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THE TECHNOLOGY FOR ASSESSING THE DEVELOPMENT OF EXPORT-IMPORT ACTIVITIES OF ECONOMIC ENTITIES

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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

The article is aimed at forming theoretical provisions for assessing the development of export-import activity of the enterprise, developing methodological support and technology for carrying out this assessment, practical recommendations for its implementation. The article notes the relevance of creating a technology for the development of export-import activities of economic entities in modern conditions. On the basis of the analysis of the scientific works of foreign and domestic scholars, practical experience of domestic enterprises, the theoretical provisions of the assessment of the development of export-import activities are substantiated. The main directions of development of export-import activities in Ukraine in modern conditions are summarized. A technology for assessing the development of export-import activities of economic entities is developed. The methodological support for the assessment of the development of export-import activities of economic entities is substantiated, which contains recommendations for the use of tools for the implementation of each stage of the technology of this assessment. A system of partial indicators of internal and external environments that affect the level of development of export-import activity of the enterprise is provided. It is proposed to determine: the level of development of export-import activity of an enterprise using an integral taxonomic indicator of development; influence of internal and external environmental factors on the level of development of export-import activity of the enterprise – paired regression models; delayed influence of internal and external environmental factors on the level of development of export-import activity of the enterprise – dynamic econometric models (with distributed lag and autoregression). The developed technology for assessing the development of export-import activities of economic entities is of practical importance in modern conditions.

Keywords: *technology of assessment, development of export-import activity, directions of development of export-import activity, provisions of assessment, methodological support of technology stages.*
Fig.: *3.* ***Tabl.:*** *1.* ***Bibl.:*** *23.*

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Малярець Л. М., Отенко В. І., Бударін О. С., Скляр Т. П. Технологія оцінки розвитку експортно-імпортної діяльності суб'єктів господарювання

Метою статті є формування теоретичних положень оцінки розвитку експортно-імпортної діяльності підприємства, розроблення методичного забезпечення та технології здійснення цієї оцінки, практичних рекомендацій щодо її реалізації. У статті зазначено актуальність розроблення технології розвитку експортно-імпортної діяльності суб'єктів господарювання в сучасних умовах. На основі аналізу праць закордонних і вітчизняних учених, практичного досвіду вітчизняних підприємств обґрунтовано теоретичні положення оцінки розвитку експортно-імпортної діяльності. Узагальнено основні напрями розвитку експортно-імпортної діяльності в Україні в сучасних умовах. Розроблено технологію оцінки розвитку експортно-імпортної діяльності суб'єктів господарювання. Обґрунтовано методичне забезпечення оцінки розвитку експортно-імпортної діяльності суб'єктів господарювання, яке містить рекомендації щодо застосування інструментів реалізації кожного етапу технології цієї оцінки. Надано систему частинних показників внутрішнього та зовнішнього середовищ, що впливають на рівень розвитку експортно-імпортної діяльності підприємства. Запропоновано визначати: рівень розвитку експортно-імпортної діяльності підприємства за допомогою

інтегрального таксономічного показника розвитку; вплив факторів внутрішнього та зовнішнього середовищ на рівень розвитку експортно-імпортної діяльності підприємства – парних регресійних моделей; запізнюючий вплив факторів внутрішнього та зовнішнього середовищ на рівень розвитку експортно-імпортної діяльності підприємства – динамічних економетричних моделей (з розподіленим лагом і авторегресією). Розроблена технологія оцінки розвитку експортно-імпортної діяльності суб'єктів господарювання має практичне значення в сучасних умовах.
Ключові слова: *технологія оцінки, розвиток експортно-імпортної діяльності, напрями розвитку експортно-імпортної діяльності, положення оцінки, методичне забезпечення етапів технології.*
Рис.: *3.* ***Табл.:*** *1.* ***Бібл.:*** *23.*

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The activities of economic entities are carried out in the context of wartime challenges, namely: high security risks; destruction of energy infrastructure, which requires a long period and resources for its restoration and which in a certain way slows down the recovery of production activity in some types of activities; logistic problems; difficult situation in the labor market due to high migration; lack of available credit resources [1]. Such operating conditions had a negative impact on Ukraine export and import indicators (*Fig. 1*).

As can be seen from Fig. 1, during 2021–2024 there is a significant decrease in exports, which led to an increase in the negative balance between exports and imports, and therefore a decrease in one of the indicators of Ukraine's development.

Modern challenges to the national economies of the EU countries have led to the development of a comprehensive strategy of economic security, which is aimed at protecting the interests and values of the EU in a changing global environment. The Economic Security Strategy has three priorities, namely: promot-

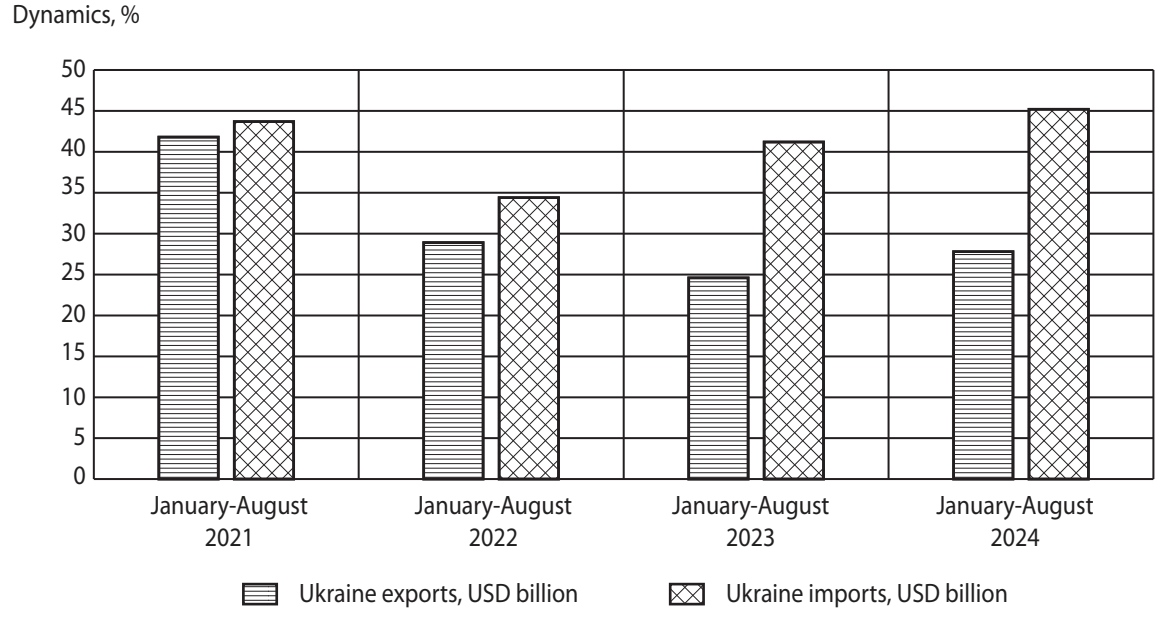

Fig. 1. Dynamics of Ukraine exports and imports during 2021–2024

ing competitiveness and growth in the EU; protection against risks to economic security; promoting international cooperation and partnership with «like-minded countries». These priorities aim to create a framework for the robust assessment and management of the risks taking place in the combination of economic openness and security in a global environment. To ensure the economic security of Ukraine, it is important to develop a technology for assessing the development of export-import activities of enterprises (EIAE) as conductors of export-import activities of the country [1].

A large number of foreign and domestic scientists were engaged in solving the problems of assessment and analysis of export-import activities. The fundamental issues of the development of export-import activities and the formation of strategies for these activities are covered in numerous works of Ukrainian and foreign scholars. A significant contribution to solving this problem was made by such foreign authors as: Jackson, Emerson Abraham, Jabbie Mohamed [2], Jawaid, S. T., Waheed, A., Siddiqui, A. H. [3], Katsikeas C. S., Leonidou L. C., Morgan N. A. [4], Seyoum B. [5], Smith, M. P. [6], and others. Among domestic researchers, special attention should be paid to the following works: Baliuk Yu. S. [7], Hrynko P. V. [8], Kuzmina O. Ye. [9], Mazaraki A. A. [10], Melnyk O. H. [11], Melnyk T. M. [12], Piddubna L. I. [13], Ponomarenko V. S. [14], Fatianova D. V. [15], Shtal T. V. [16], and others. The results of scientific research of these researchers undoubtedly testify to the essential significance of their contribution to the development of export-import activities. However, it should be noted that the existing developments are of a general and fragmentary nature, in particular, concerning the formation of scientific and methodological support for assessing the development of export-import activities of the enterprise.

The article is aimed at forming theoretical provisions for assessing the development of export-import activities of the enterprise, developing methodological support and technology for carrying out this assessment, practical recommendations for its implementation.

An analysis of the scientific works of the abovementioned authors made it possible to systematize the directions of development of export-import activities in modern conditions (*Tab. 1*).

Table 1

The main directions of development of export-import activities in Ukraine in modern conditions

Directions of development of export-import activities	Conditionality of the direction
Sustainable development of EIAE	The direction is determined by the theory of sustainable development
Directed development of EIA	The direction is determined by the theory of directed development of the enterprise
Cyclical development of EIA	The direction is determined by the theory of cyclical development
Evolutionary development of EIA	The direction is determined according to the conception of evolutionary development of the enterprise
The direction of EIA development related to the life cycles of the enterprise	The direction is determined according to the conception of the life cycle of the enterprise
Transformative development of EIA	The direction is due to systemic transformations in the economy and the transition to a new quality of the system
Development of EIA based on the digitalization of the economy	The direction is determined by the transition to the digital economy
Innovative development of EIA	The direction is realized according to the strategy of innovative development of the economy of Ukraine and the Sustainable Development Goals of Ukraine

To ensure the reliability, adequacy, effectiveness of the assessment of the development of export-import activities of economic entities, it is important to comply with the relevant theoretical provisions, namely:

1. Assessment of the development of export-import activities of economic entities should be carried out methodologically, with the definition of the subject, object, principles, aim, objectives, types of assessment, functions, technology, methods, results.
2. To ensure adequacy, the assessment of the development of export-import activities of economic entities must correspond to the real content of this development, its substantive essence, contentual, conceptual, informational, mathematical model.

3. Assessment of the development of export-import activities of the enterprise should be multidimensional, multi-criteria, and comparable. The multidimensionality of the assessment is explained by the multidimensionality of the features that describe this development. Many goals of the development of export-import activities determine the multi-criteria of the latter due to: increasing the efficiency of these activities; efficiency of using export-import potential; entering new foreign and domestic markets; spread of the import substitution process, etc. Comparability of the assessment provides an opportunity to compare the activities of competitors in markets and analyze their dynamics.
4. The validity of the assessment of the development of export-import activities of economic entities depends on the validity of the system of partial indicators that describe this development. In turn, this system of indicators must meet the following requirements: adequacy in reflecting the content of the object; representativeness or reliability in the reflection of the relevant properties of the object; completeness, i. e. contain the necessary and sufficient information on the object; accessibility, i. e. be contained in various forms of reporting or the possibility of calculations at the enterprise; relevance, i. e. the ability to preserve the value of information for a certain period; timeliness, i. e. receipt by the appropriate period of time; sustainability, which implies the possession of the property of maintaining accuracy; accuracy, which is mostly based on documentary basis, various forms of reporting and accounting; be hierarchical, multidimensional; be expressed by metric and non-metric values of features; be limited; contain information comparable in space and time, be heuristic, i. e. allow obtaining new knowledge [17].
5. The level of assessment of the development of export-import activities is expressed by the value of the integral indicator, obtained by means of a convolution of the system of partial indicators of this development. It is recommended to make a convolution of partial indicators using the method of calculating the taxonomic integral indicator of development or the Harrington quality indicator [18]. The integral indicator of the level of development has its advantages, namely: it has a clear interpretation, a simple calculation algorithm. The taxonomic integral of the development indicator acquires values from 0 to 1. The closer the value of the integral indicator is to 1, the higher the level of development of export-import activities of the enterprise. Harrington's integral quality indicator takes into account the qualitative levels of development of the phenomenon, but at the same time requires the establishment of reference points that are determined by experts, which complicates its calculation.
6. Determination of the forecast values of indicators of development of export-import activities provides an opportunity to better understand the results of this assessment. To calculate the forecast values of indicators of development of export-import activities, formalized methods are recommended, such as econometric models and non-formalized ones, e. g. scenario forecasting.
7. The process of assessing the development of export-import activities of economic entities should be carried out technologically. The assessment technology corresponds to the aim, goals, and objectives of the assessment.
8. The choice of mathematical tools determines the objectivity, adequacy and reliability of the assessment of the development of export-import activities. On the other hand, the technology of assessment directs the choice of mathematical methods, and it is the content of its stages that determines this choice.
9. Innovation as a key modern characteristic of the development of export-import activities of economic entities should be taken into account in the assessment. In their research, the authors proposed to consider the innovative development of export-import activities of economic entities as an irreversible, directed, natural change in the state of these activities into a new qualitative and quantitative level, which is due to innovations in the effective use of the export-import potential of the corresponding economic entities [19]. In particular, in assessing the development of export-import activities of economic entities, it is necessary to take into account such features of the innovative property of this development, as digitalization of the activities, innovative competitiveness of human capital, increase in innovatively active enterprises, differentiation of the origin of investments and verification of their purity, transition in international trade from *off-shoring* to *friend-shoring* (friendly investments), etc.

10. The results of the assessment of the development of export-import activities of economic entities should be used in determining war risks and insurance against such risks.
11. The assessment of the development of export-import activities of economic entities should be heuristic, i. e. provide opportunities for obtaining new knowledge about this development.

Thus, the substantiated provisions of the assessment of development of export-import activities of economic entities strengthen the methodology of this assessment and contribute to the validity of technology of its implementation, the development of methodological support. It is recommended to implement the technology for assessing the development of export-import activities at the enterprise according to the appropriate technological stages (*Fig. 2*). The first stage of the technology is the substantiation of the aim and objectives of assessing the development of EIAE. The aim of the assessment consists in determining objectively the value of the level of development of EIAE, to conduct an analysis and on this basis to form a conclusion for the development of an appropriate managerial decision. The objectives of assessing the development of EIAE should include: measurement of the values of elementary and complex features of activity; control over the achievement of orientation targets; comparability of assessment in dynamics and statics; identification of development reserves; identification of critical situations. A contentual model of development of EIAE should reflect structural elements, main characteristics, criteria, processes and mechanisms, driving forces of development.

Taking into account the limitations of the effective statistical, accounting, financial information in modern conditions and the recommendations of recognized experts in the analysis of export-import activities of the enterprise, the system of partial indicators that determine the development of export-import activities should include the following indicators: revenue from the sale of products for export, thousand UAH (x_1), net income from the sale of products (goods, works, services), thousand UAH (x_2), gross profit, thousand UAH (x_3), net financial result, thousand UAH (x_4), gross profitability, % (x_5), profitability of activities, % (x_6), volume of products sold (goods, works, services) in the domestic market, thousand UAH (x_7), exports efficiency ratio (x_8), imports efficiency ratio (x_9), overdue liabilities ratio (x_{10}), level of use of production capacities, % (x_{12}), capital investments total, thousand UAH (x_{12}), labor productivity of one worker of industrial and production personnel (IPP), thousand UAH/person/month (x_{13}), proportion of employees engaged in scientific and technical activities, % (x_{14}), use of assets, total, thousand UAH (x_{15}), fixed assets, thousand UAH (x_{16}) [15, 17].

The stage of formation of a structured feature space for the development of EIAE involves the development of a space of elementary and complex features, in accordance with the structure, the identification of defining characteristics and criteria. As a result of the implementation of the stage of formation of a system of indicators, the EIAE receives a system of partial indicators.

To determine the level of development of export-import activities of a modern industrial enterprise, it is necessary to collapse the recommended system of partial indicators into one value using the mathematical method of developing an integral taxonomic indicator of development by V. Pliuta. Fig. 3 shows the dynamics of the taxonomic integral indicator of the development of export-import activities of JSC «Ukrainian Energy Machines» during 2017–2023 [20].

The sixth stage of the technology is to determine the influence of internal environmental factors on the level of development of EIAE. Thus, the influence of internal environmental factors on the level of the integral taxonomic indicator of the development of the enterprise JSC «Ukrainian Energy Machines» is determined by the following regression equations:

$$I = \sqrt{0{,}169 + (1{,}214\text{E-}12)x_1^2}, \quad R^2 = 62{,}591\%;$$

$$I = 0{,}934 - \frac{586355}{x_2}, \quad R^2 = 99{,}386\%;$$

$$I = \sqrt{0{,}633 + \frac{115113}{x_3}}, \quad R^2 = 96{,}717\%;$$

$$I = \left(0{,}81 - \frac{1108{,}83}{x_4}\right)^2, \quad R^2 = 84{,}9441\%;$$

$$I = \sqrt{-1{,}2696 + 0{,}506\ln x_5}, \quad R^2 = 94{,}208\%;$$

$$I = e^{-0{,}411 - \frac{0{,}217}{\delta_6}}, \quad R^2 = 86{,}295\%;$$

$$I = \sqrt{-4{,}9789 + 0{,}376\ln x_7}, \quad R^2 = 95{,}941\%;$$

$$I = \left(1{,}699 - \frac{1{,}044}{x_8}\right)^2, \quad R^2 = 35{,}395\%;$$

$$I = e^{7{,}527 - \frac{8{,}595}{x_9}}, \quad R^2 = 67{,}11\%;$$

$$I = e^{0{,}317 - \frac{0{,}15}{x_{10}}}, \quad R^2 = 73{,}37\%;$$

$$I = \frac{1}{-1{,}029 + \frac{154{,}135}{x_{11}}}, \quad R^2 = 80{,}3147\%;$$

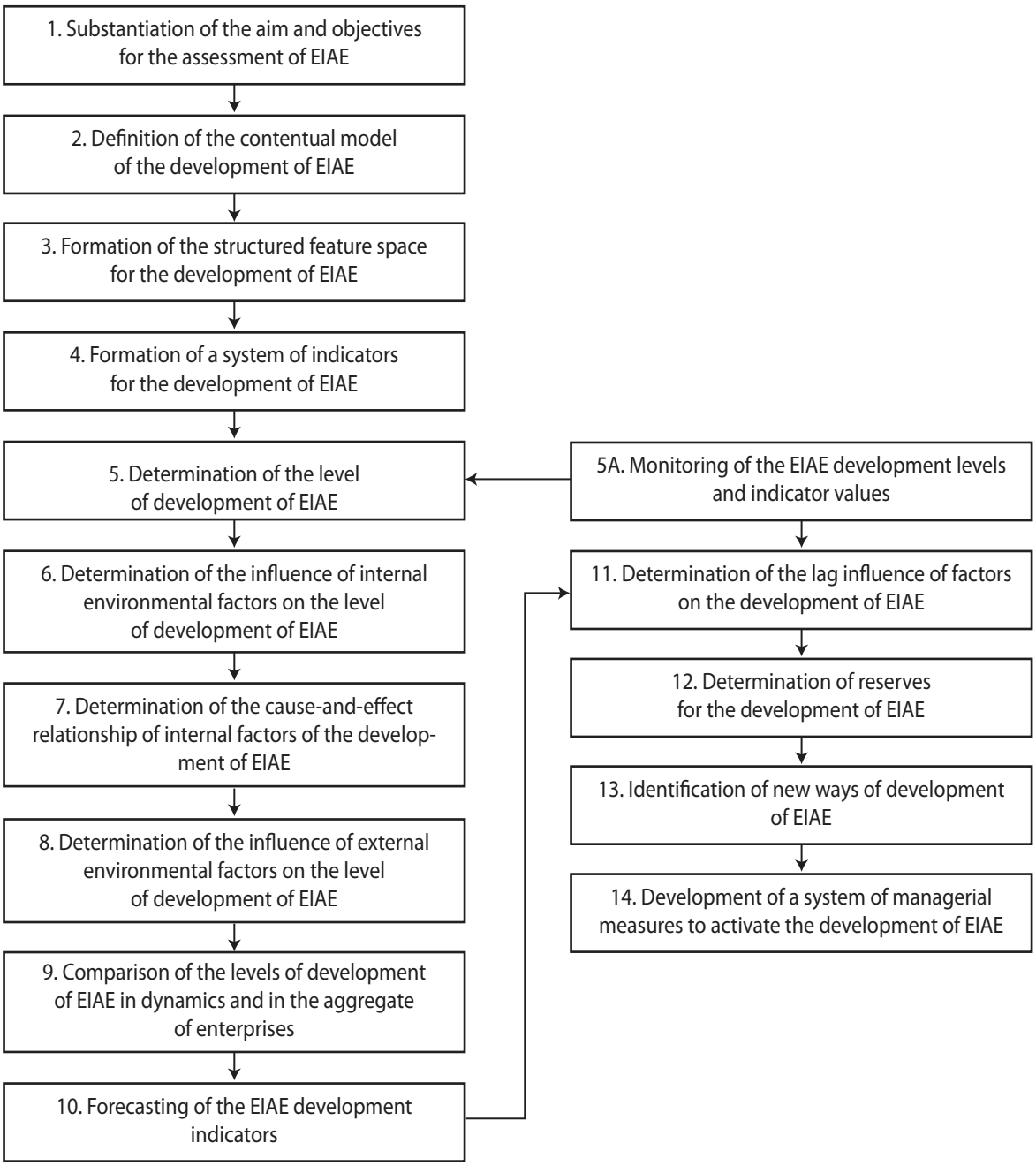

Fig. 2. The technology for assessing the development of export-import activities of the enterprise

$$I=\sqrt{0{,}21+(1{,}018\text{E-}10)x_{12}^2},\quad R^2=14{,}868\,\%;$$

$$I=\sqrt{-2{,}5556+0{,}275\ln x_{13}},\quad R^2=92{,}317\,\%;$$

$$I=\frac{1}{-1{,}0112+\frac{21{,}308}{x_{14}}},\quad R^2=80{,}096\,\%;$$

$$I=\frac{1}{0{,}617+\frac{1{,}101\text{E}7}{x_{15}}},\quad R^2=11{,}295\,\%;$$

$$I=\frac{1}{-0{,}878+\frac{2{,}949\text{E}7}{x_{16}}},\quad R^2=51{,}955\,\%.$$

Factors of the internal environment have different effects on the level of development of export-import activities of the enterprise. The analysis of the value of the determination ratio shows that the influencing factors are net income from the sale of products (goods, works, services) (x_2), gross profit (x_3), volume of products sold (goods, works, services) in the domestic market (x_7), gross profitability (x_5), labor productivity of one worker of industrial and production personnel (IPP) (x_{13}), profitability of activities (x_6), net financial result (x_4), level of use of production capacities (x_{11}), proportion of employees engaged in scientific and technical activities (x_{14}), overdue liabilities ratio (x_{10}), imports efficiency ratio (x_9), revenue from

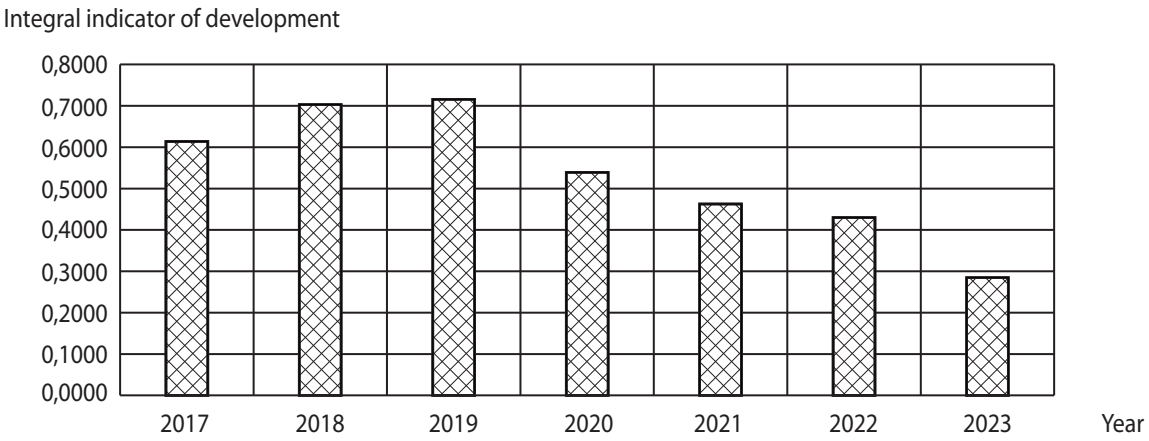

Fig. 3. Dynamics of the integral taxonomic indicator of the development of export-import activities of JSC «Ukrainian Energy Machines» during 2017–2023

the sale of products for export (x_1), fixed assets (x_{16}). The level of development of export-import activity of the enterprise is not affected by such factors as: capital investments, total (x_{12}), use of assets, total (x_{15}), and is not significantly affected by the factor of export efficiency (x_9). It should also be noted that the influence of internal environmental factors on the level of development of export-import activity of the enterprise is non-linear and is determined by a different type of non-linear function.

To determine the cause-and-effect relationship of internal factors in the development of EIAE, it is recommended to use multidimensional factor analysis.

The factors of the external environment are: GDP in actual prices (X_1, billion UAH), volumes of exports of goods (X_2, million USD), imports of goods (X_3, million USD), accounting balance of goods (X_4, million USD), volumes of exports of services (X_5, million USD), imports of services (X_6, million USD), accounting balance of services (X_7, million USD), volume of industrial products sold (X_8, billion UAH), consumer price index (to the corresponding month of the previous year, X_9, %), million USD), direct investments: assets (X_{10}, million USD), direct investments: liabilities (X_{11}, million USD), income from capital transactions (X_{12}, million UAH), revenues of the State Budget from the European Union, foreign governments, international organizations, donor institutions (X_{13}, million UAH) [8; 15; 19]. The influence of these factors on the level of the integral indicator of the development of export-import activities of the enterprise JSC «Ukrainian Energy Machines» is determined by the following regression equations:

$$I = 4{,}854 - 0{,}5487\ln X_1, \quad R^2 = 53{,}569\,\%;$$

$$I = -0{,}442 + \frac{34215}{X_2}, \quad R^2 = 53{,}569\,\%;$$

$$I = \sqrt{-0{,}569 + \frac{37923{,}1}{X_3}}, \quad R^2 = 76{,}054\,\%;$$

$$I = \sqrt{0{,}403 + 0{,}000024X_4^2}, \quad R^2 = 34{,}975\,\%;$$

$$I = -0{,}815 + \frac{17918{,}6}{X_5}, \quad R^2 = 78{,}166\,\%;$$

$$I = \frac{1}{(-1{,}233 + 0{,}00032X_6)}, \quad R^2 = 64{,}332\,\%;$$

$$I = \frac{1}{(3{,}681 - 0{,}00025X_7)}, \quad R^2 = 32{,}162\,\%;$$

$$I = \sqrt{-0{,}36 + \frac{1450{,}89}{X_8}}, \quad R^2 = 81{,}117\,\%;$$

$$I = \sqrt{0{,}099 + 0{,}00019X_9^2}, \quad R^2 = 51{,}293\,\%;$$

$$I = \sqrt{0{,}279 - 0{,}00042X_{10}}, \quad R^2 = 25{,}835\,\%;$$

$$I = \sqrt{0{,}236 - 0{,}000018X_{11}}, \quad R^2 = 10{,}477\,\%;$$

$$I = 4{,}63 - 0{,}541\ln X_{12}, \quad R^2 = 72{,}59\,\%;$$

$$I = \frac{1}{(3{,}005 + (2{,}02E - 11)X_{13}^2)}, \quad R^2 = 59{,}162\,\%.$$

Thus, according to the value of the determination ratio, it follows that the change in the level of development of export-import activities of the enterprise is explained by changes in GDP in actual prices (X_1), the volume of industrial products sold (X_8), the volume of exports of services (X_5), imports of goods (X_3), the accounting balance of telecommunication services (X_{12}), the accounting balance of telecommunication services (X_{12}), the accounting balance of computer ser-

vices (X_{13}), the imports of services (X_6), the revenues of the State Budget from the European Union, foreign governments, international organizations, donor institutions (X_{13}), the volume of exports of goods (X_2), the consumer price index (to the corresponding month of the previous year (X_9). Change in the level of development of export-import activities of the enterprise is less explained by changes in the accounting balance of goods (X_4) and the accounting balance of services (X_7). Insignificant changes in the level of development of export-import activities of the enterprise are less explained by the volume of direct investments: assets (X_{10}) and direct investments: liabilities (X_{11}). It should be noted that this influence of external environmental factors on the level of development of export-import activities of the enterprise is also non-linear, and the form of influence has a different type of non-linear function.

To forecast the indicators of the development of export-import activities, it is recommended to use growth curves, which make it possible to determine the main trend of changes in the values of indicators and on this basis to extrapolate to subsequent periods.

The impact on the development of export-import activities is also due to the delayed influence of internal and external environmental factors. It is advisable to determine this effect using dynamic econometric models, such as distributed lag models and autoregression models. For example, the level of development of export-import activities of the enterprise is influenced not only by the current values of GDP in actual prices (X_1, billion UAH), but also by the lag values, for example, with a delay of one or two periods. The model with a distributed lag of the level of development of export-import activities of the enterprise JSC «Ukrainian Energy Machines» during 2017-2023 is as follows:

$$I = 0{,}758 - 0{,}00014X_1Lg2, \quad R^2 = 96{,}91\%.$$

Thus, the constructed multifactor regression linear model shows that taking into account the delayed influence of GDP in actual prices, the level of development of export-import activities of the enterprise is influenced by the lag variable with a delay of two periods. Compared to the influence of this lag variable, the influence of current values, lag values with a delay in one period of the GDP factor in actual prices, turned out to be insignificant.

The analysis of the scientific works of Fatenok-Tkachuk A. O., Danylko A. R. [21], Padii I. O. [22], Oliinyk T. O., Korotunova O. V., Vecherko O. M. [23], among others, shows that the reserves for the development of export-import activities of the enterprise should be distinguished as those that are sought and those that are formed. It is advisable to consider the reserves for the development of export-import activities of the enterprise as inefficiently used opportunities for this activity. It is recommended to determine the reserves for the development of export-import activities of the enterprise on the basis of a comparative analysis of the actual values of indicators with the optimal or forecast ones.

A special stage of the assessment technology is the monitoring of the levels of development of EIAE and the values of indicators. Thanks to monitoring tools, the course of the process of development of EIAE is observed, evaluated and forecast. Also, thanks to monitoring, the organizational content of the process of managing the development of EIAE is formed. The organizational content of the management process is manifested in the sequence of using organizational levers of influence, namely regulation, rationing, instructing and indicating measures of responsibility for the performance or non-performance of the assigned work. Each of these levers provides for a monitoring procedure or its elements. The technology for assessing the development of EIAE, which contains the monitoring stage, more fully implements the functional content of the management process and provides information support for all management functions. This is due to the fact that functionally monitoring is implemented through systematic tracking, observation, evaluation, control and forecasting of the states of export-import activities at the enterprise. It should also be noted that monitoring is the main procedure and one of the main processes of the information system of the enterprise, since it searches for information, collects information, transmits information in the EIAE management system [17].

Therefore, according to the specified logic of the stages of the technology for assessing the development of EIAE, both the performance of its function and the entire management process at the enterprise is provided with objective, reliable information. In the process of implementing the technology for assessing the development of EIAE, it is necessary to adhere to the provisions that are substantiated in the work, since they scientifically base the assessment process. The provisions of the assessment take into account the current features and the main directions of development of export-import activities in Ukraine in modern conditions. The presented solution of analytical problems of the stages of development assessment technology is of practical importance for all economic entities. ■

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