Yang S., Song Y. & Tong S. (2017). Sustainable Retailing in the Fashion Industry: A Systematic Literature Review. *Sustainability, 7*(9), 1266. https://doi.org/10.3390/su9071266

Zborovska O. M. (2010). Lohistyka yak faktor pidvyshchennia konkurentospromozhnosti ta ekonomichnoi stiikosti promyslovykh pidpryiemstv [Logistics as a factor in increasing the competitiveness and economic stability of industrial enterprises]. *Ekonomika: problemy teorii ta praktyky, Vyp. 261*(2), 530–536.

Zborovska O. M. (2011). Analiz faktoriv vplyvu na obsiahy lohistychnykh vytrat u metalurhiinii haluzi [Analysis of factors influencing the volume of logistics costs in the metallurgical industry]. *Ekonomika ta derzhava, 7*, 26–27. http://www.economy.in.ua/pdf/7_2011/9.pdf

Zborovska O. M. (2011). Ekonomiko-matematychna model optymizatsii lohistychnykh vytrat promyslovoho pidpryiemstva [Economic-mathematical model of logistics costs optimization of an industrial enterprise]. *Naukovyi visnyk Uzhhorodskoho natsionalnoho universytetu. Seriia «Ekonomika», Spetsvyp. 33*. Ch. 1, 105–110. https://dspace.uzhnu.edu.ua/server/api/core/bitstreams/78e31b9a-c2c1-4bec-b933-0c96d39d25eb/content

Zborovska O. M. (2011). Vzaiemozviazok lohistychnykh vytrat pidpryiemstva i faktoriv makroseredovyshcha [Interrelation of logistics costs of an enterprise and macroenvironment factors]. *Investytsii: praktyka ta dosvid, 11*, 29–31. http://nbuv.gov.ua/UJRN/ipd_2011_11_9

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THE METHODOLOGICAL SUPPORT FOR ASSESSING THE IMPACT OF INNOVATIVE DEVELOPMENT OF INDUSTRIAL ENTERPRISES ON EXPORT-IMPORT ACTIVITY

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Malyarets L. M., Skliar T. P. The Methodological Support for Assessing the Impact of Innovative Development of Industrial Enterprises on Export-Import Activity

In modern conditions, the development of all types of activities of industrial enterprises is transformed due to innovative development. This impact is especially significant on the export-import activity of enterprises. The aim of the article is to substantiate the information and analytical support for assessing the impact of innovative development of industrial enterprises on export-import activity on the basis of specifying the type of impact, main components and directions of innovative development of export-import activity of industrial enterprises in Ukraine. Theoretical significance is given to the substantiated main components of the impact of the innovative development of industrial enterprises on their export and import activities separately, as well as the main directions of innovative development of export-import activities of industrial enterprises in Ukraine. Practical significance is given to the recommendations on the system of indicators that characterize the transition from the raw material model to the export of products with high added value at the macro level and the system of indicators that characterize the impact of the innovative development of industrial enterprises on export-import activities. It is found that the lagging effect of the innovative development of industrial enterprises on export-import activity and the assessment of its lag are of significant practical importance. The article proposes dynamic econometric models with a distributed lag to determine this lagging effect of two types: in the form of a multifactor model with lag variables and a pair nonlinear model with lag variables. The definition of lag is of particular importance in the formation of management decisions. The main stages of the methodological approach to assessing the innovative development of export-import activity of large State-owned industrial enterprises, which ensure economic stability in conditions of limited activity, are proposed.

Keywords: *assessment; innovative development; export-import activity; indicator system; lagging effect; dynamic econometric models with distributed lag; methodological approach.*

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Малярець Л. М., Скляр Т. П. Методичне забезпечення оцінювання впливу інноваційного розвитку промислових підприємств на експортно-імпортну діяльність

У сучасних умовах розвиток всіх видів діяльності промислових підприємств трансформується завдяки інноваційному розвитку. Особливо цей вплив істотний на експортно-імпортну діяльність підприємств. Метою статті є обґрунтування інформаційно-аналітичного забезпечення оцінювання впливу інноваційного розвитку промислових підприємств на експортно-імпортну діяльність на основі уточнення виду впливу,основних складових і напрямів інноваційного розвитку експортно-імпортної діяльності промислових підприємств в Україні. Теоретичне значення мають обґрунтовані основні складові впливу інноваційного розвитку промислових підприємств на їх експортну й імпортну діяльність окремо, а також виокремлено основні напрями інноваційного розвитку експортно-імпортної діяльності промислових підприємств в Україні. Практичне значення мають рекомендації щодо системи показників, яка характеризує перехід від сировинної моделі до експорту продукції з високою доданою вартістю на макрорівні, та система показників, яка характеризує вплив інноваційного розвитку промислових підприємств на експортно-імпортну діяльність. Встановлено, що велике практичне значення має визначення запізнюючого впливу інноваційного розвитку промислових підприємств на експортно-імпортну діяльність та оцінка його лагу. У статті запропоновано динамічні економетричні моделі з розподіленим лагом для визначення цього запізнюючого впливу двох типів: у вигляді багатофакторної моделі з лаговими змінними і парної нелінійної з лаговими змінними. Особливе значення у формуванні управлінських рішень має визначення лага. Запропоновано відмінні основні етапи методичного підходу оцінки інноваційного розвитку експортно-імпортної діяльності великих державних промислових підприємств, які забезпечують економічну стійкість в умовах обмеженості діяльності.

Ключові слова: *оцінювання; інноваційний розвиток; експортно-імпортна діяльність; система показників; запізнюючий вплив; динамічні економетричні моделі з розподіленим лагом; методичний підхід.*
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In modern conditions, the innovative development of industrial enterprises is a driving force behind the transformation of their export-import activities, which is reflected in changes in the structure of trade turnover, increased competitiveness in global markets, increased portfolio diversification, brand strengthening, reduction of import dependence and critical dependence on the import of scarce energy resources. In 2025, Ukraine reduced the share of the EU in the total volume of exports, which reflects not only restrictions on Ukrainian goods but may also indicate the balancing, to some extent, of the geographical structure of exports and the growing role of Asian and African markets [1]. The dynamics of import of intellectual services, software, and patents (royalties) in Ukraine during 2014–2025 reflects the transformation of the national economy: from the consumption of foreign licenses in industry to the mass implementation of cloud solutions and IT products. The importation of energy-efficient and environmentally friendly technologies into Ukraine during 2014–2025 has progressed from isolated investment projects to the mass import of equipment for energy independence. In 2024–2025, there is a sharp increase in the imports of energy generation and storage devices, caused by enemy attacks on the domestic energy system. During these years, an innovative transformation of export-import activities in Ukraine is taking place, reflected in the transition from a raw material model to high value-added goods, the digitalization of logistics, the simplification of customs procedures, and integration with European green and technological standards.

Regarding the digitalization of customs and trade procedures, the following measures have been implemented: 1) an information system «Single Window for International Trade» has been created, which unites customs and regulatory authorities; 2) an electronic cabinet has been developed, allowing enterprises to interact with the State Customs Service online; 3) a procedure of joint transit is being implemented to simplify trade routes with the countries of the European Union. In Ukraine, government programs such as the Innovation Development Fund are in operation, which stimulate the production and export of products in the fields of defence-tech, robotics, and unmanned technologies [2].

The ***aim*** of the article is to substantiate the information-analytical support for assessing the impact of innovative development of industrial enterprises on

export-import activities based on clarifying the type of impact, the main components, and directions of innovative development of export-import activities of industrial enterprises in Ukraine.

The resolution of problems of innovative development of industrial enterprises and their impact on export-import activities is the subject of research by foreign scientists, such as G. Kore [3], Y. Lyu, L. Wang, Y. Lu [4], K. Chang, H. Zhang, B. Li [5], J. P. Montégu, J. A. Pertuze, C. Calvo [6], N. Bocken, J. Konietzko [7], and others.

The analysis of the dynamics between innovations, market structure, and trade indicators is presented in the work of G. Kore [3], where the impact of innovations at an aggregated level is first considered, and then the effect at a disaggregated level or firm level is assessed.

Researchers Y. Lyu, L. Wang, Y. Lu concluded that cross-border e-commerce is increasingly becoming an important driver for improving factor productivity at the enterprise [4]. The impact of the digital economy and industrial agglomeration on the rationalization and development of industrial structure was studied in the work of researchers K. Chang, H. Zhang, B. Li [5].

In their work, researchers J. P. Montégu, J. A. Pertuze, C. Calvo examine in detail the impact of import activity on technological and non-technological innovations in Chilean firms and concluded that importers demonstrated a significant advantage in implementing product, marketing, and organizational innovations [6].

Many domestic scientists have also addressed the issues of the impact of innovative development of industrial enterprises on their export-import activities, namely: V. Heyets [8], A. Dunska, O. Pinchuk [9], N. Vnukova. [10], V. Nyzhnyk, I. Nyzhnyk [11], N. Khomiuk, O. Bilous [12], V. Ponomarenko, L. Malyarets, N. Vnukova, and others [13]. The well-known scientist, academician V. Heyets, emphasizes the need to revive Ukraine's potential in high-tech sectors and in those types of activities that were quite highly developed in the pre-war period and have maintained their level to this day [8]. In the studies of A. Dunska and O. Pinchuk, the composition of the innovation instrumentarium at the macro and micro levels is substantiated, which differs in hierarchical structure, including mechanism, strategy, program, project, and also differs in terms of directions of innovative impact, namely: technological, organizational, marketing, financial, and ecological. The authors proposed digital tools for foreign economic activity, in particular, ERP, CRM, AI, Blockchain, export platforms, IoT solutions [9].

N. Vnukova formulated potential innovative directions for identifying, analyzing, and solving problems of export-import activities of business entities, namely: 1) building structured models to calculate the costs and revenues of this activity; 2) using synthetic approaches to determine State regulation; 3) using an additive-analytical approach in determining the absolute effect; 4) identifying the influence of specific factors on this activity; 5) applying an integrative approach in evaluation; 6) improving accounting and taxation through differences in various countries; 7) new approaches in own trade relations [10].

V. Nyzhnyk and I. Nyzhnyk formulated the main innovative approaches to increasing the competitive advantages of foreign economic activity, namely: State support in the reproduction process, insurance of negative risks in the system of implementing investment strategies, formation of capital investments in profitable projects, elimination of imbalances in industry support, amendments to regulatory legal documents, development and activation of financial resource investment in equipment leasing, investment of funds in accelerated self-sufficiency, reduction of import dependence of production [11].

N. Khomiuk, O. Bilous highlight innovative approaches to the development of foreign economic activity strategies aimed at increasing the competitiveness of enterprises: 1) integration of digital platforms into business processes (automation of operations management and logistics, creation of a platform for analytics management, integration of e-commerce platforms, cloud solutions for activity coordination); 2) risk-oriented approach to FEA management (scenario modeling, risk identification, integration of risk monitoring tools); 3) consumer data strategy (analysis of consumer behavior and external markets, adaptation of products and services based on market analytics) [12]. Thus, the analysis of the indicated and other works of scholars and practitioners allowed highlighting the main components of the impact of innovative development of industrial enterprises on their export and import activities (*Fig. 1*) and the main directions of innovative development of export-import activities of industrial enterprises in Ukraine (*Tbl. 1*).

To reflect the innovative development of Ukraine's export-import activity, it is recommended to use indicators that characterize the transition from a raw material model to the exportation of high value-added products, technological renewal of imports, digitalization of trade and customs procedures, efficiency in the use of intellectual property, and competitiveness in international markets [14; 15]. This system of indicators should be structured according to the following components: 1) indicators of exportation structure and quality (the share of high-tech and knowledge-intensive goods in total exports; the share

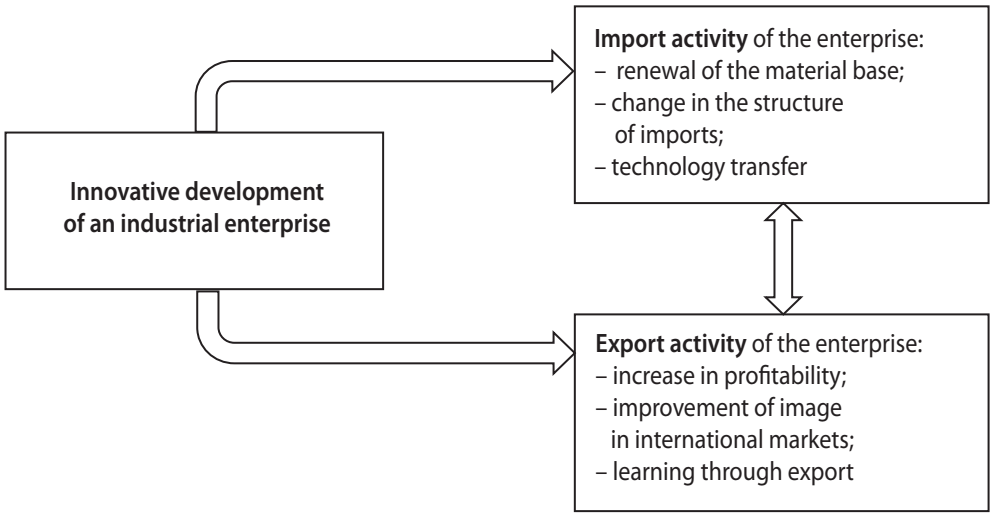

Fig. 1. Main contemporary components of the impact of innovative development of industrial enterprises on their export and import activities

Source: composed by the authors.

Table 1

Main directions of innovative development of export-import activities of industrial enterprises in Ukraine

Direction	Content of the direction
1	2
Implementation of digital technologies to ensure logistics in FEE	Formation of digital logistics and supply chains based on the use of the Internet of Things, artificial intelligence, blockchain with the aim of tracking cargo in real time, optimizing routes.
Implementation of digital technologies for automation of accounting and control in FEE	Adaptation of accounting for foreign economic operations to the conditions of international trade and their changes
Implementation of digital technologies in terms of using electronic trading platforms	Use of online platforms for finding partners, selling goods, and entering new markets
Improving staff qualifications	Training staff to work with new analytical tools and digital platforms
Implementation of a green economy	Promotion and stimulation of green exports (organic products and environmentally friendly raw materials), implementation of EU environmental standards
Implementation of digital technologies for customs regulation in FEE	Creating electronic document management, including the transition to electronic customs declarations, digital certificates of origin, automatic licensing
Management reform	Carrying out State-controlled and legal reforms aimed at adapting Ukrainian legislation to EU standards, State support for exporters, support for enterprises under limited operational conditions. Implementing transformational processes in the enterprise through improving strategic planning, EID controlling, enhancing information support, optimizing economic and administrative methods to increase the efficiency of operational regulation in response to market changes
Implementation and dissemination of import substitution mechanisms	Reducing imports through the use of domestic efficient, cheaper, and high-quality raw materials, materials, and less energy-intensive components. Production of domestic high-quality competitive products with high added value
Diversification of markets, products, and services	Ensuring stability, reducing risks, and increasing competitiveness, entering new foreign markets, search for new countries importing domestic products, reorientation to other markets, and diversification of sources of raw materials, equipment, and components

End of the Tbl. 1

1	2
Investment in research and experimental development	Investing in the development of new high-tech products and technologies that meet international standards, creating knowledge-intensive industries
Expansion of cooperation with international partners, acceleration of European integration	Creating free trade zones, integrating Ukraine into the EU market, in particular, sectoral integration into the EU digital, energy, and transport markets, expanding industrial visa-free regimes, financial assistance from international partners, and cross-border cooperation

Source: composed by the authors.

of finished products with high added value relative to raw materials; the number of new product items exported to foreign markets; geographical diversification of exports); 2) indicators of import innovativeness (the share of machinery, equipment, and vehicles in the total import structure; volumes of imported intellectual services, software, and patents; importation of energy-efficient and environmentally friendly technologies); 3) indicators of efficiency and competitiveness (profit per unit of exported product; average annual growth of the market share of the main innovative exported products; percentage of certified exported products); 4) indicators characterizing the level of institutionality and digitalization (level of digitalization of customs procedures; number of joint innovation projects, grant programs, and small and medium business support programs aimed at exportation).

The listed indicators systematically and thoroughly reflect the innovative development of export-import activities, but their significant problem is, for the most part, the absence in official statistics. However, some indicators are available on official websites. *Fig. 2* and *Fig. 3* display the dynamics of the share of high-tech and knowledge-intensive goods in the total volume of exports and the dynamics of the share of machinery and equipment in imports during 2014–2025 [16]

The analysis of Fig. 2 indicates both a low level of the share of high-tech and knowledge-intensive goods in Ukraine's total exports, and its decline since 2022 and a slow recovery. The analysis of Fig. 3 indicates fluctuations in the dynamics of the share of machinery and equipment in Ukraine's imports, and since 2022 there has been a clear growing trend.

Economic development indicators of the country are influenced by various factors, either immediately or with a delay. Mostly, it is lagged factors that ensure sustainable development. It is known that investment in education, science, and infrastructure has the longest lags, but it is precisely they that transform the national economy from raw-material-based to technological, ensure high labor productivity, and economic resilience. To determine the lagging impact of factors on the result, econometric dynamic models with dis-

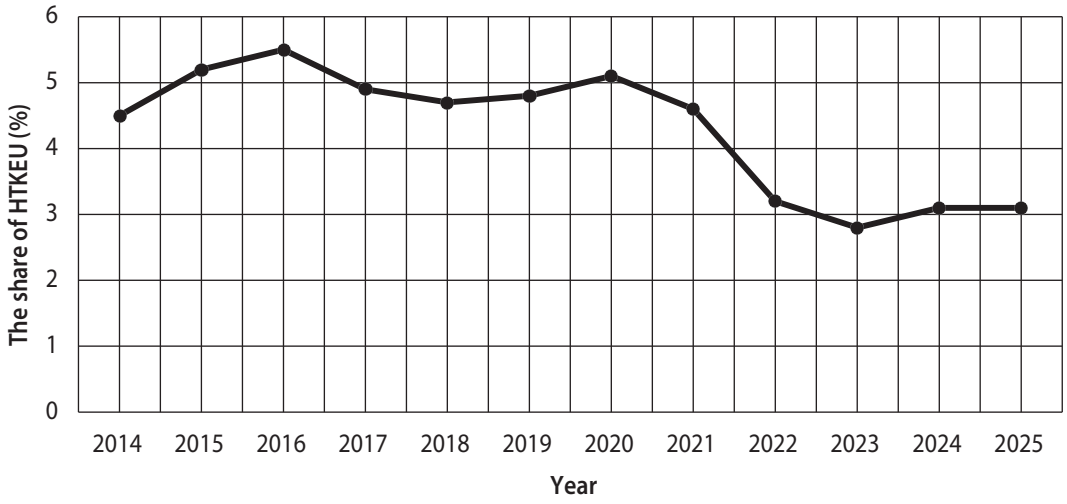

Fig. 2. Dynamics of the share of high-tech and knowledge-intensive goods in the total volume of exports of Ukraine (HTKEU) during 2014–2025

Source: [16].

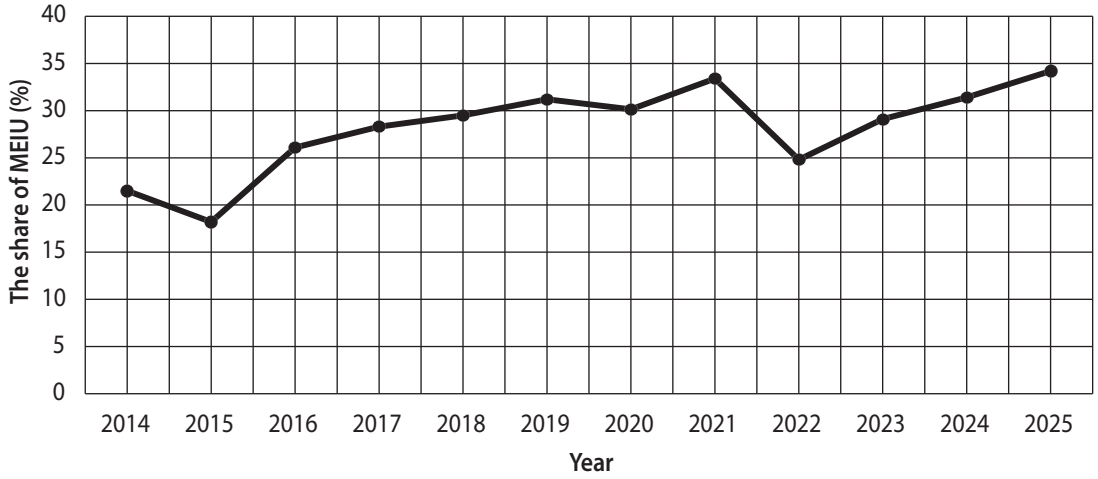

Fig. 3. Dynamics of the share of machinery and equipment in Ukraine's imports (MEIU) during 2014–2025

Source: [16].

tributed lag and autoregression models are used. Using distributed lag models, research was conducted on the lagging impact on the goods exports (Y) and GDP per capita of Ukraine (nominal, USD) (Y_1) of the following factors: the number of industrial enterprises that sold innovative products (goods, services) that are new only to the enterprises (X_1); the number of industrial enterprises that implemented innovative processes (X_2); the expenditures on innovations of industrial enterprises (UAH thousand) (X_3); the quantity of implemented innovative products (goods, services) (new to the market, industry) (X_4); the share of the volume of sold innovative industrial products (goods, services) in the total volume of sold products (goods, services) of industrial enterprises (industry) (X_5); the number of enterprises that engaged in e-commerce (X_6).

However, before determining the lagged impact of factors on the indicators of goods exports (Y) and GDP per capita of Ukraine (nominal, USD) (Y_1), it is necessary to calculate multifactor regression models of the current impact of these factors (first stage). The calculations showed that not all models turned out to be statistically sound. Next, in the study of the lagged effects of factors, dynamic models with distributed lag should be calculated (second stage). But among these models, there were also models that were insignificant. The third stage in determining the lagged impact of factors on the specified outcome indicators is the calculation of paired regression models with the identified influential variables. Thus, according to the stages of the proposed algorithm for determining the lagged impact of factors, the following statistically sound models were obtained:

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6);$$

$$Y = 56{,}289 + 0{,}963X_1 + 0{,}532X_2 + 0{,}018X_3 + 0{,}367X_4;$$

$$R^2 = 0{,}659;\ F = 5{,}10\ (p - value = 0{,}0476);$$

$$Y = f(X_1, X_{1lg1}, X_{1lg2}, X_{1lg3});$$

$$Y = 22{,}24 + 0{,}085X_{1lg1};\ R^2 = 0{,}873;$$

$$F = 20{,}67(p - value = 0{,}0199);$$

$$Y = \frac{1}{0{,}064 - 0{,}0073\ln(X_{1lg1})};\ R^2 = 0{,}638;$$

$$F = 8{,}83(p - value = 0{,}0311);$$

$$Y = \frac{1}{0{,}015 + \frac{2{,}124}{X_{1lg2}}};\ R^2 = 0{,}405;$$

$$F = 4{,}83(p - value = 0{,}0411);$$

$$Y = \frac{1}{0{,}026 - (3{,}22E - 8)X_{2lg1}^{\ 2}};\ R^2 = 0{,}752;$$

$$F = 15{,}19(p - value = 0{,}0114);$$

$$Y = f(X_4, X_{4lg1}, X_{4lg2}, X_{4lg3});$$

$$Y = 7{,}43 + 0{,}087X_{4lg1};\ R^2 = 0{,}828;$$

$$F = 14{,}43(p - value = 0{,}032);$$

$$Y = \sqrt{(1180{,}42 + 0{,}003X_{4\lg 3}^2)};\ R^2 = 0{,}638;$$

$$F = 5{,}28(p - value = 0{,}0497);$$

$$Y = \sqrt{(1411{,}89 + 814{,}72X_{5\lg 1}^2)};\ R^2 = 0{,}768;$$

$$F = 16{,}54(p - value = 0{,}0097);$$

$$Y = \frac{1}{0{,}014 - 0{,}0073\ln(X_{5lg3})};\ R^2 = 0{,}563;$$

$$F = 5{,}86(\text{p} - \text{value} = 0{,}0411);$$

$$Y = \frac{1}{-0{,}0039 + \frac{61{,}08}{X_{6lg1}}};\ R^2 = 0{,}432;$$

$$F = 4{,}80(p - value = 0{,}0501);$$

$$Y_1 = f(X_1, X_2, X_3, X_4, X_5, X_6);$$

$$Y_1 = 5032{,}68 + 6{,}253X_2 + 1080{,}37X_5;\ R^2 = 0{,}858;$$
$$F = 15{,}10(p - value = 0{,}0076);$$
$$Y_1 = f(X_1, X_{1lg1}, X_1lg_2, X_1lg_3);$$
$$Y_1 = 6137{,}81 - 4{,}01X_{1lg2};\ R^2 = 0{,}923;$$
$$F = 35{,}73(p - value = 0{,}0094);$$
$$Y_1 = 13789{,}8 - 1683{,}55lnX_1;$$
$$R^2 = 0{,}488;\ F = 5{,}72(p - value = 0{,}05001);$$
$$Y_1 = \sqrt{\left(8{,}61E6 + \frac{3{,}081E9}{X_{1lg1}}\right)};\ R^2 = 0{,}358;$$
$$F = 5{,}79(p - value = 0{,}051);$$
$$Y_1 = \sqrt{\left(7{,}67E6 + \frac{4{,}159E9}{X_{1lg2}}\right)};\ R^2 = 0{,}7078;$$
$$F = 9{,}69(p - value = 0{,}0358);$$
$$Y_1 = exp\left(8{,}03 + \frac{77{,}338}{X_2}\right);\ R^2 = 0{,}29;$$
$$F = 5{,}45(p - value = 0{,}05002);$$
$$Y_1 = exp\left(8{,}078 + \frac{77{,}076}{X_{2lg1}}\right);\ R^2 = 0{,}472;$$
$$F = 5{,}58(p - value = 0{,}049);$$
$$Y_1 = \sqrt{\left(9{,}78E6 + \frac{3{,}53E9}{X_{2lg2}}\right)};\ R^2 = 0{,}658;$$
$$F = 7{,}69(p - value = 0{,}05);$$
$$Y_1 = \sqrt{\left(1{,}388E7 + \frac{3{,}08E9}{X_{2lg3}}\right)};\ R^2 = 0{,}357;$$
$$F = 5{,}69(p - value = 0{,}048);$$
$$Y_1 = f(X_3, X_{3lg1}, X_{3lg2}, X_{3lg3});$$
$$Y_1 = \sqrt{(1{,}197E7 + 0{,}656X_3^2)};$$
$$Y_1 = 814{,}34 + 1{,}49X_{3lg3};\ R_2 = 0{,}905;$$
$$F = 28{,}68(p - value = 0{,}0127);$$
$$R^2 = 0{,}372;\ F = 5{,}14(p - value = 0{,}0487);$$
$$Y_1 = f(X_4, X_{4lg1}, X_{4lg2}, X_{4lg3});$$
$$Y_1 = exp\left(89042 + \frac{8{,}24E9}{X_4}\right);\ R^2 = 0{,}359;$$
$$F = 5{,}45(p - value = 0{,}050);$$
$$Y_1 = 6063{,}9 - 2{,}48X_{4lg2};\ R^2 = 0{,}90;$$
$$F = 27{,}05(p - value = 0{,}0128);$$
$$Y_1 = \sqrt{\left(4{,}65E7 - 4{,}438X_{6lg2}^2\right)};\ R^2 = 0{,}506;$$
$$F = 5{,}2(p - value = 0{,}0491).$$

The rest of the models, according to the Student's t-test, Fisher's test, and the coefficient of determination, turned out to be insignificant.

Thus, the calculated models with lagged variables indicate that changes in the export of goods (Y) in Ukraine depend on: 1) the current impact of factors such as the number of industrial enterprises that sold innovative products (goods, services) that are new only for the enterprises (X_1), the number of industrial enterprises that implemented innovative processes (X_2); expenditures on innovations of industrial enterprises (UAH thousand) (X_3); the quantity of implemented innovative products (goods, services) (new for the market, industry) (X_4); 2) the delayed nonlinear impact of the number of industrial enterprises that sold innovative products (goods, services) that are new only for the enterprises (X_{1lg1}) with a lag of one and two years; 3) the delayed nonlinear impact of the number of industrial enterprises that implemented innovative processes (X_2) with a lag of one year; 4) the lagged nonlinear effect of the introduced innovative products (goods, services) (new to the market, industry) (X_{4lg1}, X_{4lg3}) with a lag of one year and three years; 5) the lagged nonlinear effect of the share of the volume of sold innovative industrial products (goods, services) in the total volume of sold products (goods, services) of industrial enterprises (industry) (X_{5lg3}) with a lag of three years; the lagged nonlinear effect of the number of enterprises engaged in e-commerce (X_{6lg1}) with a lag of one year. Thus, it can be said that there is a significant lagged effect of innovation activity factors on the export of goods in Ukraine. At the State level, it is necessary to develop a system of managerial measures to reduce the lag of the impact of innovation activity factors on export-import activities in Ukraine.

The calculated models with lagged variables also indicate that changes in Ukraine's GDP per capita (nominal, USD) (Y_1) depend on: 1) the current impact of the number of industrial enterprises that implemented innovative processes (X_2) and the share of the volume of sold innovative industrial products (goods, services) in the total volume of sold products (goods, services) of industrial enterprises (industry) (X_5); 2) the current and lagged nonlinear impact of the number of industrial enterprises that sold innovative products (goods, services) which are new only to the enterprises (X_1, X_{1lg1}, X_{1lg2}) with a lag of one and two years; 3) the current and lagged nonlinear impact of the number of industrial enterprises that implemented innovative processes (X_2, X_{2lg1}, X_{2lg2}, X_{2lg3}) with a lag of one, two, and three years; 4) the current and lagged nonlinear impact of expenditures on innovations of industrial enterprises (UAH thousand) (X_3, X_{3lg3}) with a lag of three years; 5) the current and lagged nonlinear effect of the number of implemented innovative products (goods, services) (new to the market, industry) (X_4, X_{4lg2}) with a lag of two years; 6) the lagged nonlin-

ear effect of the number of enterprises that conducted electronic commerce (X_{6lg2}) with a lag of two years. Thus, there is also a significant lagged effect of innovation activity factors on GDP per capita of Ukraine (nominal, USD) (Y_1). The calculated models allow determining the magnitude of the lagged effect of innovation activity factors on the resulting macroeconomic indicators.

To determine the lagged effect of innovation activity factors on the development of a company's export-import activities, econometric dynamic models with a distributed lag are also recommended. At this, the development of export-import activities should be characterized by indicators such as revenue from product sales for export (UAH thousand), net income from sales of products (goods, works, services) (UAH thousand), gross profit (UAH thousand), net financial result (UAH thousand), gross profitability (%), operational profitability (%), volume of products sold (goods, works, services) on the domestic market (UAH thousand), export efficiency coefficient, import efficiency coefficient, overdue liabilities coefficient, level of production capacity utilization (%), total capital investments (UAH thousand), labor productivity of one employee of the industrial-production staff (UAH thousand/person/month), share of employees engaged in scientific and technical activities (%), total asset use (UAH thousand), fixed assets (UAH thousand) [18].

The analysis of the works of scientists and practitioners who studied the problems of innovative development and the development of export-import activities of enterprises, and its assessment, showed the appropriateness of the corresponding logic of the main stages of the methodological approach, which is presented in *Fig. 4*.

The specified stages of the methodological approach to assessing the innovative development of export-import activities can be the stages of forming the corresponding strategy of large State-owned industrial enterprises.

CONCLUSIONS

Thus, the transformational processes occurring in the domestic economy primarily encompass innovative activities and export-import activities, which contribute to strengthening economic resilience under the limitations of industrial enterprises' operations. The main components of the impact of innovative development of industrial enterprises on their export and import activities have been identified, providing opportunities both for the development of these activities and for increasing the efficiency of the enterprise's overall economic activities. The generalized main directions of innovative development of the export-import activities of industrial enterprises in Ukraine reinforce theoretical foundations and have practical significance in finding development reserves at a specific enterprise. The proposed econometric dynamic models with distributed lag for assessing the impact of innovative development of industrial enterprises on export-import activities are an analytical tool for determining the lag of influence, which is important to consider in the development of substantiated management decisions and strategy formation. The excellent content and logic of the methodological approach stages for assessing the innovative development of export-import activities allow for scientifically grounded development programs for large State-owned industrial enterprises. ■

BIBLIOGRAPHY

1. Зовнішня торгівля України товарами: підсумки 2025 року. *Національний інститут стратегічних досліджень*. URL: https://niss.gov.ua/doslidzhennya/mizhnarodni-vidnosyny/zovnishnya-torhivlya-ukrayiny-tovaramy-pidsumky-2025-roku
2. Цифровізація, модернізація, довіра: як митниця змінювала взаємодію з бізнесом у 2025 році. *Державна митна служба України*. URL: https://customs.gov.ua/news/it-transformatsiia-62/post/tsifrovizatsiia-modernizatsiia-dovira-iak-mitnitsia-zminiuvala-vzaiemodiiu-z-biznesom-u-2025-rotsi-2619
3. Kore G. On the role of innovation and market structure on trade performance: is Schumpeter right? *European Journal of Management and Business Economics*. 2023. Vol. 32. No. 2. P. 241–256. DOI: https://doi.org/10.1108/EJMBE-07-2021-0213
4. Lyu Y., Wang L., Lu Y. Opening new paths to enterprise total factor productivity improvement: evidence from cross-border e-commerce pilot in China. *Economia Politica*. 2026. Vol. 43. P. 129–160. DOI: https://doi.org/10.1007/s40888-025-00392-z
5. Chang K., Zhang H., Li B. The impact of digital economy and industrial agglomeration on the changes of industrial structure in the Yangtze River Delta. *Journal of the Knowledge Economy*. 2024. Vol. 15. P. 9207–9227. DOI: https://doi.org/10.1007/s13132-023-01448-w
6. Montégu J. P., Pertuze J. A., Calvo C. The effects of importing activities on technological and non-technological innovation: evidence from Chilean firms. *International Journal of Emerging Markets*. 2022. Vol. 17. No. 7. P. 1659–1678. DOI: https://doi.org/10.1108/IJOEM-05-2020-0534
7. Bocken N., Konietzko J. Circular business model innovation in consumer-facing corporations. *Technological Forecasting and Social Change*. 2022. Vol. 185. Art. 122076. DOI: https://doi.org/10.1016/j.techfore.2022.122076

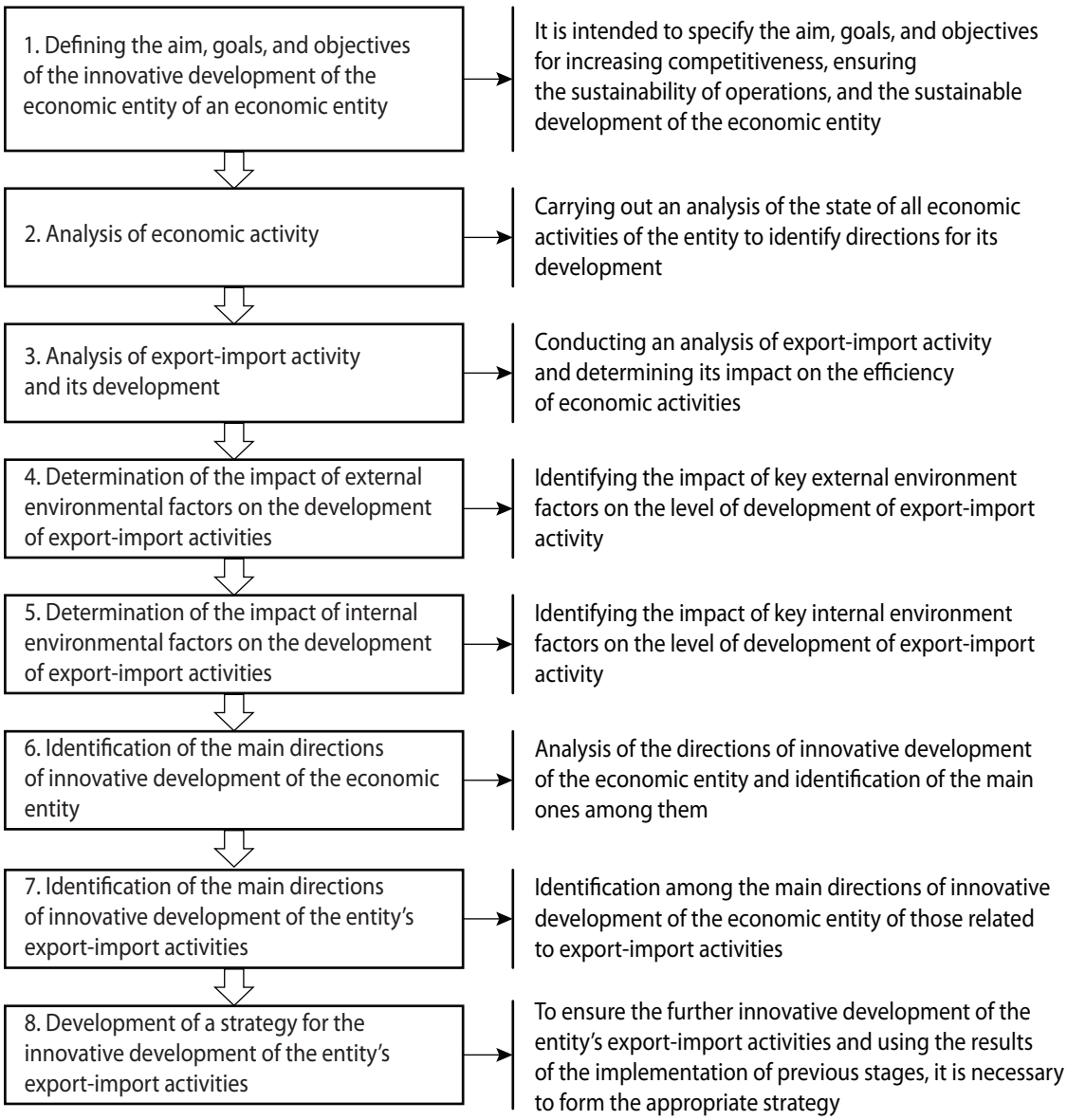

Fig. 4. Main stages of the methodological approach to assessing the innovative development of export-import activities of large state industrial enterprises

Source: composed by the authors.

8. Геєць В. М. Суперечності та перспективи економічного зростання на інноваційній основі в Україні. *Економіка України*. 2024. № 11. С. 3–28. DOI: https://doi.org/10.15407/economyukr.2024.11.003
9. Дунська А. Р., Пінчук О. В. Інноваційні інструменти розвитку зовнішньоекономічної діяльності підприємств. *Сталий розвиток економіки*. 2025. № 6. С. 795–801. DOI: https://doi.org/10.32782/2308-1988/2025-57-110
10. Внукова Н. Інноваційний розвиток експортно-імпортної діяльності для економічної стійкості в умовах воєнного стану. *Acta Academiae Beregsasiensis. Economics*. 2025. Вип. 9. С. 125–139. DOI: https://doi.org/10.58423/2786-6742/2025-9-125-139
11. Нижник В., Нижник І. Зовнішньоекономічна діяльність промислових підприємств: інноваційні підходи у підвищенні конкурентних переваг. *Modeling the Development of the Economic Systems*. 2025. № 2. С. 120–123. DOI: https://doi.org/10.31891/mdes/2025-16-14
12. Хомюк Н. Л., Білоус О. Л. Інноваційні стратегії управління зовнішньоекономічною діяльністю підприємства в умовах цифрової трансформації. *Економіка та суспільство*. 2024. Вип. 69. DOI: https://doi.org/10.32782/2524-0072/2024-69-129
13. Інноваційний розвиток діяльності суб'єктів господарювання в умовах воєнного та повоєнного стану: теорія, практика, аналітика : монографія / Пономаренко В. С., Малярець Л. М., Внукова Н. М. та ін. ; за заг. ред. Пономаренка В. С. Харків : ХНЕУ

ім. С. Кузнеця, 2024. 429 с. URL: http://repository.hneu.edu.ua/handle/123456789/33198

14. Zubko T., Kovshova I., Ilchenko N., Laptieva V., Vavdiichyk I. Evaluation of innovative activity of enterprises in the conditions of European integration. *Eastern-European Journal of Enterprise Technologies*. 2021. Vol. 3. No. 13. P. 63–73. DOI: https://doi.org/10.15587/1729-4061.2021.235950
15. Клепікова С. В., Яцина С. Г., Другова О. С. Особливості управління зовнішньоекономічною діяльністю підприємств. *Економіка. Фінанси. Право*. 2021. Вип. 11. С. 18–22. DOI: https://doi.org/10.37634/efp.2021.11.3
16. From Logistics to Technology: How Ukraine Plans to Achieve a 50% Increase in Exports by 2030? *BDO Україна*. 2025. URL: https://www.bdo.ua/en-gb/insights-1/information-materials/2025/ukraine%E2%80%99s-national-export-strategy-by-2030
17. *Державна служба статистики України*. URL: https://www.ukrstat.gov.ua/
18. Malyarets L. M., Otenko V. I., Budarin O. S., Skliar T. P. The technology for assessing the development of export-import activities of economic entities. *Бізнес Інформ*. 2024. № 10. С. 64–73. DOI: https://doi.org/10.32983/2222-4459-2024-10-64-73

REFERENCES

BDO Ukraina. (2025). *From Logistics to Technology: How Ukraine Plans to Achieve a 50% Increase in Exports by 2030?* https://www.bdo.ua/en-gb/insights-1/information-materials/2025/ukraine%E2%80%99s-national-export-strategy-by-2030

Bocken N. & Konietzko J. (2022). Circular business model innovation in consumer-facing corporations. *Technological Forecasting and Social Change, 185*, Art. 122076. https://doi.org/10.1016/j.techfore.2022.122076

Chang K., Zhang H. & Li B. (2024). The impact of digital economy and industrial agglomeration on the changes of industrial structure in the Yangtze River Delta. *Journal of the Knowledge Economy, 15*, 9207–9227. https://doi.org/10.1007/s13132-023-01448-w

Derzhavna mytna sluzhba Ukrainy. (2025). *Tsyfrovizatsiia, modernizatsiia, dovira: yak mytnytsia zminiuvala vzaiemodiiu z biznesom u 2025 rotsi* [Digitalization, modernization, trust: how customs changed interaction with business in 2025]. https://customs.gov.ua/news/it-transformatsiia-62/post/tsifrovizatsiia-modernizatsiia-dovira-iak-mitnitsia-zminiuvala-vzaiemodiiu-z-biznesom-u-2025-rotsi-2619

Dunska A. R. & Pinchuk O. V. (2025). Innovatsiini instrumenty rozvytku zovnishnoekonomichnoi diialnosti pidpryiemstv [Innovative tools for the development of foreign economic activity of enterprises]. *Stalyi rozvytok ekonomiky, 6*, 795–801. https://doi.org/10.32782/2308-1988/2025-57-110

Heiets V. M. (2024). Superechnosti ta perspektyvy ekonomichnoho zrostannia na innovatsiinii osnovi v Ukraini [Contradictions and prospects of economic growth on an innovative basis in Ukraine]. *Ekonomika Ukrainy, 11*, 3–28. https://doi.org/10.15407/economyukr.2024.11.003

Khomiuk N. L. & Bilous O. L. (2024). Innovatsiini stratehii upravlinnia zovnishnoekonomichnoiu diialnistiu pidpryiemstva v umovakh tsyfrovoi transformatsii [Innovative strategies for managing foreign economic activity of the enterprise under digital transformation conditions]. *Ekonomika ta suspilstvo, Vyp. 69*. https://doi.org/10.32782/2524-0072/2024-69-129

Klepikova S. V., Yatsyna S. H. & Druhova O. S. (2021). Osoblyvosti upravlinnia zovnishnoekonomichnoiu diialnistiu pidpryiemstv [Features of management of foreign economic activity of enterprises]. *Ekonomika. Finansy. Pravo, Vyp. 11*, 18–22. https://doi.org/10.37634/efp.2021.11.3

Kore G. (2023). On the role of innovation and market structure on trade performance: is Schumpeter right? *European Journal of Management and Business Economics, 2*(32), 241–256. https://doi.org/10.1108/EJMBE-07-2021-0213

Lyu Y., Wang L. & Lu Y. (2026). Opening new paths to enterprise total factor productivity improvement: evidence from cross-border e-commerce pilot in China. *Economia Politica, 43*, 129–160. https://doi.org/10.1007/s40888-025-00392-z

Malyarets L. M., Otenko V. I., Budarin O. S. & Skliar T. P. (2024). The technology for assessing the development of export-import activities of economic entities. *Biznes Inform, 10*, 64–73. https://doi.org/10.32983/2222-4459-2024-10-64-73

Montégu J. P., Pertuze J. A. & Calvo C. (2022). The effects of importing activities on technological and non-technological innovation: evidence from Chilean firms. *International Journal of Emerging Markets, 7*(17), 1659–1678. https://doi.org/10.1108/IJOEM-05-2020-0534

Natsionalnyi instytut stratehichnykh doslidzhen. (2025). *Zovnishnia torhivlia Ukrainy tovaramy: pidsumky 2025 roku* [Foreign trade of Ukraine in goods: results of 2025]. https://niss.gov.ua/doslidzhennya/mizhnarodni-vidnosyny/zovnishnya-torhivlya-ukrayiny-tovaramy-pidsumky-2025-roku

Nyzhnyk V. & Nyzhnyk I. (2025). Zovnishnoekonomichna diialnist promyslovykh pidpryiemstv: innovatsiini pidkhody u pidvyshchenni konkurentnykh perevah [Foreign economic activity of industrial enterprises: innovative approaches to increasing competitive advantages]. *Modeling the Development of the Economic Systems, 2*, 120–123. https://doi.org/10.31891/mdes/2025-16-14

Ponomarenko V. S., Maliarets L. M., Vnukova N. M. & ta in. (2024). *Innovatsiinyi rozvytok diialnosti subiektiv hospodariuvannia v umovakh voiennoho ta povoiennoho stanu: teoriia, praktyka, analityka*: monohrafiia [Innovative development of business entities' activity in the conditions of martial law and post-

war state: theory, practice, analytics: monograph]. Kharkiv: KhNEU im. S. Kuznetsia. http://repository.hneu.edu.ua/handle/123456789/33198

ukrstat.gov.ua. Derzhavna sluzhba statystyky Ukrainy [State Statistics Service of Ukraine]. https://www.ukrstat.gov.ua/

Vnukova N. (2025). Innovatsiinyi rozvytok eksportno-importnoi diialnosti dlia ekonomichnoi stiikosti v umovakh voiennoho stanu [Innovative development of export-import activity for economic stability under martial law conditions]. *Acta Academiae Beregsasiensis. Economics, Vyp. 9*, 125–139. https://doi.org/10.58423/2786-6742/2025-9-125-139

Zubko T., Kovshova I., Ilchenko N., Laptieva V. & Vavdiichyk I. (2021). Evaluation of innovative activity of enterprises in the conditions of European integration. *Eastern-European Journal of Enterprise Technologies, 13*(3), 63–73. https://doi.org/10.15587/1729-4061.2021.235950

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