in goods by partner country: Archive*. Retrieved from https://ukrstat.gov.ua/operativ/operativ2018/zd/ztt_za_kr_partner/ztt_za_kr_partner_u/Arch_ztt_za_kr_partner_u.htm.
- [19] State Statistics Service of Ukraine. (n.d.b). *External trade of goods*. Retrieved from <https://stat.gov.ua/en/datasets/external-trade-goods>.
- [20] Strategy for the EU integration of the Ukrainian and Moldovan rail systems. (2023). Retrieved from <https://jaspers.eib.org/files/library/2023/strategy-for-the-eu-integration-of-the-ukrainian-and-moldovan-rail-systems.pdf>.
- [21] Subačienė, R., Krutova, A., & Nesterenko, O. (2023). Determinants of sustainable development in the post-war recovery of Ukraine. *Economics of Development*, 22(4), 23-33. doi: [10.57111/econ/4.2023.23](https://doi.org/10.57111/econ/4.2023.23).
- [22] Tkachenko, S. (2024). Post-war recovery of Ukraine's economy: Problems, risks, and solutions. *Economic Horizons*, 2-3(28), 4-13. doi: [10.31499/2616-5236.2\(28\).2024.300402](https://doi.org/10.31499/2616-5236.2(28).2024.300402).
- [23] Vesco, P., et al. (2025). The impacts of armed conflict on human development: A review of the literature. *World Development*, 187, article number 106806. doi: [10.1016/j.worlddev.2024.106806](https://doi.org/10.1016/j.worlddev.2024.106806).
- [24] Yanovska, V., Król, M., & Pittman, R. (2025). The logistics of grain exports from wartime Ukraine: What are the highest priority areas to address? *Transportation Research Interdisciplinary Perspectives*, 30, article number 101363. doi: [10.1016/j.trip.2025.101363](https://doi.org/10.1016/j.trip.2025.101363).



Роль експедиторської діяльності у відновленні економіки України

Георгій Прокудін

Доктор технічних наук, професор
Національний транспортний університет
01010, вул. М. Омеляновича-Павленка, 1, м. Київ, Україна
<https://orcid.org/0000-0001-9701-8511>

Петро Поляк

Аспірант
Національний транспортний університет
01010, вул. М. Омеляновича-Павленка, 1, м. Київ, Україна
<https://orcid.org/0009-0002-4750-0064>

Ігор Мельников

Аспірант
Національний транспортний університет
01010, вул. М. Омеляновича-Павленка, 1, м. Київ, Україна
<https://orcid.org/0009-0004-3439-0956>

Олександр Цуканов

Кандидат технічних наук, професор
Національний транспортний університет
01010, вул. М. Омеляновича-Павленка, 1, м. Київ, Україна
<https://orcid.org/0009-0007-1433-4668>

Анотація. У статті проведено всебічний аналіз ролі діяльності експедиторських компаній у підтримці економічного відновлення України в умовах повномасштабної війни. Основною метою дослідження було проаналізувати динаміку торгового балансу України та розробити прогноз його розвитку на 2025-2026 роки. Для досягнення цієї мети застосовано методи економіко-математичного моделювання, зокрема різні типи апроксимації трендів, включаючи експоненціальну, лінійну, логарифмічну, поліноміальну та степеневу моделі. Цей методологічний підхід дозволив порівняти різні функціональні залежності та вибрати найбільш підходящі моделі в умовах високої невизначеності. Результати дослідження показали стабільний негативний торговий баланс (-33 390,9 млн дол. у 2025 році та -37 679,1 млн дол. у 2026 році), який характеризується зниженням експорту та одночасним збільшенням імпорту. Такий дисбаланс значною мірою обумовлений зростаючою потребою в енергоресурсах, техніці, обладнанні та інших необхідних товарах для підтримки економіки під час війни та відновлення. Враховуючи ризики, пов'язані з постійним торговим дефіцитом, у статті запропоновано комплекс стратегічних заходів, спрямованих на стабілізацію економічної ситуації. Серед них відновлення та модернізація транспортної інфраструктури, диверсифікація експортних ринків, стимулювання виробництва з високою доданою вартістю, розширення мультимодальних транспортних систем та впровадження цифрових технологій у логістиці. Крім того, дослідження підкреслило стратегічне значення інтеграції України в Trans-European Transport Network та необхідність залучення інвестицій у логістичну інфраструктуру та хаби. Загалом дослідження підтвердило важливу роль ефективних логістичних і транспортних систем у забезпеченні економічної стійкості та зміцненні позицій України на міжнародних ринках. Результати можуть бути використані при розробці національних логістичних стратегій, політики та програм підтримки експортерів

Ключові слова: зовнішня торгівля; логістика; транспортна інфраструктура; TEN-T; експорт; імпорт; торговий баланс; прогнозування