AGORA International Journal of Economical Sciences, http://univagora.ro/jour/index.php/aijes
ISSN 2067-3310, E-ISSN 2067-7669
Vol. 19, No. 1 (2025), pp. 371-385

REGIONAL INTEGRAL ASSESSMENT OF UKRAINIAN FOREIGN TRADE: SHIFTS IN EXPORTS, IMPORTS, GEOPOLITICAL IMPACT AND SPILLOVER ECONOMIC EFFECTS

L. ZOMCHAK, S. OHORODNYK

Larysa Zomchak[1], Svitlana Ohorodnyk[2]
[1] [2] Ivan Franko National University of Lviv, Ukraine
[1] https://orcid.org/0000-0002-4959-3922, E-mail: lzomchak@gmail.com
[2] E-mail: sviitlana.ohorodnyk@lnu.edu.ua

Abstract: *This paper provides an in-depth analysis of the regional features of Ukraine's foreign trade in goods, focusing on export and import dynamics for 2024 and historical trends. The study aims to assess the state of foreign economic activity across different regions of Ukraine, using statistical data from the State Statistics Service of Ukraine and Customs Service of Ukraine. The paper explores the key sectors driving foreign trade, such as products of plant origin, machinery, and mineral products, while considering the impact of the ongoing martial law on trade activities. The methodology includes multidimensional ranking techniques, such as integral estimation, to assess regional economic performance based on export-import volumes, business operations, and economic indicators. The key findings reveal significant regional disparities in foreign trade activity, with Kyiv and Dnipropetrovsk regions showing the highest levels of trade. The paper also highlights a decline in overall trade performance compared to previous years, underlining the adverse effects of the current geopolitical situation. The findings suggest that improving Ukraine's foreign economic activity and expanding its international market presence are essential for economic recovery and growth.*

Keywords: *regional development, foreign trade, region, model, assessment, regional disparities, export, import, regional analysis, multidimensional, ranking, resilience, shocks, spatial, spillover.*

INTRODUCTION

The integration of Ukraine into the global economic landscape is a critical factor for its sustainable development and future prosperity. This paper delves into an in-depth analysis of the regional dimensions of Ukraine's foreign trade in goods, examining both export and import dynamics. Utilizing statistical data provided by the State Statistics Service of Ukraine, this study aims to comprehensively assess the state of foreign economic activity across the diverse regions of the country as of January 1, 2024. Furthermore, it contextualizes these contemporary figures by examining historical trends and comparing them with data from 2015 and 2022, offering a longitudinal perspective on the evolution of regional trade patterns.

The structure of Ukraine's foreign trade in goods reveals key sectors driving its international commerce. Notably, the ongoing martial law in Ukraine has significantly influenced this export composition, leading to a redirection of certain goods, particularly machinery and equipment, towards domestic needs. Regional analysis of export volumes indicates a concentration of activity in Kyiv (28%) and the Dnipropetrovsk region (16.7%), highlighting existing regional disparities in trade contribution (Customs Service of Ukraine, n.d.).

On the import side, machinery, equipment, and mechanical appliances, including electrical devices (19.5%), represent the largest category, followed by mineral products (12%) and products from the chemical and related industries (11%). The demand for imported goods

is also geographically concentrated, with Kyiv city (45%), Lviv region (9%), and Dnipropetrovsk region (8%) exhibiting the highest import volumes in 2024 (Customs Service of Ukraine, n.d.). These regional variations in both export and import activities are likely influenced by a confluence of factors, including population density, geographic characteristics, and the overall level of economic development within each region.

Beyond the sectoral and regional breakdown, understanding Ukraine's key international trade partners is crucial. The data presented in this paper reveals a strong reliance on trade with Europe and Asia, a pattern largely dictated by geographical proximity. Interestingly, imports from these continents significantly outweigh exports, pointing to potential inefficiencies in Ukraine's current foreign economic activity. A notable exception is trade with Africa, where export volumes considerably surpass imports.

A comparative analysis of trade data spanning 2015, 2022, and 2024 reveals a concerning trend of declining overall export volumes coupled with increasing imports, suggesting a weakening of Ukraine's economic position and a growing reliance on foreign goods. This underscores the imperative for strategies aimed at bolstering the international presence of Ukrainian-produced goods and services to foster economic recovery and growth.

To provide a robust assessment of the external economic engagement of Ukraine's regions, this study employs a multidimensional approach. Recognizing the limitations of evaluating regional performance based on single indicators, the methodology incorporates integral estimation techniques. This allows for a comparative analysis of regions across multiple criteria, encompassing export-import volumes, business operations related to customs activities, and broader economic indicators. By standardizing and weighting these diverse factors, this research aims to provide a nuanced understanding of the relative foreign economic activity levels across Ukraine's regions, ultimately informing policy recommendations for enhanced international trade and economic development.

1.1.Literature review

The study of regional trade agreements (RTAs) and their impact on international trade has been a significant area of research in recent decades. Studnicka, Thierie, and Van Hove (2019) examined the impact of RTAs on European exports, providing insights into how these agreements shape trade patterns within Europe. Park (2020) offered a broader perspective by analyzing RTAs in East Asia, discussing their historical context and future implications for the region's development. The Regional Comprehensive Economic Partnership Agreement and its implications for Europe, highlighting the interconnectedness of regional trade dynamics across different continents, are either explored by authors (Hilpert, 2025). Qose and Dibra (2023) provided a broader analysis of international trade policies and markets**.**

Several studies have also investigated the factors influencing trade and economic growth in specific regions. Nurjannah et al. (2023) focused on the relationship between inter-regional trade and economic growth in ASEAN countries, emphasizing the importance of corruption control and human development indicators. The authors examined the effects of regional trade integration and the transition to renewable energy on environmental quality in South Asia, adding an environmental dimension to the analysis of trade dynamics (Murshed et al., 2021).

The resilience of regional economies in the face of global challenges, such as trade wars, has also been a subject of scholarly attention. He et al. (2024) explored the role of global connections and local networks in enhancing regional resilience during trade disruptions. The impact of digital trade, trade openness, and foreign direct investment on productivity has been investigated, highlighting the evolving nature of international trade in the digital age (Dai et al., 2025).

In addition to economic factors, other dimensions of regional trade have been explored, such as the ecological implications of trade practices. Mulligan et al. (2023) assessed the risk of invasive species spread through the live bait trade, underscoring the importance of considering ecological factors in trade analysis. The specific context of Ukraine's external sector and regional trade agreements has been examined by several researchers. Lukianenko, Pokydko, and Tokarchuk (2022) discussed the sustainability of Ukraine's external sector in the context of high risks, while Kryvenko (2021) analyzed the realities and prospects of Ukraine's regional trade agreements. Zomchak and Klochnyk (2023) investigated the tendencies, determinants, and interdependencies between various indicators of Ukraine's external sector. Sirenko et al. (2024) conducted a comprehensive analysis of the relationship between international trade relations and regional development, examining the influencing factors. Further contributions to this area include the work of Vdovyn and Zomchak (2022), who explored Ukraine's export in services during the pre-pandemic period, Covid-19, and the ongoing war. Additionally, Zubko (2024) proposed strategies for the development of international trade in Ukraine, offering insights into future directions.

Several studies have also focused on the methodologies used to analyze trade patterns and their economic impacts. Gopalakrishnan, Ciuriak, and Singh (2015) provided a review of models used to quantify mega-regional trade agreements. Harris and Liu (1998) utilized input-output modeling to analyze urban and regional economies, emphasizing the significance of external trade. Jiang et al. (2020) explored methods for improving subnational input-output analyses using regional trade data. Arbolino, Boffardi, and Di Caro (2023) measured regional trade resilience in Italy during crises. Bludova and Savchuk (2017) modeled the economic security of regional external trade flows. Barbero, de Lucio, and Rodríguez-Crespo (2021) measured the impact of COVID-19 on trade flows through government policy responses. Cai (2023) employed a calibrated gravity model to analyze interregional trade. Zhao and Mun (2023) used a panel vector autoregressive model to analyze the impact of the RCEP on intra-industry trade. Khan et al. (2023) used dynamic autoregressive distributed lags model and kernel based regression and examined emissions-adjusted international trade. Kurniawan and A'yun (2022) used an autoregressive distributed lag (ARDL) model to analyze the relationship between export, FDI, and economic growth in Indonesia. Hatipoglu, Considine, and AlDayel (2023) employed a global vector autoregression simulation to study the transnational effects of sanctions. Jafari, Engemann, and Zimmermann (2023) adopted a network perspective in their analysis of food trade and regional trade agreements. Oberhofer and Pfaffermayr (2021) estimated the trade and welfare effects of Brexit using a panel data structural gravity model. Zomchak and Miskiv (2024) used structural equations method.

The application of machine learning techniques in trade analysis has also gained prominence. Blöthner and Larch (2022) revisited the determinants of regional trade agreements using machine learning. Baier and Regmi (2023) utilized machine learning to capture heterogeneity in trade agreements. Kopczewska (2022) discussed the opportunities of spatial machine learning for regional science. Huang et al. (2021) employed a BP neural network approach for regional logistics demand forecasting, and Cheng and Huang (2022) used a deep neural network to analyze regional economic growth factors in the digital economy. Yotov (2022) examined the role of domestic trade flows in estimating the gravity model of trade.

These studies collectively contribute to a broader understanding of the complexities of regional trade, highlighting the importance of considering economic, environmental, and geopolitical factors in the analysis of trade dynamics. They also provide a valuable context for the present study, which focuses on the regional dimensions of Ukraine's foreign trade in goods, offering additional insights into the specific challenges and opportunities faced by the country in its pursuit of enhanced international trade and economic development.

1.2.Export and import in Ukraine

The analysis is based on statistical data regarding regional volumes of foreign trade in goods, provided by the State Statistics Service of Ukraine.

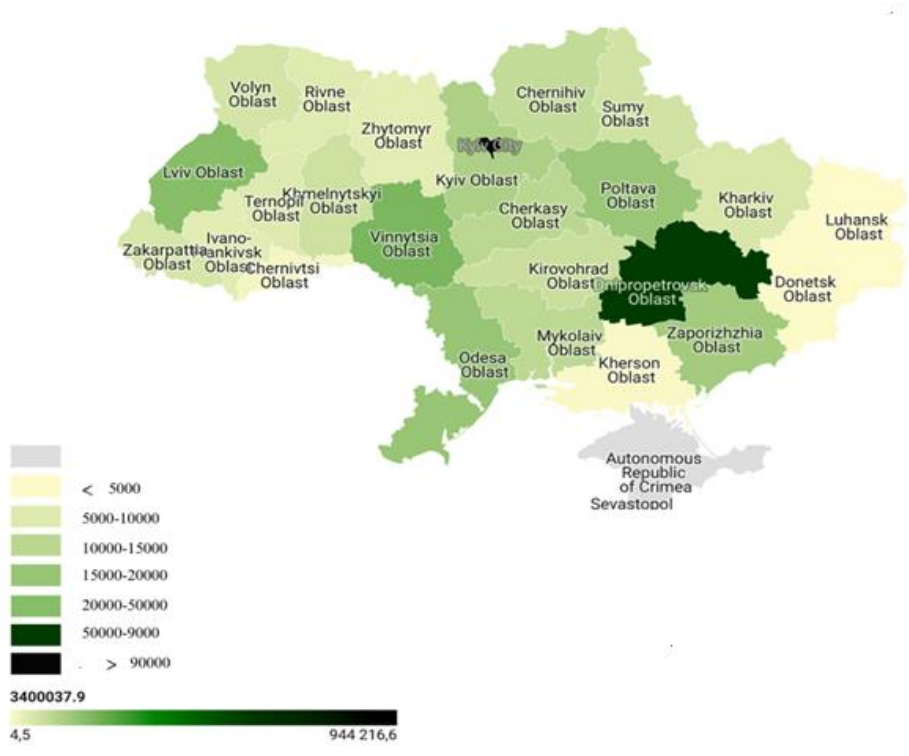
As of January 1, 2024, the total export volume amounted to 3,400,037.91 thousand USD (Customs Service of Ukraine, n.d.). The exported goods can generally be categorized into the following groups: live animals and products of animal origin; products of plant origin; animal or vegetable fats and oils; prepared foodstuffs; mineral products; products of the chemical and related industries; polymeric materials, plastics, and related products; wood and wood products; textile materials and products; footwear, headgear, and umbrellas; articles of stone, gypsum, and cement; natural or cultured pearls, precious and semi-precious stones; base metals and related products; machinery, equipment, and electrical devices; optical and photographic instruments; weapons, ammunition, and their components; various industrial goods; and works of art.

The largest share of exports consists of products of plant origin (37.2%), followed by animal or vegetable fats and oils (15.4%), and prepared foodstuffs (10.1%) (Customs Service of Ukraine, n.d.). This export structure is significantly influenced by the ongoing martial law in Ukraine, as many goods, particularly machinery and equipment, are being redirected for domestic use by the state.

According to the data presented on the map, the highest volume of exported goods originates from Kyiv (28%), followed by the Dnipropetrovsk region (16.7%) (Customs Service of Ukraine, n.d.).

Overall, the structure of regional exports is illustrated in Figure 1.

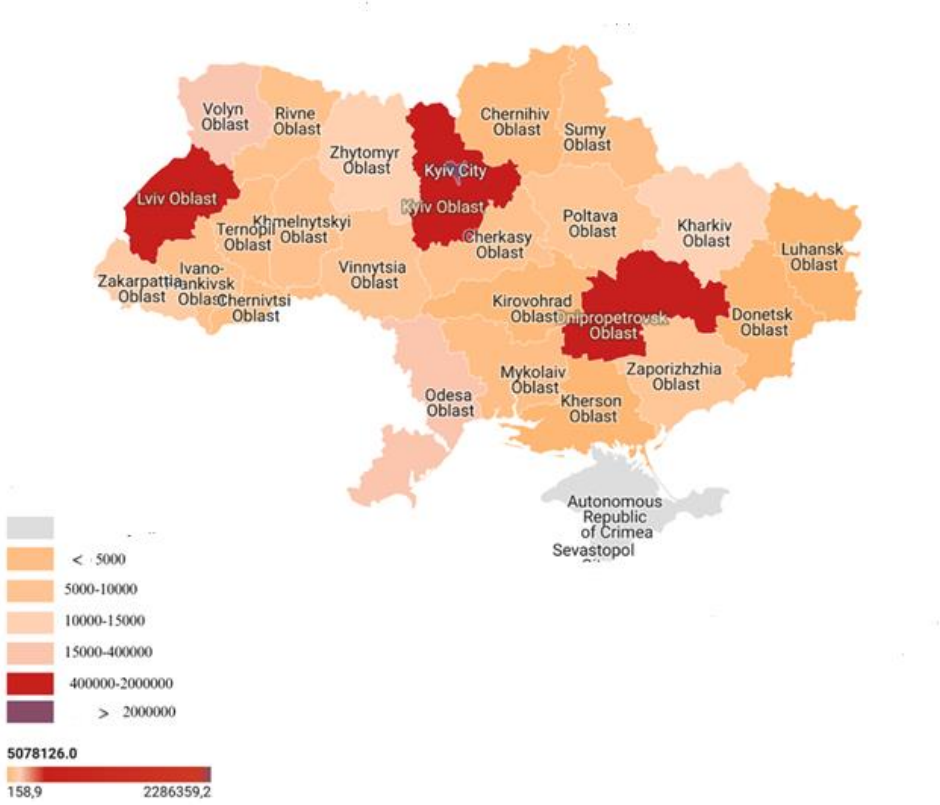
Figure 1. *Regional volumes of goods exports in Ukraine for January 2024*



Source: Developed by the authors based on data from the Customs Service of Ukraine, n.d. and State Statistics Service of Ukraine, n.d.

In terms of imports, the largest categories are machinery, equipment, and mechanical appliances, including electrical devices (19.5%), followed by mineral products (12%) and products from the chemical and related industries (11%) (Customs Service of Ukraine, n.d.). Figure 1.2 illustrates which regions of Ukraine had the highest demand for imported goods in 2024. The leading regions include Kyiv city (45%), Lviv region (9%), and Dnipropetrovsk region (8%).

Figure 2. *Regional volumes of imports of goods in Ukraine for January 2024*



Source: Developed by the authors based on data from the Customs Service of Ukraine, n.d. and State Statistics Service of Ukraine, n.d.

In general, these indicators are influenced by factors such as population size, geographic area, and the level of economic development in each region.

It is also important to examine Ukraine's key trade partners, specifically, the continents with which the country engages in trade and the extent of that cooperation. Relevant data are presented in Tables 1 and 2.

Table 1. *Amount trading partner of Ukraine with continents in exports goods in 2024 (in thousands of US dollars).*

Europe	Asia	America	Africa	Australia and Oceania
1,759	883	108	316	2
EU countries - 1933		CIS countries - 136		

Source: Developed by the authors based on data from the Customs Service of Ukraine, n.d. and State Statistics Service of Ukraine, n.d.

Table 2. *Amount trading partner of Ukraine with continents in imports goods in 2024 (in thousands of US dollars)*

Europe	Asia	America	Africa	Australia and Oceania
2453	1659	324	65	32
EU countries - 2275	CIS countries - 58			

Source: Developed by the authors based on data from the Customs Service of Ukraine and State Statistics Service of Ukraine, n.d.

Ukraine primarily cooperates with Europe and Asia, a trend largely influenced by the country's geographical location. A significant portion of this cooperation consists of imports, which exceed exports by nearly 50%. This imbalance highlights the current inefficiencies in Ukraine's foreign economic activity. The only exception is Africa, where the volume of exported goods is four times higher than the volume of imports.

A comparison of data from Appendix A, which presents statistics for the years 2015 and 2024, reveals a general decline in Ukraine's export volumes, while imports have increased. This trend suggests a deterioration in the country's economic position and a growing dependence on foreign goods. These findings underscore the need to enhance the presence of Ukrainian-produced goods and services in the international market.

METHODOLOGY

To model the external activity of the regions of Ukraine, it is important to analyze the situation that currently exists. It is necessary to compare regions not by one indicator, for example, the balance, but by several that will describe the region from different directions. It is also important to work with the latest data, or by the trend over several years. Such an analysis can be done using a taxonomic or integral assessment (Zomchak, L., & Hakava, S. (2025)).

The first method by which a certain situation can be analyzed is integral estimation. In the initial table X weekend data expressed peculiar for each indicator, in different units measurement. Therefore, it is necessary to calculate the matrix of standardized Z indicators.

The first step is to calculate the average value for each of the criteria. To do this, you can use the formula:

$$\overline{x_i} = \frac{\sum_{j=1}^{m} x_{ij}}{m}, \quad (1)$$

where $\overline{x_i}$is the arithmetic mean value of the criterion,
x_{ij}- value of criterion *i* a certain object research *j* ,
m– number of objects research .

Next The next stage is to calculate the standard deviation for each of the criteria, which is calculated using the formula:

$$\sigma_i = \sqrt{\frac{\sum_{j=1}^{m}(x_{ij}-\overline{x_i})}{m-1}} \quad , \quad (2)$$

where $\bar{x}$is the arithmetic mean value of the criterion,
x_{ij}- value of criterion *i* a certain object research *j*,
m– number of objects research.

These values are needed to calculate the standardized matrix Z. To do this, use the following formula:

$$z_{ij} = \frac{x_{ij}-\overline{x_i}}{\sigma_i}, \quad (3)$$

where $\bar{x}$is the arithmetic mean value of the criterion,
x_{ij}- value of criterion *i* of a certain element *j*,
σ_i– mean square deviation.

Another stage of calculating the integral assessment of the foreign economic activity of the regions of Ukraine is the calculation of partial coefficients, i.e. the matrix K. Assessment comes down to assigning a numerical value level competitiveness.

It should be noted that not all indicators can be converted into partial coefficients in the range (0;1) by dividing by their maximum value, since for stimulating factors the largest value will be the most desirable, and for de-stimulating factors the smallest.

Considering this is necessary distribute all indicators for two groups: stimulating and disincentive factors .

Calculation partial coefficients for disincentive indicators are made as follows:

$$\mathrm{K}_{ij} = \frac{maxz_i - z_{ij}}{maxz_i - minz_i} \quad , \qquad (4)$$

For indicators stimulants The calculation is made using the formula:

$$\mathrm{K}_{ij} = \frac{z_{ij} - minz_i}{maxz_i - - minz_i}, \qquad (5)$$

where $z_{ij}$is the actual value criterion for a certain sample element,
$minz_i$- – minimal value criterion,
$maxz_i$– maximum value criterion.

The final integral score is calculated as the average value for the criteria of each region, that is, according to the formula:

$$\mathrm{I_j} = \frac{\sum_{i=1}^{n} \mathrm{K_{ij}}}{\mathrm{n}} \quad , \qquad (6)$$

where $I_j$is the integral estimate of the jth sample element,
K_{ij}- partial coefficient *i* -th criterion of *j* -th research object,
n– number of criteria.

RESULTS AND DISCUSSION

Each region of Ukraine exhibits varying levels of development, influenced by factors such as geographical location, population size, availability of natural resources, and other indicators. These factors significantly affect the level of foreign economic activity in each region. Assessing the foreign economic activity of Ukraine is a key component in shaping effective economic policy, enhancing competitiveness in the global market, and ensuring the country's sustainable development. Therefore, it is crucial to evaluate the development of foreign economic activity for each region and identify areas where increased state intervention is necessary to support further growth.

In this assessment, both the integral evaluation method and the taxonomic method are used. These methodologies enable equitable comparisons across regions by considering both factors that facilitate and those that hinder development.

Due to the ongoing martial law in Ukraine, data for many indicators in 2024 are unavailable. Consequently, the analysis focuses on the current state in 2024 using the accessible data, alongside a comparative analysis for 2022 and 2015.

For 2024, the following criteria are used to analyze the foreign economic activity of Ukrainian regions:

- Total value of exports of goods and services
- Total value of imports of goods and services
- Number of enterprises authorized to conduct customs brokerage activities
- Number of enterprises authorized to open and operate temporary storage warehouses
- Number of relocated enterprises that have moved to the region

- Consumer price indices

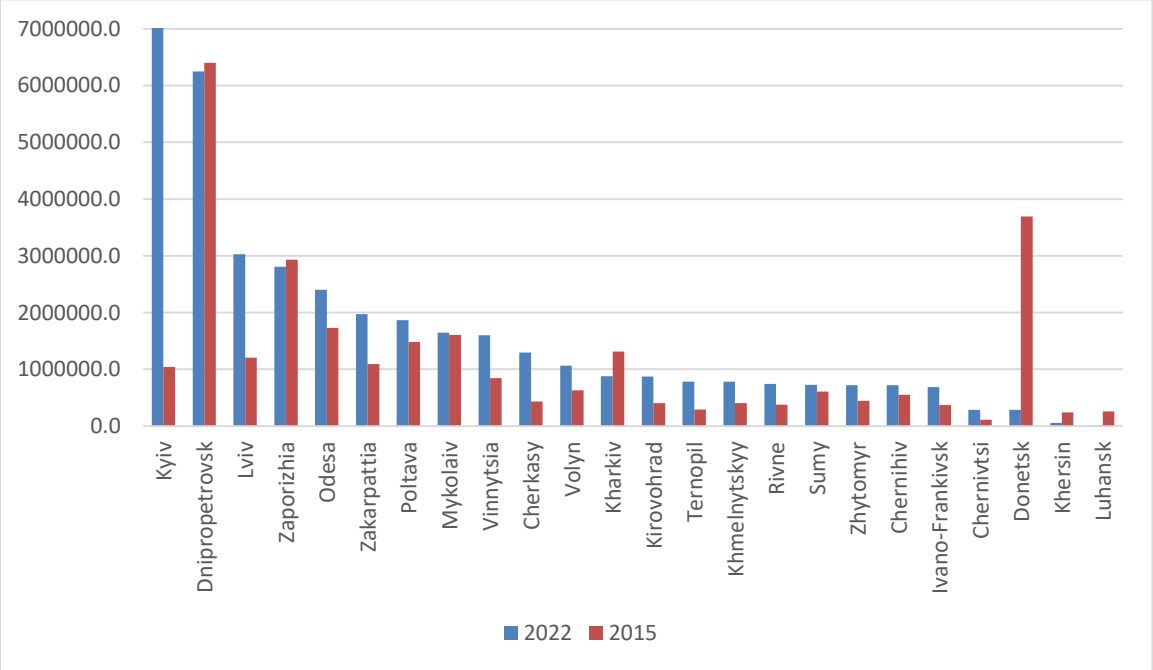
For the years 2022 and 2015, the analysis includes the following indicators:

- Total value of exports of goods and services
- Total value of imports of goods and services
- Number of enterprises authorized to conduct customs brokerage activities
- Number of enterprises authorized to open and operate temporary storage warehouses
- Export volumes by business entities categorized by number of employees
- Consumer price indices
- Capital investments
- Population size
- Import volumes by business entities categorized by number of employees

Data were collected for all 24 regions of Ukraine, with Kyiv included as part of the Kyiv region. The data sources include the State Statistics Service of Ukraine, the National Bank of Ukraine, and the Customs Service of Ukraine.

Since exports and imports are the primary indicators of regional foreign economic activity, it is advisable to track their volumes across the regions. This information is presented in Figures 3 and 4.

Figure3. *Volume of exports of goods and services in 2022 and 2015*



Source: Developed by the authors based on data from the Customs Service of Ukraine, n.d. and State Statistics Service of Ukraine, n.d.

The data on the export of goods of the Kyiv region for 2022 exceed the upper limit and amount to 12,559,421.3 thousand dollars.

From Figures 3 and 4 it can be seen that the highest indicators are in the Kyiv region. This shows the positive development of this region, but imports also have high values, so the situation is ambiguous.

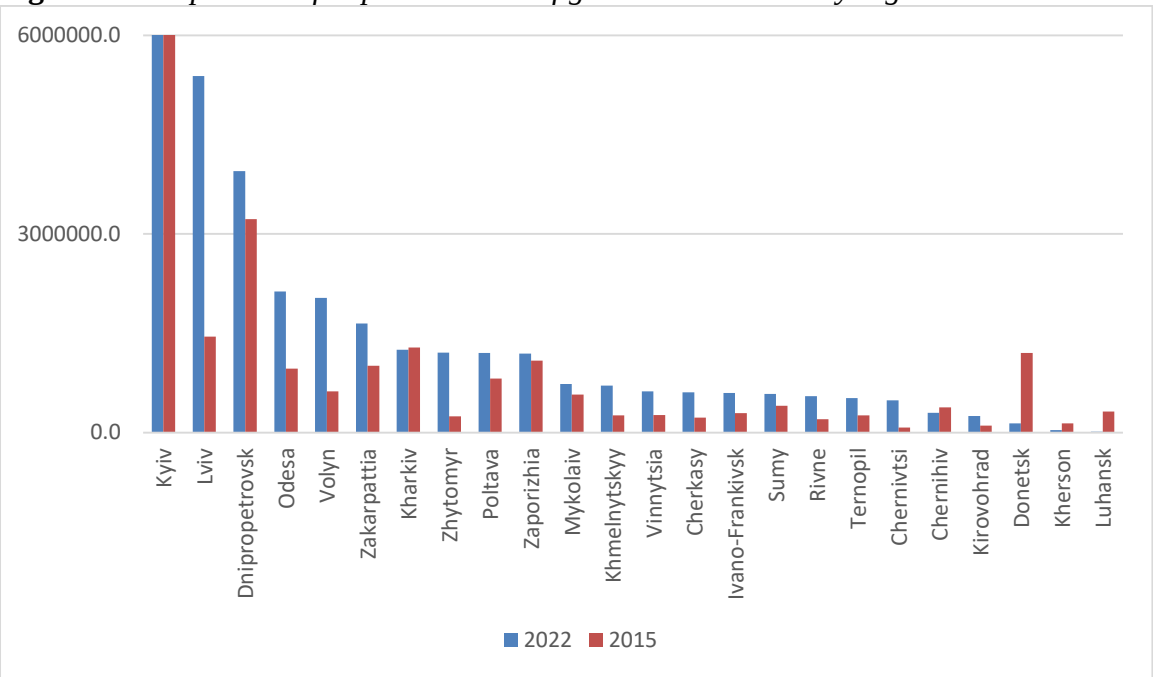
To ensure an accurate assessment of each region, an integral evaluation was carried out using a set of selected criteria, defined as follows:

- Total value of exports of goods and services (X_1)

- Total value of imports of goods and services (X_2)
- Number of enterprises granted permission to conduct customs brokerage activities (X_3)
- Number of enterprises granted permission to open and operate temporary storage warehouses (X_4)
- Number of relocated enterprises that moved to the region (X_5)
- Consumer price index (X_6)

Figure 4 presents a comparison of import volumes of goods and services by region in 2022 and 2015.

Figure4. *Comparison of import volumes of goods and services by regions in 2022 and 2015.*



Source: Developed by the authors based on data from the Customs Service of Ukraine, n.d. and State Statistics Service of Ukraine, n.d.

For the years 2022 and 2015, additional indicators were introduced:

- Total value of exports of goods and services (X_1)
- Total value of imports of goods and services (X_2)
- Number of enterprises granted permission to conduct customs brokerage activities (X_3)
- Number of enterprises granted permission to open and operate temporary storage warehouses (X_4)
- Export volume of goods by business entities, categorized by number of employees (X_5)
- Consumer price index (X_6)
- Capital investments (X_7)
- Population size (X_8)
- Import volume of goods by business entities, categorized by number of employees (X_9)

Using Formula 1, where *m* is the number of regions, average values for each indicator were calculated. The results are as follows:

For 2024: X_1 - 102137.5 , X_2 - 205978.4 , X_3 - 214.6 , X_4 - 7.5 , X_5 - 789.3 , X_6 - 101.0 .

For 2022: X_1 - 1834252.6 , X_2 - 2157382.6 , X_3 - 195.8 , X_4 - 7.0 , X_5 - 930.7 , X_6 - 107.6 , X_7 - 17069.2 , X_8 - 1713768.0 , X_9 - 3880.7 .

For 2015: X_1 - 1185824.2 , X_2 - 1354255.0 , X_3 - 89.6 , X_4 - 1.3 , X_5 - 631.1 , X_6 - 103.1 , X_7 - 10464.8 , X_8 - 1785.2 , X_9 - 985.8 .

The next step involves calculating the standard deviation using Formula 2. The results are presented in Table 3.

Table 3. *Calculated values of the mean square deviation*

	2024	2022	2015
X1	114586.45	2635861.3	1408891.791
X2	541282.39	5151295.573	3418617.903
X3	626.49653	571.5169935	244.01
X4	5.6103876	5.4092	1.6854
X5	1444,408	1088.2	845.27
X6	0.391185	2.9188	0.4634
X7		34519	20272.45133
X8		1030460.687	1035.7
X9		4153.593422	1937.3

Source: calculated by the authors

Since the values of each criterion are expressed in different units of measurement, the matrix of criterion values (X) was standardized to create matrix Z. Standardization was performed using Formula 3, which incorporates the calculated average and root mean square values.

An important consideration in the assessment process is that some criteria reflect a region's development positively when their values are higher, while others have a negative impact. Therefore, the set of criteria is divided into stimulating and destimulating indicators.

For 2024, the stimulating criteria include: X_1, X_3, X_4, and X_5, while the destimulating criteria are X_2 and X_6.

For 2022 and 2015, the stimulating criteria are: X_1, X_3, X_4, X_5, X_7, and X_8, and the destimulating ones are: X_2, X_6, and X_9.

Accordingly, the reference vector for 2024 is:

p = (+, −, +, +, +, −)

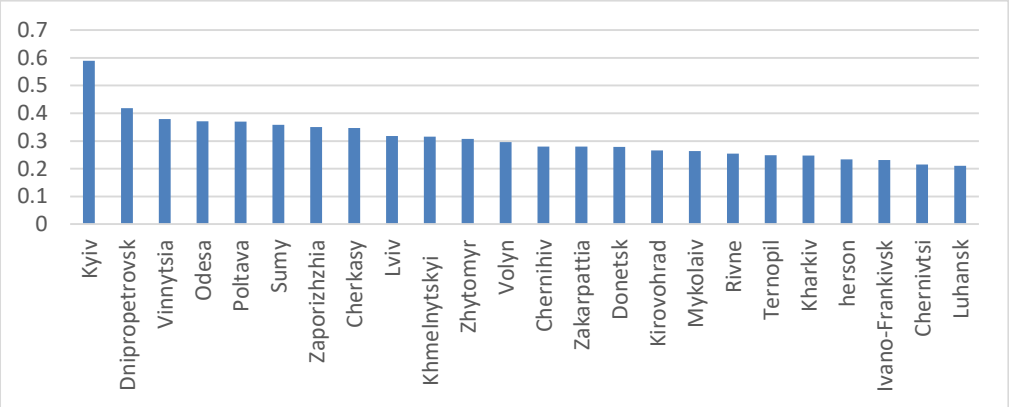
And for 2022 and 2015:

p = (+, −, +, +, +, −, +, +, −)

The next step in calculating the integral assessment of foreign economic activity in Ukraine's regions is the computation of partial coefficients, forming matrix K. At this stage, Formula (1.4) is applied to stimulating criteria, while Formula (5) is used for destimulating criteria.

The final step is the calculation of the integral assessment, obtained as the arithmetic mean of the partial coefficient values (matrix K) for each region. The results are illustrated in Figures 5-7.

Figure 5. *The value of the integrated assessment of regions for 2024*



Source: Calculated by the authors

Based on the data presented in Figures 5–7, it is possible to analyze regional development trends, track the growth or decline of the integral assessment for individual regions, and evaluate the overall situation in the country.

To facilitate this analysis, the regions are classified into five categories based on their integral assessment scores:

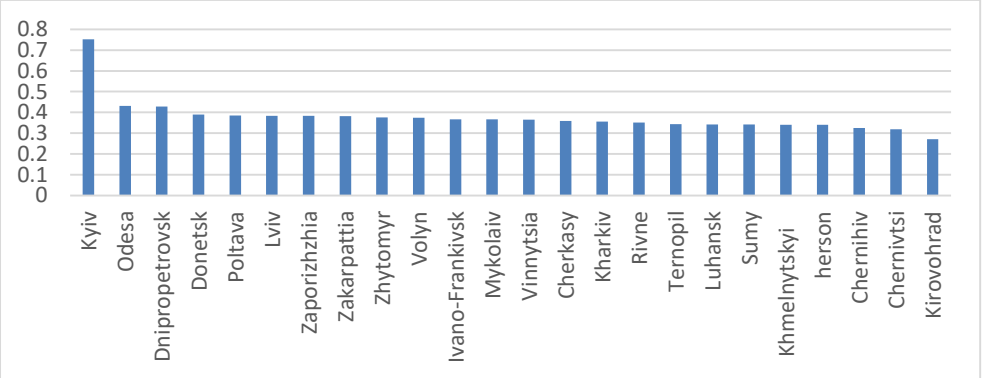
- First class – regions with an integral score of 0.6 and above
- Second class – score within the range [0.5–0.6)
- Third class – score from 0.4 to 0.5 inclusive
- Fourth class – score within the range [0.3–0.39]
- Fifth class – regions with an integral score below 0.3

According to the data for 2024, no region falls into the first class. The second class includes only the Kyiv region. The Dnipropetrovsk region is classified in the third class. Regions such as Vinnytsia, Odesa, Poltava, Sumy, Zaporizhia, Cherkasy, Lviv, Khmelnytskyi, Zhytomyr, and Volyn demonstrate average performance and are therefore assigned to the fourth class. All remaining regions are placed in the fifth class.

It is noteworthy that the Kyiv region demonstrates the highest score, with a gap of nearly 0.2 compared to other regions. This reflects its relatively high level of economic development and active participation in foreign economic activity.

In general, the overall situation in the country is not favorable. The average integral assessment score for Ukraine in 2024 is 0.309, indicating a low level of development in the sphere of foreign economic activity. This outcome is primarily attributed to the ongoing state of war.

Figure 6. *The value of the integrated assessment of regions for 2022*



Source: Calculated by the authors

For 2022 it is slightly better.

In 2022, there is an oblast that belongs to the first group – Kyiv. Its integral score is 0.6. There are no oblasts in the second class.

The third class includes the Odesa and Dnipropetrovsk regions.

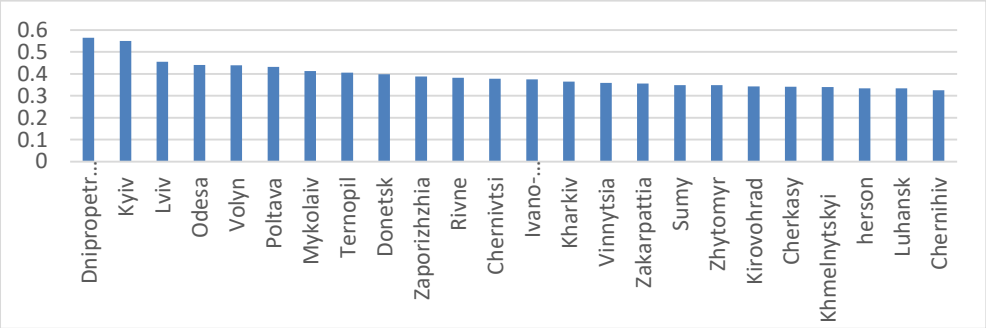
All the rest, except Kirovohrad region, belong to the fourth class. Kirovohrad region, whose integral indicator is 0.27, belongs to the fifth class.

The average value of the integral indicator for all regions of Ukraine is 0.38.

In 2015, no region was included in the first class of regions. Dnipropetrovsk and Kyiv have the highest values, 0.57 and 0.55 respectively, so they belong to the second class. The third class includes 7 regions: Lviv, Odesa, Volyn, Poltava, Mykolaiv, Ternopil and Donetsk. All other regions are classified as class 4. Regions critical fifth- grade students in this year. The average value for all regions is 0.39.

Overall, the trend is downward. The best situation for the country as a whole was in 2015, the worst in 2024. The score fell by 0.09, which indicates the need to improve the foreign economic activity of Ukraine's regions.

Figure 7. *The value of the integrated assessment of regions for 2015*



Source: Calculated by the authors

If we analyze specific regions, we can see that Kyiv region was in second position in 2015, and in 2022 and 2024 it is leading. In 2022, it is the only one that entered the first class. In the remaining regions, such dynamics are not observed.

CONCLUSIONS

This study offers a comprehensive regional integral assessment of Ukrainian foreign trade, meticulously analyzing the shifts in its export and import landscape. Our findings underscore significant disparities in regional performance, with Kyiv and Dnipropetrovsk consistently exhibiting higher trade activity. This concentration reflects an uneven distribution of economic development and participation in international trade across Ukraine, echoing broader regional imbalances observed in contexts like ASEAN countries (Nurjannah et al., 2023). These regional differences are crucial, as they highlight the potential for spatial spillover effects, where the economic vitality or decline of dominant regions can influence the trade performance of neighboring or less developed areas. Understanding these spillover mechanisms is key to fostering more balanced national development.

The analysis further highlights the profound geopolitical impact of ongoing martial law on Ukraine's foreign trade structure and volume. The observed shifts in exports, particularly the redirection of key goods like machinery and equipment towards domestic use and a general decline in overall export volumes, demonstrate the severe challenges posed by the current security situation.

This aligns with Vdovyn and Zomchak's (2022) examination of the war's impact on Ukraine's services exports, reinforcing the notion of widespread disruption. Concurrently, the increasing reliance on imports, predominantly from Europe and Asia, raises concerns about Ukraine's economic vulnerability. This trend resonates with broader discussions on international trade policies and markets (Qose & Dibra, 2023), emphasizing the need to strengthen domestic production capabilities to mitigate future risks and enhance national resilience.

Our integral assessment methodology proved effective in providing a nuanced understanding of regional foreign economic activity. By considering a range of indicators, including export-import volumes, customs operations, and broader economic factors, this approach offers a more holistic evaluation than traditional single-indicator analyses. This innovative methodology builds upon established approaches for analyzing urban and regional economies, such as input-output modeling, but extends it by integrating a broader set of indicators relevant to crisis conditions. The assessment results underscore an urgent need for targeted interventions to improve the foreign economic performance of less developed regions, which are particularly susceptible to negative spatial spillover effects, and to enhance Ukraine's overall competitiveness in the global market.

The comparative analysis of trade data from 2015, 2022, and 2024 reveals a concerning downward trend in Ukraine's foreign trade performance. The deterioration in the country's integral assessment score, particularly amidst ongoing challenges, aligns with the high risks identified for Ukraine's external sector (Lukianenko, Pokydko, & Tokarchuk, 2022). Addressing these challenges is paramount for mitigating the negative economic consequences of the current crisis and laying the foundation for sustainable recovery and growth. This reinforces the importance of proactive measures like those suggested by Zubko (2024) for the development of international trade in Ukraine.

In summary, this research emphasizes the critical importance of enhancing Ukraine's foreign economic activity and expanding its presence in international markets. Our findings call for a multifaceted approach encompassing policy reforms, targeted regional development strategies that account for spatial spillover economic effects, and robust support for domestic industries. This study contributes new insights by offering a detailed, regionally-disaggregated assessment within the context of war. Our use of an integral assessment methodology provides a unique comparative lens, highlighting specific disparities and trends crucial for navigating current difficulties and paving the way for a more resilient and prosperous future.

REFERENCES

1. Arbolino, R., Boffardi, R., & Di Caro, P. (2023). Measuring and Exploring Regional Trade Resilience in Italy During Different Crises. Italian Economic Journal, 9(3), 1027-1047. https://doi.org/10.1007/s40797-023-00250-6
2. Baier, S. L., & Regmi, N. R. (2023). Using machine learning to capture heterogeneity in trade agreements. Open Economies Review, 34(4), 863-894. https://doi.org/10.1007/s11079-022-09685-3
3. Barbero, J., de Lucio, J. J., & Rodríguez-Crespo, E. (2021). Effects of COVID-19 on trade flows: Measuring their impact through government policy responses. PloS one, 16(10), e0258356. https://doi.org/10.1371/journal.pone.0258356
4. Blöthner, S., & Larch, M. (2022). Economic determinants of regional trade agreements revisited using machine learning. Empirical Economics, 63(4), 1771-1807. https://doi.org/10.1007/s00181-022-02203-x
5. Bludova, T., & Savchuk, N. (2017). Modelling the Economic Security of Regional External Trade Flows. Baltic Journal of Economic Studies, 3(5), 19-24. https://doi.org/10.30525/2256-0742/2017-3-5-19-24

6. Cai, M. (2023). A calibrated gravity model of interregional trade. Spatial Economic Analysis, 18(1), 89-107. https://doi.org/10.1080/17421772.2022.2081715
7. Cheng, C., & Huang, H. (2022). Evaluation and analysis of regional economic growth factors in digital economy based on the deep neural network. Mathematical Problems in Engineering, 2022(1), 1121886. https://doi.org/10.1155/2022/1121886
8. Customs Service of Ukraine (n.d.) Retrieved February 1, 2025, from https://customs.gov.ua/en/
9. Dai, S., Tang, D., Li, Y., & Lu, H. (2025). Digital trade, trade openness, FDI, and green total factor productivity. International Review of Financial Analysis, 97, 103777. https://doi.org/10.1016/j.irfa.2024.103777
10. Harris, R. I., & Liu, A. (1998). Input-output modelling of the urban and regional economy: the importance of external trade. Regional studies, 32(9), 851-862. https://doi.org/10.1080/00343409850118004
11. Hatipoglu, E., Considine, J., & AlDayel, A. (2023). Unintended transnational effects of sanctions: A global vector autoregression simulation. Defence and Peace Economics, 34(7), 863-879. https://doi.org/10.1080/10242694.2022.2073429
12. He, C., Li, J., Wang, W., & Zhang, P. (2024). Regional resilience during a trade war: The role of global connections and local networks. Journal of World Business, 59(5), 101567. https://doi.org/10.1016/j.jwb.2024.101567
13. Hilpert, H. G. (2025). The Regional Comprehensive Economic Partnership Agreement and Europe: Impact and Implications. In Political Economy of East Asian Economic Integration (pp. 164-195). Routledge. https://doi.org/10.4324/9781032624044-9
14. Huang, L., Xie, G., Zhao, W., Gu, Y., & Huang, Y. (2021). Regional logistics demand forecasting: a BP neural network approach. Complex & Intelligent Systems, 1-16. https://doi.org/10.1007/s40747-021-00297-x
15. Jafari, Y., Engemann, H., & Zimmermann, A. (2023). Food trade and regional trade agreements–A network perspective. Food Policy, 119, 102516. https://doi.org/10.1016/j.foodpol.2023.102516
16. Jiang, M., Liu, L., Behrens, P., Wang, T., Tang, Z., Chen, D., ... & Zhu, B. (2020). Improving subnational input–output analyses using regional trade data: a case-study and comparison. Environmental Science & Technology, 54(19), 12732-12741. https://doi.org/10.1021/acs.est.0c04728
17. Khan, Z., Badeeb, R. A., Hassan, T., Zhang, C., & Elfaki, K. E. (2023). Emissions-Adjusted International Trade for Sustainable Development in China: Evidence from dynamic autoregressive distributed lags model and kernel based regression. Sustainable Development, 31(1), 379-392. https://doi.org/10.1002/sd.2398
18. Kopczewska, K. (2022). Spatial machine learning: new opportunities for regional science. The Annals of Regional Science, 68(3), 713-755. https://doi.org/10.1007/s00168-021-01101-x
19. Kryvenko, N. V. (2021). Regional trade agreements of Ukraine: Realities and prospects. Scientific Bulletin of Mukachevo State University. Series "Economics, 8(2), 56-81. https://doi.org/10.52566/msu-econ.8(2).2021.56-81
20. Kurniawan, M. L. A., & A'yun, I. Q. (2022). Dynamic Analysis On Export, FDI and Growth in Indonesia: An Autoregressive Distributed Lag (ARDL) Model. Journal of Economics, Business, & Accountancy Ventura, 24(3), 350-362. https://doi.org/10.14414/jebav.v24i3.2717
21. Lukianenko, I., Pokydko, A., & Tokarchuk, T. (2022). Ensuring the sustainability of the external sector of Ukraine in the conditions of high risks. Scientific Papers NaUKMA, Ecinomics, 7(1), 68-78. https://doi.org/10.18523/2519-4739.2022.7.1.68-78
22. Mulligan, H., Schall, B. J., Davis, T., & Coulter, A. A. (2023). Opportunities for regional collaboration and prevention: Assessing the risk of the live bait trade as a pathway of invasive species. Biological Conservation, 287, 110342. https://doi.org/10.1016/j.biocon.2023.110342

23. Murshed, M., Ahmed, R., Kumpamool, C., Bassim, M., & Elheddad, M. (2021). The effects of regional trade integration and renewable energy transition on environmental quality: Evidence from South Asian neighbors. Business Strategy and the Environment, 30(8), 4154-4170. https://doi.org/10.1002/bse.2862
24. Narayanan Gopalakrishnan, B., Ciuriak, D., & Singh, H. (2015). Quantifying the mega-regional trade agreements: a review of the models. Chapter, 3, 93-131. https://doi.org/10.2139/ssrn.2611025
25. National Bank of Ukraine (n.d.) Retrieved February 1, 2025, from https://bank.gov.ua/en/#
26. Nurjannah, N., Masbar, R., Majid, M. S. A., & Suriani, S. (2023). Inter-regional trade and economic growth of ASEAN low middle income: Are corruption control and HDI important?. Cogent Economics & Finance, 11(2), 2230733. https://doi.org/10.1080/23322039.2023.2230733
27. Oberhofer, H., & Pfaffermayr, M. (2021). Estimating the trade and welfare effects of Brexit: A panel data structural gravity model. Canadian Journal of Economics/Revue canadienne d'économique, 54(1), 338-375. https://doi.org/10.1111/caje.12494
28. Park, I. (2020). Regional trade agreements in East Asia: Past and future. Development Policy Review, 38(2), 206-225. https://doi.org/10.1111/dpr.12418
29. Qose, E., & Dibra, R. (2023). International trade policies and markets. Agora International Journal of Economical Sciences, 17(2), 137-141. https://doi.org/10.15837/aijes.v17i2.6451
30. Sirenko, P., Balian, I., Martyniak, I., Malakhova, T., & Bakushevych, I. (2024). The relationship between international trade relations and regional development: a comprehensive analysis and assessment of influencing factors. Multidisciplinary Science Journal, 6. https://doi.org/10.31893/multiscience.2024ss0220
31. State Statistics Service of Ukraine (n.d.) Retrieved February 1, 2025, from https://stat.gov.ua/en
32. Studnicka, Z., Thierie, W., & Van Hove, J. (2019). The impact of regional trade agreements on European exports. International Economics and Economic Policy, 16, 467-488. https://doi.org/10.1007/s10368-019-00436-3
33. Vdovyn, M., & Zomchak, L. (2022). Export in services of Ukraine: pre-pandemic period, Covid-19 and war. Věda a perspektivy, 8(15), 48-57. https://doi.org/10.52058/2695-1592-2022-8(15)-48-57
34. Yotov, Y. V. (2022). On the role of domestic trade flows for estimating the gravity model of trade. Contemporary Economic Policy, 40(3), 526-540. https://doi.org/10.1111/coep.12567
35. Zhao, G., & Mun, C. J. (2023). The impact of the regional comprehensive economic partnership (RCEP) on intra-industry trade: an empirical analysis using a panel vector autoregressive model. Journal of Korea Trade, 27(3), 103-118. https://doi.org/10.35611/jkt.2023.27.3.103
36. Zomchak, L., & Hakava, S. (2025). Unveiling Disparities and Resilience in Ukrainian Regional Labor Markets: Multidimensional Ranking Approach. In Developments in Information and Knowledge Management Systems for Business Applications: Volume 8 (pp. 495-516). Cham: Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-80935-4_23
37. Zomchak, L., & Klochnyk, O. (2023). External sector of Ukraine: tendencies, determinants and interdependencies between indicators. Customs Scientific Journal, 1, 62-69. https://doi.org/10.32782/2308-6971/2023.1.7
38. Zomchak, L., & Miskiv, D. (2024). Structural model of Ukrainian economic performance: interactions between GDP and industrial output. Smart-economy, Entrepreneurship and Security, *2*(2), 7-16. https://doi.org/10.60022/sis.2.2-1
39. Zubko, T. (2024). Strategies for the development of inernational trade in Ukraine. Agora International Journal of Economical Sciences, 18(1), 250-261. https://doi.org/10.15837/aijes.v18i1.6727