UDC 339.564
JEL: F13; F19; L60; P42
DOI: https://doi.org/10.32983/2222-4459-2025-11-280-288

ANALYZING THE INTERRELATIONS BETWEEN INNOVATIVE DEVELOPMENT AND EXPORT-IMPORT ACTIVITIES OF THE REGIONS OF UKRAINE

©2025 KUPRIIANOV V. M.

UDC 339.564
JEL: F13; F19; L60; P42

Kupriianov V. M. Analyzing the Interrelations between Innovative Development and Export-Import Activities of the Regions of Ukraine

The article highlights the relevant issue of innovative development in Ukraine's export-import activities amid structural transformations of the national economy, increasing foreign policy challenges, and the need for post-war recovery. The aim of the article is to refine the definition of strategizing innovative development for export-import activities, to examine the interrelations between innovative development and export-import activities, and to analyze the impact of industrial enterprises' innovative activities on the efficiency of regional export-import activities. As a result of the study, a refined definition of strategizing innovative development for export-import activities is proposed. An analysis was conducted of the interrelations between the indicators of innovative development of industrial enterprises and the export-import activities of 23 regions of Ukraine for 2020–2024. A cluster analysis confirmed the significant heterogeneity of innovative development across regions. As a result of canonical correlation analysis, no statistically significant relationship was found between groups of indicators of innovative development and export-import activities in most clusters. Along with this, using multifactor regression analysis, a statistically significant impact of innovation development indicators on export-import performance in specific clusters and years has been identified: an increase in innovation development indicators promotes growth in growth in exports and imports volumes as well as the import coverage ratio, while a negative impact of innovation development indicators can be explained by the delayed effect of innovations on export-import efficiency and by the consideration that, during wartime, industrial innovations are directed towards defense needs and production adaptation. Therefore, in further studies, it is appropriate to conduct an analysis of dynamic econometric models with lagged variables to assess the impact of the delayed effect of innovations. The practical significance of the conducted analysis of the interrelations between innovative development and the export-import activities of Ukrainian regions lies in identifying the features and directions of these interrelations using econometric methods.

Keywords: *innovation strategizing, innovative development of regions, strategic planning of innovative development, export-import activities, indicators of innovative development.*
Tabl.: *5.* ***Bibl.:*** *23.*

Kupriianov Vladyslav M. *– Postgraduate Student of the Department of Economic and Mathematical Modeling, Simon Kuznets Kharkiv National University of Economics (9a Nauky Ave., Kharkiv, 61166, Ukraine)*
E-mail: *kupriianovvladyslav@gmail.com*

УДК 339.564
JEL: F13; F19; L60; P42

Купріянов В. М. Аналіз взаємозв'язків між інноваційним розвитком та експортно-імпортною діяльністю регіонів України

У статті висвітлено актуальну проблему інноваційного розвитку експортно-імпортної діяльності України в умовах структурних трансформацій національної економіки, посилення зовнішньополітичних викликів та необхідності повоєнного відновлення. Метою статті є уточнення визначення стратегування інноваційного розвитку експортно-імпортної діяльності, дослідження взаємозв'язків між інноваційним розвитком та експортно-імпортною діяльністю, а також аналіз впливу інноваційної діяльності промислових підприємств на ефективність експортно-імпортної діяльності регіонів. У результаті дослідження запропоновано уточнене визначення стратегування інноваційного розвитку експортно-імпортної діяльності. Здійснено аналіз взаємозв'язків між показниками інноваційного розвитку промислових підприємств та експортно-імпортної діяльності 23 регіонів України за 2020–2024 рр. Кластерний аналіз підтвердив суттєву неоднорідність інноваційного розвитку регіонів. У результаті аналізу канонічних кореляцій не виявлено статистично значущого зв'язку між групами показників інноваційного розвитку та експортно-імпортної діяльності в більшості кластерів. Водночас за допомогою багатофакторного регресійного аналізу визначено статистично значущий вплив показників інноваційного розвитку на показники експортно-імпортної діяльності в окремих кластерах і роках: зростання показників інноваційного розвитку сприяє збільшенню обсягів експорту, імпорту та коефіцієнта покриття імпорту експортом, а негативний вплив показників інноваційного розвитку може пояснюватися відкладеним ефектом впливу інновацій на ефективність експортно-імпортної діяльності та тим, що в умовах війни інновації в промисловості спрямовані на оборонні потреби та адаптацію виробництва. Тому в подальших дослідженнях є доцільним проводити аналіз динамічних економетричних моделей з лаговими змінними для оцінки впливу відкладеного ефекту інновацій. Практична значимість проведеного аналізу взаємозв'язків між інноваційним розвитком та експортно-імпортною діяльністю регіонів України полягає у визначенні особливостей і напрямків взаємозв'язків за допомогою економетричних методів.

Ключові слова: *інноваційне стратегування, інноваційний розвиток регіонів, стратегування інноваційного розвитку, експортно-імпортна діяльність, показники інноваційного розвитку.*
Табл.: *5.* ***Бібл.:*** *23.*

Купріянов Владислав Михайлович *– аспірант кафедри економіко-математичного моделювання, Харківський національний економічний університет імені Семена Кузнеця (просп. Науки, 9а, Харків, 61166, Україна)*
E-mail: *kupriianovvladyslav@gmail.com*

In the context of structural transformations of the national economy and increasing foreign policy challenges, innovative development becomes a key factor in enhancing competitiveness and ensuring Ukraine's economic resilience. Transitioning from a raw-material export model to one based on innovation and high added value requires a strategic approach to managing the innovative development of export-import activities at all levels of the economy. The relevance of studying the innovative development of export-import activities lies in its impact on improving efficiency, stimulating the growth of high-tech exports, and reducing dependence on imports of high-value-added products. At the same time, the absence of a systematic approach to coordinating innovation and export-import activities slows down the process of technological modernization and post-war recovery in Ukraine. The aim of the article is to refine the definition of strategic planning for the innovative development of export-import activities, to examine the interconnections between innovative development and export-import operations, and to analyze the impact of industrial enterprises' innovative activities on the efficiency of regional export-import activities. The practical significance of the study lies in identifying the characteristics and directions of these interconnections, which strengthens the theoretical foundations of innovative development in export-import activities and supports the formation of rational managerial decisions for creating innovative strategies aimed at enhancing the efficiency of enterprises' export-import activities.

The issues of innovative development in export-import activities, as well as the challenges of its strategizing, have been examined in the works of such scholars as P. P. Mykytiuk, Zh. L. Krysko, O. F. Ovsianiuk-Berdadina, S. M. Skochylias [1], V. S. Ponomarenko, L. M. Malyarets, I. O. Barannik, Yu. S. Balyuk, N. M. Vnukova, L. A. Norik, O. S. Budarin [2–5], S. Yu. Sokoliuk [6], R. V. Yankovoi [7], O. M. Lutskiv, R. M. Bilan [8], M. Yu. Slynko [9], O. O. Yastremska [10]. Despite a significant number of scientific studies, the problematics of innovative strategizing of export-import activities remains insufficiently explored. Therefore, it is appropriate to clarify the definition of strategizing the innovative development of export-import activities and to study the interconnection between innovation and export-import activities.

P. P. Mykityuk, Zh. L. Krysko, O. F. Ovsianiuk-Berdadina, S. M. Skochylias define the innovative development of export-import activities of business entities as an irreversible, purposeful, and regular change in the state of this activity to a new qualitative and quantitative level, determined by innovations in the effective use of the export-import potential of these business entities [1].

S. Yu. Sokoliuk affirms that innovative development is a key component of the activities of enterprises of any form of ownership, which, aimed at improving the efficiency of their functioning, facilitates changes in the composition and structure of business entities over time [6].

R. V. Yankovoi views innovative enterprise strategy as a system of institutionally organized innovation processes for the generation, development, and commercialization, which creates the conditions for the effective functioning of domestic businesses through adaptive development, combining intellectual, financial, production, organizational, technological, and information-digital capabilities to ensure long-term competitiveness [7].

In the context of export-import activities, innovative strategizing gains particular importance, as it defines the directions for integrating innovations into export-import processes, ensures export growth, reduces dependence on imported high-tech products, and contributes to enhancing competitiveness and strengthening economic resilience. By analyzing approaches to defining the essence of innovation strategizing and the innovative development of export-import activities, and drawing on our own previous research, it is advisable to clarify the definition of the concept of innovation development strategizing specifically for export-import activities [11; 12]. Thus, innovation development strategizing in export-import activities is a type of strategizing aimed at ensuring new, technological, and non-traditional pathways for the development of export-import activities, which entails making rational managerial decisions on the formulation and development of strategies through the full utilization of export-import potential with the goal of achieving strategic objectives, building long-term sustainable competitive advantage, and enhancing the efficiency of export-import activities.

The full-scale war has transformed Ukraine's export-import landscape, causing the loss of a significant part of production, logistics, and port infrastructure, as well as structural changes in export-import flows. The blockade of seaports and the reduction of traditional markets have led to a strategically important pivot toward European Union countries. At the same time, the war has acted as a catalyst for innovation in key sectors – defense technologies, digital supply chain management platforms, and energy-efficient and logistical innovations are actively developing. Rising logistics costs and infrastructure constraints negatively affect the export of raw materials, encouraging the development of high-tech industries capable of maintaining profitability through higher added value [2].

According to the World Intellectual Property Organization (WIPO), Ukraine's position in the Global Innovation Index (GII) declined from 45th to 60th place among 133 countries between 2020 and 2024. However, in terms of innovation performance relative to GDP, Ukraine shows results above expectations, which indicates the country's capacity to effectively transform limited resources into innovative outcomes. A distinctive feature of Ukraine's innovation profile is the asymmetry between «innovation resource input», where the country ranks 78th, and «innovation resource output», which ranks 54th in 2024. This gap points to the high adaptability of the private sector and human capital, which can partially offset the weaknesses of the institutional environment. Thus, although Ukraine's overall ranking in the GII is declining, its innovation performance demonstrates potential that can be realized through strengthened institutional capacity, investments in science, and efficient strategic planning for the innovation-driven development of export-import activities [12].

The Economic Complexity Index (ECI) is also used to evaluate innovation development, serving as an indicator of the country's technological and production capabilities. Unlike the GII, which primarily emphasizes innovation potential (institutional conditions, education, R&D), the ECI reflects realized outcomes – that is, the country's ability to produce and export complex, high-tech products. In Ukraine, there is a negative trend in the Economic Complexity Index: from 60th place in 2019 to 63rd in 2023. Despite a short-term improvement in 2021–2022 (58th place), recent years' trend reflects a narrowing technological base of exports and the dominance of raw materials. Thus, the existing innovation potential, according to the GII, has so far not contributed to the growth of high-tech exports, underscoring the need for strategic planning of innovation development in export-import activities [14].

Another important indicator of a country's innovation development is the Global Talent Competitiveness Index (GTCI), which evaluates the ability of countries to develop, attract, and retain human capital [8]. From 2019 to 2023, Ukraine's positions on this indicator remained stable within the range of 61st–66th place among over 130 countries worldwide (64th place in 2023) [15].

According to UN data on digital and sustainable trade facilitation, Ukraine is demonstrating gradual improvements in trade facilitation mechanisms, particularly through the digitalization of customs procedures. In 2025, the overall trade facilitation index was 60.22%, which corresponds to the level of 2023–2021, but significantly exceeds the figures of 2015 (27.96%) and 2017 (43.01%). The highest results were recorded in the areas of «Transparency» (73.33%), «Formality» (66.67%), and «Institutional Coordination» (66.67%). The low score in the area of «Cross-Border Paperless Trade» (33.33%) indicates a limited level of integration of digital solutions into international trade processes. The implementation of tools such as the «single window» is an example of process innovations that directly impact the efficiency of export-import operations, reducing customs clearance time and lowering trade costs [16].

According to the UNCTAD Technology and Innovation Report, which assesses countries' readiness to implement advanced technologies (artificial intelligence, the Internet of Things, green hydrogen, etc.), Ukraine's position in 2023 has declined – 58th place compared to 53rd in 2021. The highest results were recorded for skills (42) and research and development (R&D – 49). At the same time, low positions in industrial development (85) and innovation financing (114) reflect limitations in converting technological ideas into commercial solutions [17].

An important indicator of innovative entrepreneurship development is the Global Startup Ecosystem Index, which evaluates the maturity of a country's startup ecosystem across three components – level of activity (number of startups, hubs, investors, etc.), quality – the impact and success of startups (international achievements, scaling), and the business environment's supportiveness for startup development [18]. According to StartupBlink, in 2025 Ukraine moved up to 42nd place, improving its position by four spots compared to the previous year. The index growth of 26.2% is the highest among countries ranked 41st to 50th, indicating a recovery of entrepreneurial activity even during wartime. Total investment in startups in 2024 amounted to USD 13.9 million, and the Ukrainian ecosystem demonstrates notable resilience due to a high concentration of technical talent and an entrepreneurial culture. The city of Kyiv retains its status as the country's main innovation hub, ranking 68th among cities globally and showing the highest growth (+7 positions). Particularly strong results were observed in the VR/AR sector (25th worldwide, 4th in Eastern Europe), as well as in the SaaS sector, where Ukraine ranks 17th globally. Along with this, other cities, in particular Lviv, show negative trends, indicating a high concentration of innovation activity in the capital and uneven development of regional ecosystems (*Tbl. 1*) [19].

Recognizing the challenges of a raw-source-based economic model, the Ministry of Economy of Ukraine, in cooperation with leading international partners such as the World Bank, the Organization for Economic Co-operation and Development (OECD), and the United Nations Industrial Development Or-

Table 1

Cities of Ukraine in the Global Startup Ecosystem Index in 2025

No.	City	Position in Global ranking (2025)	Position 2025 vs 2024	Overall score	Annual ecosystem growth, %	Leading industry (Global ranking)
1	Kyiv	68	+7	11.996	+24.7	VR/AR (25)
2	Lviv	404	–7	0.923	+9.5	–
3	Kharkiv	618	–19	0.379	+15.2	–
4	Odesa	725	–43	0.265	+1.6	–
5	Dnipro	1062	–93	0.118	–6.0	–
6	Ternopil	1094	–132	0.111	–14.4	–
7	Zaporizhzhia	1336	–156	0.060	–12.4	–
8	Vinnytsia	1390	–	0.050	–	–
9	Chernivtsi	1426	–177	0.050	–14.1	–

ganization (UNIDO), is developing a new industrial strategy. The document is scheduled to be finalized by the end of 2025, with its implementation planned for the period 2026–2030. The main aim of the strategy is to shift from crisis measures to sustainable economic growth. This involves creating a competitive, innovative, and export-oriented industrial ecosystem, closely integrated into global value chains, with a particular emphasis on strengthening cooperation with the EU market. The strategy is directly aimed at addressing key structural challenges: «technological backwardness' and the «raw-source-dependent economy». Among the key tasks are implementing «smart specialization» strategies in accordance with EU standards and launching partnership platforms between the State and businesses [23].

Alongside the development of a new industrial strategy, in 2024 the government approved the Digital Innovation Development Strategy (WINWIN) up to 2030, which defines Ukraine's vision as an innovation-driven State and outlines the key directions of State policy in the field of digital innovation. The strategy aims to create favorable conditions for the development of businesses, startups, scientists, investors, and international partners, who are seen as the driving force of economic growth, post-war recovery, and Ukraine's integration into the European innovation space. The fundamental directions of the WINWIN 2030 strategy are: opening markets for priority industries; development and support of innovation infrastructure; deregulation of innovation activities; access to financing; human capital development; efficient management of State institutions in the field of innovation; protection of intellectual property; development of high-tech innovations; creation of inclusive innovations; and establishment of WINWIN Centers of Excellence (CoE) for each of the priority industries [21].

The strategy envisages the creation of a network of Centers of Excellence (WINWIN CoE) in key technological areas – DefenseTech, MedTech, BioTech, GreenTech, EdTech, AgroTech, AI, XR, AUV, Semiconductors, Secure Cyberspace, SpaceTech, GovTech – which will enable the development of a systematic approach to innovation policy and enhance Ukraine's competitiveness in high-tech sectors. The implementation of the strategy is intended to serve as the foundation for transitioning from episodic innovation initiatives to an institutionalized innovation ecosystem capable of generating sustainable economic growth and increasing the share of high-tech exports [22].

The economic structure of Ukraine's regions varies in terms of industrial potential, technological development, and digital maturity, making it impossible to apply a single national innovation development strategy to each region. Such differences necessitate a differentiated approach to developing innovation strategies, which considers the specifics of each region's economic profile, the level of diversification of its production, access to investment resources, and integration into global value chains. An important stage in strategizing the innovative development of export-import activities is identifying the interrelations between indicators of innovation development and indicators of export-import activity, as well as evaluating the impact of innovation activities on the efficiency of export-import operations. To analyze these interrelations, it is advisable to examine the innovation activities of industrial enterprises and the export-import activities of Ukraine's regions using econometric methods.

For the analysis, statistical data from 2020–2024 were used for indicators of innovation development and import-export activities in 23 regions of Ukraine [23]:

X_1 – the number of innovation-active industrial enterprises, % of the total number of industrial enterprises in the respective region;

X_2 – the share of industrial enterprises that implemented innovations (products and/or innovative processes) in the total number of industrial enterprises in the respective region, %;

X_3 – the expenditures on innovations by industrial enterprises, % of the total value of products (goods, services) sold by industrial enterprises;

X_4 – the volume of innovative industrial products (goods, services) sold by enterprises, % of the total value of products (goods, services) sold by industrial enterprises in the respective region;

Y_1 – the volume of goods exports of the region, USD million;

Y_2 – the volume of goods imports of the region, USD million.

Using the statistical package Statgraphics 18, a cluster analysis was performed using Ward's method with the Euclidean distance squared, resulting in the identification of 3 clusters of regions (*Tbl. 2*) for each year during the period 2020–2024. The clustering algorithm implemented in Statgraphics using Ward's method does not assign fixed numbers to clusters throughout 2020–2024; therefore, the numbering of clusters in different years is conditional. However, after analyzing the dynamics of regional clusters based on innovation development indicators and export-import activities in 23 regions of Ukraine, we can draw the following conclusions. First, throughout the entire period from 2020 to 2024, the city of Kyiv consistently forms a separate cluster with the highest volumes of exports and imports and average innovation development indicators. Secondly, the remaining regions form two clusters, among which the following regularly fall into the same cluster:

- Volyn, Donetsk, Zhytomyr, Zakarpattia, Khmelnytskyi, Cherkasy, Chernivtsi, Chernihiv;
- Odesa, Poltava, Rivne; Vinnytsia, Lviv, Sumy;
- Kirovohrad, Ternopil, Kharkiv.

Other regions show higher variability in cluster affiliation, which may be due to differences in industry specialization, resource base, and the dynamics of innovation activity.

A cluster analysis indicated the heterogeneity of Ukraine's regions, as there is a significant difference between the minimum and maximum centroids of the clusters in terms of innovation development and export-import activity indicators (*Tbl. 3*).

For each cluster, a canonical correlation analysis was conducted to identify the interrelations between groups of innovation development indicators and export-import activity indicators (*Tbl. 4*). The results showed that in most clusters, the p-values exceeded 0.05, indicating the absence of statistically significant

Table 2

Dynamics of clusters of Ukrainian regions based on innovation development indicators and export-import activity in 2020–2024

Year	Cluster 1	Cluster 2	Cluster 3
2020	Vinnytsia, Sumy, Chernihiv, Chernivtsi, Ivano-Frankivsk, Kyiv, Lviv, Poltava, Cherkasy, Odesa, Rivne, Dnipropetrovsk, Volyn, Zhytomyr, Zakarpattia, Khmelnytskyi	Donetsk, Zaporizhzhia, Kirovohrad, Kharkiv, Mykolaiv, Ternopil	the city of Kyiv
2021	Vinnytsia, Sumy, Lviv, Kharkiv, Mykolaiv, Ternopil	Volyn, Chernihiv, Zhytomyr, Kyiv, Zakarpattia, Khmelnytskyi, Zaporizhzhia, Chernivtsi, Kirovohrad, Ivano-Frankivsk, Poltava, Odesa, Rivne, Cherkasy, Dnipropetrovsk, Donetsk	the city of Kyiv
2022	Vinnytsia, Kirovohrad, Lviv, Sumy, Kharkiv, Ternopil, Dnipropetrovsk	Volyn, Khmelnytskyi, Donetsk, Zhytomyr, Rivne, Chernivtsi, Kyiv, Odesa, Poltava, Zakarpattia, Ivano-Frankivsk, Zaporizhzhia, Mykolaiv, Cherkasy, Chernihiv	the city of Kyiv
2023	Vinnytsia, Zaporizhzhia, Lviv, Sumy, Kharkiv, Kyiv, Odesa, Poltava, Kirovohrad, Rivne, Chernivtsi, Cherkasy, Chernihiv, Ternopil	Volyn, Zakarpattia, Donetsk, Zhytomyr, Mykolaiv, Khmelnytskyi, Dnipropetrovsk	the city of Kyiv
2024	Vinnytsia, Kharkiv, Khmelnytskyi, Dnipropetrovsk, Kirovohrad, Ternopil	Volyn, Cherkasy, Mykolaiv, Zaporizhzhia, Ivano-Frankivsk, Odesa, Zhytomyr, Poltava, Sumy, Chernihiv, Kyiv, Lviv, Donetsk, Zakarpattia, Rivne, Chernivtsi	the city of Kyiv

Table 3

Difference between cluster centroids by innovation development and export-import activity indicators in 2020–2024

Year	X_1	X_2	X_3	X_4	Y_1	Y_2
2020	51%	53%	274%	575%	717%	2336%
2021	75%	85%	433%	283%	718%	1684%
2022	51%	65%	229%	262%	711%	1824%
2023	128%	181%	1300%	181%	708%	1898%
2024	95%	104%	309%	258%	864%	2008%

Table 4

Analysis of canonical correlations between groups of innovation development indicators and export-import activity indicators in 2020–2024

Year	Cluster	Linear combinations of variable sets
2022	1, 2, 3	$U_1 = 0.014X_1 + 0.227X_2 - 0.184X_3 + 0.965X_4$ and $V_1 = 2.398Y_1 - 2.146Y_2$ (p-value = 0.014)
2023	2	$U_1 = 0.195X_1 + 0.092X_2 + 0.201X_3 + 0.627X_4$ and $V_1 = 0.831Y_1 + 0.187Y_2$ (p-value = 0.049)
2023	1, 2, 3	$U_1 = -0.181X_1 + 0.055X_2 + 0.03X_3 + 0.999X_4$ and $V_1 = 2.989Y_1 - 2.828Y_2$ (p-value = 0.012)
2024	1	$U_1 = 31.885X_1 - 32.088X_2 - 0.232X_3 - 0.0118X_4$ and $V_1 = -1.056Y_1 + 1.91Y_2$ (p-value = 0.00)
2024	1, 2, 3	$U_1 = 4.669X_1 - 4.587X_2 - 0.375X_3 + 1.049X_4$ and $V_1 = 2.657Y_1 - 2.169Y_2$ (p-value = 0.23)

interrelations between the studied groups of variables. At the same time, statistically significant interrelations were found in cluster 2 (2023) and cluster 1 (2024), as well as in the analysis of indicators for all regions in 2022, 2023, and 2024. Thus, only in some clusters during the period 2020–2024, as well as when analyzing all regions altogether, a statistically significant relationship is observed between groups of innovation development indicators and export-import activities, whereas in most clusters this relationship is not significant. Therefore, it is advisable to assess the impact of innovation development indicators on each of the export-import activity indicators separately using multifactor regression analysis.

As a result of the conducted multifactor regression analysis, it was found that in most clusters during 2020–2024, no statistically significant multifactor regression models were detected. However, in some clusters, the influence of innovation development indicators on import-export activity indicators was identified, including Y_3 – the import coverage by export ratio (*Tbl. 5*). Thus, the growth of innovation development indicators generally promotes an increase in the volumes of exports and imports and in the import coverage ratio, but in some clusters, the opposite effect was observed – an increase in X_2 and X_3 leads to a decrease in export volumes and a worsening of the trade balance, which may be due to the fact that innovation activities often have a delayed effect, and also under wartime conditions, industrial innovations may be directed toward defense needs and the adaptation of domestic production.

Thus, as a result of the conducted study, a refined definition of the strategy for innovation development of export-import activities has been proposed. The analysis of Ukraine's positions in global innovation development indices showed that despite structural changes in export-import flows and increasing external challenges, Ukraine has significant innovation potential, which can be realized through effective strategic management of innovation development in export-import activities. The analysis of canonical correlations revealed statistically significant interrelations between groups of innovation development indicators and export-import activities in certain clusters and years, while in most cases, a significant connection was absent. However, using multifactor regression analysis, a statistically significant

Table 5

A multifactor regression analysis of the impact of innovation development indicators on the export-import activities of Ukrainian regions in 2020–2024

Year	Cluster	Dependent variable	Regression equation
2020	2	Y_1	$Y_1 = 4328.7 - 123.207X_2$ ($R^2 = 69,89\%$)
2021	1	Y_1	$Y_1 = 2194.25 + 305.867X_1 - 475.154X_2$ ($R^2 = 94\%$)
2021	1	Y_3	$Y_3 = 2.395 - 6.432X_3 + 1.617X_4$ ($R^2 = 86.84\%$)
2021	2	Y_3	$Y_3 = 0.846 + 0.639X_4$ ($R^2 = 66.68\%$)
2022	1	Y_1	$Y_1 = 66.631 + 1798.25X_4$ ($R^2 = 64.22\%$)
2022	2	Y_3	$Y_3 = 0.957 + 2.187X_3$ ($R^2 = 43.68\%$)
2023	2	Y_1	$Y_1 = -813.463 + 340.29X_2 + 1379.38X_4$ ($R^2 = 76.76\%$)
2023	2	Y_2	$Y_2 = 368.436 + 1442.03X_4$ ($R^2 = 76.76\%$)

positive effect of innovation development on export-import activities was identified – in most cases, an increase in innovation development indicators contributes to higher volumes of exports and imports, as well as the export coverage ratio of imports. In some cases, however, the negative impact of innovation development indicators can be explained by the delayed effect of innovations on the efficiency of export-import activities and by the fact that during wartime, industrial innovations are focused on defense needs and production adaptation. Therefore, in future studies, it is advisable to analyze dynamic econometric models with lagged variables to determine the delayed effect of innovation activities on the efficiency of export-import operations.

The practical significance of this analysis of the interrelations between innovative development and the export-import activities of Ukraine's regions lies in identifying the features and directions of these interrelations using the example of Ukraine's regions. Specifically, regional differences in innovative development have been identified, confirming the necessity of implementing smart specialization in the strategic planning of innovative development in export-import activities for different regions based on their competitive advantages; the positive impact of innovative development indicators on export-import activity indicators has been substantiated, highlighting the important role of innovative development as a factor in improving the efficiency of export-import activities, which should be considered when planning innovative development in export-import activities at all levels of the economy. Hence, the research results strengthen the theoretical foundations of innovative development in export-import activities and serve as a basis for making rational managerial decisions regarding the development of innovative strategies to improve the efficiency of export-import operations.

BIBLIOGRAPHY

1. Микитюк П. П., Крисько Ж. Л., Овсянюк-Бердадіна О. Ф., Скочиляс С. М. Інноваційний розвиток підприємства : навч. посіб. / Тернопіль : ПП «Принтер Інформ», 2015. 224 с.
2. Пономаренко В. С., Малярець Л. М., Бараннік І. О., Балюк Ю. С. Положення концепції трансформації інноваційного розвитку експортно-імпортної діяльності суб'єктів господарювання у воєнних і повоєнних умовах. *Проблеми економіки*. 2023. № 2. С. 87–98. DOI: https://doi.org/10.32983/2222-0712-2023-2-87-98
3. Інноваційний розвиток діяльності суб'єктів господарювання в умовах воєнного та повоєнного стану: теорія, практика, аналітика : монографія / за заг. ред. В. С. Пономаренка. Харків : ХНЕУ ім. С. Кузнеця, 2024. 429 с.
4. Малярець Л. М., Норік Л. О., Бударін О. С., Скляр Т. П. Особливості розвитку експортно-імпортної діяльності суб'єктів господарювання державного сектора економіки. *Проблеми економіки*. 2024. № 2. С. 94–107. DOI: https://doi.org/10.32983/2222-0712-2024-2-94-107
5. Malyarets L. M., Norik L. A., Baliuk Y. S., Budarin O. S. The Development of Export-Import Activity on the Basis of Information and Communication Technologies. *Проблеми економіки*. 2023. № 4. С. 22–31. DOI: https://doi.org/10.32983/2222-0712-2023-4-22-31
6. Соколюк С. Ю. Сутність та особливості інноваційного розвитку підприємств аграрного сектору. *Науковий вісник Херсонського державного університету. Серія «Економічні науки»*. 2018. Вип. 30. Ч. 2. С. 9–13. URL: https://ej.journal.kspu.edu/index.php/ej/article/view/268/264
7. Янковой Р. В. Інноваційне стратегування діяльності вітчизняного бізнесу: теорія, методологія та практика : монографія. Житомир : ТОВ «Видавничий дім «Бук-Друк», 2024. 292 с.

8. Луцків О. М., Білан Р. М. Сучасні виклики та загрози інноваційному розвитку економіки регіонів України. *Регіональна економіка*. 2025. № 1. С. 45–58.
DOI: https://doi.org/10.36818/1562-0905-2025-1-4
9. Слинько М. Ю. Перспективи інноваційного розвитку регіонів України через реалізацію інструмента смарт-спеціалізації. *Економіка і організація управління*. 2020. № 4. С. 167–177.
DOI: https://doi.org/10.31558/2307-2318.2020.4.16
10. Iastremska O. A. Genesis of the Concept and Process of Strategizing at Enterprises. *Проблеми економіки*. 2023. № 4. С. 165–174.
DOI: https://doi.org/10.32983/2222-0712-2023-4-165-174
11. Купріянов В. М. Стратегування діяльності підприємств з використанням технологій ШІ. *Актуальні питання розвитку економічної системи*: міжнародний досвід : матеріали Всеукраїнської науково-практичної конференції, 2025. С. 57–62.
12. Купріянов В. М. Актуальні проблеми стратегування діяльності підприємств та напрямки їх вирішення. *Світове господарство та міжнародні економічні відносини в контексті глобальних викликів суспільства* : матеріали доповідей Міжнародної науково- практичної конференції (м. Ужгород, 23–24 травня 2025 р.). Львів-Торунь : Liha- Pres, 2025. С. 33–37.
DOI: https://doi.org/10.36059/978-966-397-499-6-8
13. Ukraine ranking in the Global Innovation Index 2024. URL: https://www.wipo.int/edocs/gii-ranking/2024/ua.pdf
14. Country & Product Complexity Rankings. *Harvard Growth Lab Viz Hub*. URL: https://atlas.hks.harvard.edu/rankings
15. Global Talent Competitiveness Index 2025. *INSEAD*. URL: https://www.insead.edu/global-talent-competitiveness-index
16. UN Global Survey on Digital and Sustainable Trade Facilitation – Ukraine. URL: https://www.untfsurvey.org/economy?id=UKR
17. Technology and Innovation Report 2023. *UN Trade & Development*. URL: https://unctad.org/tir2023
18. Global Startup Ecosystem Index 2025. *StartupBlink*. URL: https://startupmedias.net/storage/startupecosystemreport2025.pdf
19. Ковальова А. Україна піднялась на 42 місце в рейтингу Global Startup Ecosystem Index 2025 і показала зростання на понад 25%. *AIN*. 20.05.2025. URL: https://ain.ua/2025/05/20/ukrayina-ecosystem-index-2025/
20. Мінекономіки презентувало бачення промислової політики на URC 2025 у Римі. *Урядовий портал*. 11.07.2025. URL: https://www.kmu.gov.ua/news/minekonomiky-prezentuvalo-bachennia-promyslovoi-polityky-na-urc-2025-u-rymi
21. WINWIN: Україна затвердила Стратегію цифрового розвитку інновацій до 2030 року. *Міністерство цифрової трансформації України*. URL: https://thedigital.gov.ua/news/technologies/winwin-ukraina-zatverdila-strategiyu-tsifrovogo-rozvitku-innovatsiy-do-2030-roku
22. Розпорядження Кабінету Міністрів України «Про схвалення Стратегії розвитку інноваційної діяльності України на період до 2030 року» від 10 липня 2019 р. № 526-р. URL: https://zakon.rada.gov.ua/laws/show/526-2019-p#Text
23. Наука, технології та інновації. *Державна служба статистики України*. URL: https://www.ukrstat.gov.ua/operativ/menu/menu_u/ni.htm

REFERENCES

Country & Product Complexity Rankings. *Harvard Growth Lab Viz Hub*. https://atlas.hks.harvard.edu/rankings

Derzhavna sluzhba statystyky Ukrainy. *Nauka, tekhnolohii ta innovatsii* [Science, technology and innovation]. https://www.ukrstat.gov.ua/operativ/menu/menu_u/ni.htm

Iastremska O. A. (2023). Genesis of the Concept and Process of Strategizing at Enterprises. *Problemy ekonomiky, 4*, 165–174.
https://doi.org/10.32983/2222-0712-2023-4-165-174

INSEAD. (2025). *Global Talent Competitiveness Index 2025*. https://www.insead.edu/global-talent-competitiveness-index

Kovalova A. (2025, May 20). Ukraina pidnialas na 42 mistse v reitynhu Global Startup Ecosystem Index 2025 i pokazala zrostannia na ponad 25% [Ukraine rose to 42nd place in the Global Startup Ecosystem Index 2025 and showed growth of over 25%]. *AIN*. https://ain.ua/2025/05/20/ukrayina-ecosystem-index-2025/

Lutskiv O. M. & Bilan R. M. (2025). Suchasni vyklyky ta zahrozy innovatsiinomu rozvytku ekonomiky rehioniv Ukrainy [Modern challenges and threats to the innovative development of the economy of the regions of Ukraine]. *Rehionalna ekonomika, 1*, 45–58. https://doi.org/10.36818/1562-0905-2025-1-4

Malyarets L. M., Norik L. A., Baliuk Y. S. & Budarin O. S. (2023). The Development of Export-Import Activity on the Basis of Information and Communication Technologies. *Problemy ekonomiky, 4*, 22–31.
https://doi.org/10.32983/2222-0712-2023-4-22-31

Maliarets L. M., Norik L. O., Budarin O. S. & Skliar T. P. (2024). Osoblyvosti rozvytku eksportno-importnoi diialnosti subiektiv hospodariuvannia derzhavnoho sektora ekonomiky [Features of the development of export-import activity of economic entities of the state sector of the economy]. *Problemy ekonomiky, 2*, 94–107.
https://doi.org/10.32983/2222-0712-2024-2-94-107

Ministerstvo tsyfrovoi transformatsii Ukrainy. *WINWIN: Ukraina zatverdyla Stratehiiu tsyfrovoho rozvytku innovatsii do 2030 roku* [WINWIN: Ukraine approved

the Strategy for digital development of innovations until 2030]. https://thedigital.gov.ua/news/technologies/winwin-ukraina-zatverdila-strategiyu-tsifrovogo-rozvitku-innovatsiy-do-2030-roku

Mykytiuk P. P., Krysko Zh. L., Ovsianiuk-Berdadina O. F. & Skochylias S. M. (2015). *Innovatsiinyi rozvytok pidpryiemstva* : navch. posib. [Innovative development of the enterprise: a study guide]. Ternopil: PP «Prynter Inform».

Ponomarenko V. S. (2024). *Innovatsiinyi rozvytok diialnosti subiektiv hospodariuvannia v umovakh voiennoho ta povoiennoho stanu: teoriia, praktyka, analityka* : monohrafiia / za zah. red. V. S. Ponomarenka [Innovative development of the activities of economic entities in the conditions of military and post-war state: theory, practice, analytics: monograph]. Kharkiv: KhNEU im. S. Kuznetsia.

Ponomarenko V. S., Maliarets L. M., Barannik I. O. & Baliuk Yu. S. (2023). Polozhennia kontseptsii transformatsii innovatsiinoho rozvytku eksportno-importnoi diialnosti subiektiv hospodariuvannia u voiennykh i povoiennykh umovakh [Provisions of the concept of transformation of innovative development of export-import activity of economic entities in military and post-war conditions]. *Problemy ekonomiky, 2*, 87–98. https://doi.org/10.32983/2222-0712-2023-2-87-98

Rozporiadzhennia Kabinetu Ministriv Ukrainy «Pro skhvalennia Stratehii rozvytku innovatsiinoi diialnosti Ukrainy na period do 2030 roku» vid 10 lypnia 2019 r. № 526-r [Decree of the Cabinet of Ministers of Ukraine 'On Approval of the Strategy for the Development of Innovation Activity of Ukraine for the Period until 2030' dated July 10, 2019, No. 526-r] (2019, July 10). https://zakon.rada.gov.ua/laws/show/526-2019-r#Text

Slynko M. Yu. (2020). Perspektyvy innovatsiinoho rozvytku rehioniv Ukrainy cherez realizatsiiu instrumenta smart-spetsializatsii [Prospects for innovative development of regions of Ukraine through the implementation of the smart specialization tool]. *Ekonomika i orhanizatsiia upravlinnia, 4*, 167–177. https://doi.org/10.31558/2307-2318.2020.4.16

Sokoliuk S. Yu. (2018). Sutnist ta osoblyvosti innovatsiinoho rozvytku pidpryiemstv ahrarnoho sektoru [The essence and features of innovative development of enterprises in the agricultural sector]. *Naukovyi visnyk Khersonskoho derzhavnoho universytetu. Seriia «Ekonomichni nauky»*, Vyp. 30. Ch. 2, 9–13. https://ej.journal.kspu.edu/index.php/ej/article/view/268/264

StartupBlink. (2025). *Global Startup Ecosystem Index 2025*. https://startupmedias.net/storage/startupecosystemreport2025.pdf

UN Global Survey on Digital and Sustainable Trade Facilitation – Ukraine https://www.untfsurvey.org/economy?id=UKR

UN Trade & Development. (2023). *Technology and Innovation Report 2023*. https://unctad.org/tir2023

Uriadovyi portal. (2025, July 11). Minekonomiky prezentuvalo bachennia promyslovoi polityky na URC 2025 u Rymi [Ministry of Economy presented the vision of industrial policy at URC 2025 in Rome]. https://www.kmu.gov.ua/news/minekonomiky-prezentuvalo-bachennia-promyslovoi-polityky-na-urc-2025-u-rymi

WIPO. (2024). *Ukraine ranking in the Global Innovation Index 2024*. https://www.wipo.int/edocs/gii-ranking/2024/ua.pdf

Yankovoi R. V. (2024). *Innovatsiine stratehuvannia diialnosti vitchyznianoho biznesu: teoriia, metodolohiia ta praktyka* : monohrafiia [Innovative strategizing of domestic business activity: theory, methodology and practice: monograph]. Zhytomyr: TOV «Vydavnychyi dim «Buk-Druk».