

UDC 338.1

JEL Classification: C13, D50

DOI: <https://doi.org/10.20535/2307-5651.30.2024.313037>**Petrenko Anastasia**

Master Student

ORCID ID: 0009-0002-7414-9521

Artemenko Lina

PhD in Economics, Associate Professor

(corresponding author)

ORCID ID: 0000-0002-8585-0252

Mokhonko Hanna

PhD in Economics, Associate Professor

ORCID ID: 0000-0003-2126-6871

*National Technical University of Ukraine
"Igor Sikorsky Kyiv Polytechnic Institute"***Петренко А. С., Артеменко Л. П., Мохонько Г. А.***Національний технічний університет України**«Київський політехнічний інститут імені Ігоря Сікорського»*

ASSESSMENT APPROACHES OF THE ECONOMIC SUSTAINABILITY OF INDUSTRIAL ENTERPRISES

ПІДХОДИ ДО ОЦІНЮВАННЯ ЕКОНОМІЧНОЇ СТІЙКОСТІ ПРОМИСЛОВИХ ПІДПРИЄМСТВ

The subject of this study is the development of an approach to assessing the level of economic sustainability of domestic metallurgical enterprises. The article uses general scientific and specific research methods, including analysis, synthesis, comparison, historical, systematic, logical, and graphic methods. The authors analyzed various approaches to defining the essence of the category of economic sustainability, detailed its constituent elements, and classified approaches to its assessment. The author's proposed methodology for assessing the economic sustainability of metallurgical enterprises was tested using the example of one of the largest Ukrainian companies in the industry. The practical significance of the research results is that the developed methodology not only determines the level of economic sustainability of metallurgical enterprises but also serves as a basis for adaptation when assessing the economic sustainability of enterprises in other branches of the national economy.

Keywords: *economic sustainability of the enterprise, level of economic sustainability of the enterprise, assessment of economic sustainability of the enterprise, components of economic sustainability of the enterprise, management of economic sustainability of the enterprise.*

Предметом даного дослідження є проблематика оцінювання та визначення рівня економічної стійкості промислових підприємств, зокрема металургійної галузі. Актуальність теми дослідження обґрунтовано необхідністю оцінки впливу повномасштабної війни на підприємства-виробників групи товарів, що протягом всього періоду незалежності України завжди була основою експорту разом з сільськогосподарською продукцією. Сьогодні ж, саме ці галузі чи не найбільше економічно втратили з початком великої війни. Для створення плану повоєнного відновлення важливим етапом є розуміння відправної точки – поточного стану рівня економічної стійкості підприємств. У статті використовуються загальнонаукові і специфічні методи дослідження, серед яких можна виокремити: критичний, системний і структурний аналіз і синтез, порівняння, історичний метод, системний підхід, дедукція, логічний і графічний методи. Авторами проаналізовано різні підходи до визначення сутності категорії, визначено їх переваги та недоліки. Наведено авторське трактування економічного поняття «економічна стійкість». Деталізовано складові елементи економічної стійкості промислового підприємства. Визначено основні етапи процесу управління економічною стійкістю промислового підприємства. Класифіковано існуючі підходи до оцінювання економічної стійкості підприємств. Представлена авторська методика оцінювання економічної стійкості вітчизняних металургійних підприємств, з урахуванням недоліків розглянутих підходів. Запропонований авторами підхід до визначення рівня економічної стійкості апробований на прикладі одного з найбільших українських металургійних підприємств. За результатами оцінювання рівня економічної стійкості запропоновано заходи щодо її підвищення. Практична значущість результатів дослідження полягає в тому, що розроблена методика дозволяє визначити рівень економічної стійкості металургійних підприємств, а також виступає базою для адаптації при оцінці рівня економічної стійкості підприємств галузей національної економіки.

Ключові слова: *економічна стійкість підприємства, рівень економічної стійкості підприємства, оцінка економічної стійкості підприємства, складові економічної стійкості підприємства, управління економічною стійкістю підприємства.*

Problem statement. In the modern conditions of the functioning of domestic industrial enterprises, financial analysis departments mostly focus on monitoring the company's financial condition, particularly its financial stability. However, this is only one of the components of the enterprise's overall economic stability in an unstable market environment. The enterprise's financial stability analysis reflects its solvency, liquidity, and profitability but does not cover other essential business processes, such as investment activities, environmental safety, technical support, etc. For management to understand the complete picture, it is necessary to analyse the economic sustainability of the enterprise, which includes all the main components of its functioning subsystem. Ensuring a high level of economic stability becomes one of the main tasks of enterprise management, which, in turn, requires an adequate approach to assessment. In contrast to financial stability, scientific sources still do not present a single methodology for determining an enterprise's economic stability level.

Analysis of recent research and publications. Many scientists have studied the problem of assessing the economic sustainability of industrial enterprises. Among Ukrainian scientists, V.I. Aranchii, M.O. Udovichenko, I.L. Sitak, I.M. Murashko, S.M. Krolenko, S.S. Birbirenko, Yu.O. Zhadanova made a significant contribution to the study of this topic – in their works, they considered methods and approaches to assessing the economic sustainability of enterprises, particularly with an emphasis on financial and economic sustainability and factors affecting this indicator. Foreign economists such as R. Brealey, S. Myers, J. Friedman, and J. Schumpeter have also actively researched this topic in the context of the stability of enterprises in the changing external environment.

However, despite the variety of approaches and numerous scientific works, the problem of developing a comprehensive methodology that would assess the enterprise's economic sustainability and consider the peculiarities of industrial enterprises in the metallurgical industry remains relevant.

Formulating the purposes of the article. The purpose of the article is to systematize the approaches to the interpretation of the concept of economic sustainability of an enterprise and methods of its assessment available in literary sources, clarify the structure of the system of economic sustainability of an industrial enterprise, and develop and test the methodology for assessing the level of economic sustainability of metallurgical enterprises.

Presentation of the main research material. The metallurgical industry is important for the Ukrainian economy, as it occupies a leading place in the structure of the country's exports. Therefore, the blow suffered by metallurgical enterprises as a result of the start of full-scale Russian military aggression against Ukraine was particu-

larly «tangible» for the national economy. The total iron and steel production volumes decreased significantly in 2022–2023. (Table 1).

The negative dynamics of performance indicators of Ukrainian enterprises can also be traced in other sectors of the economy. Long-term restrictions on the supply of electricity, price increases for tariffs, a decrease in the purchasing power of consumers, migration (of consumers, employees, partners), logistical challenges, etc., inevitably lead to the deterioration of the financial condition of subjects of economic activity. According to the analytical data of the Opendatabot service [3], from March 2022 to November 2023, 6,482 companies in Ukraine began the closure process, of which 1,102 went bankrupt (17%). Such trends actualize the issue of determining the current level and developing measures to ensure the economic sustainability of domestic industrial enterprises.

Considering the large number of studies in the «economic sustainability» category, scientists and economic science experts interpret this concept differently. M. Savchenko, researching the development of the categorical basis «economic sustainability», singles out four main approaches to the interpretation of the essence of this concept, each of which has the author's concepts [4]:

1. Economic stability as financial stability.
2. Economic stability as the stability of activity and the equilibrium state of the micro-level socio-economic system.
3. Economic sustainability as an opportunity or ability.
4. Economic stability as support for optimal characteristics of the micro-level socio-economic system.

Each of these approaches has its advantages and disadvantages. Thus, the approach that equates economic sustainability with financial sustainability greatly simplifies its understanding and evaluation, as it excludes all other components of economic sustainability, focusing on only one of them. Equating economic stability to economic equilibrium helps assess the enterprise's short-term (current) state, where economic equilibrium essentially acts as an indicator of economic sustainability. However, such a comparison of these concepts in the long term may lead to an underestimation of significant trends and potential risks. In our opinion, the most correct and comprehensive is understanding the concept of «economic sustainability» of the micro-level system through the combination of 3 and 4 approaches. This approach assumes that economic sustainability is considered the ability to maintain a sufficient level of economic indicators for stable functioning and further development of the economic system.

In the further study of the economic sustainability of a unit of the micro-level system (enterprise), we will interpret this category as a broad, complex concept, which represents the ability in the long term to ensure the effec-

Table 1

Production indicators of the metallurgical industry, 2019–2023, million tons

Products	2019 p.		2020 p.		2021 p.		2022 p.		2023 p.	
	Ukraine	World	Ukraine	World	Ukraine	World	Ukraine	World	Ukraine	World
Pig Iron	20,1	1355,6	20,4	1385,0	21,1	1351,3	6,4	1301,3	6,0	1406,7
Steel	20,9	1878,5	20,6	1884,0	21,3	1962,4	6,2	1889,6	6,2	1891,3
Pipes&Tubes	18,2	–	18,4	–	19,1	–	5,3	–	5,3	–

Source: compiled by the authors based on [1; 2]

tive and uninterrupted functioning of the enterprise and to maintain such a state of its material, technical, labor and other resources that can provide further sustainable development, regardless of the influence of various factors.

The difficulty of industrial enterprises achieving economic sustainability is due to many subsystems that directly or indirectly influence it. Today, scientists have yet to reach a unanimous agreement on their number, so each scientist distinguishes different elements. Investigating this issue, we discovered the expediency of conditionally dividing the enterprise's economic sustainability elements into two main groups – internal and external. Internal components include those subsystems of the enterprise's economic stability that are directly related to the internal structure and available resources (raw materials, management stability, etc.). They reflect the potential of the enterprise to achieve sustainability through the management of assets, business processes, and personnel. As for the group of external components, they include factors of the external business environment that affect the enterprise's sustainability but, at the same time, are outside the zone of its direct control. A complete list of elements of the economic sustainability of an industrial enterprise is presented in Figure 1.

Thus, the enterprise's sustainability is a complex concept that covers several internal and external aspects. Internal components determine how well a business can independently manage its resources and processes to maintain efficiency and profitability. In contrast, external components emphasize the importance of a company's ability to respond to the challenges and opportunities in its larger business environment. Both groups of components interact and are interdependent, contributing to the strengthening of the overall sustainability of the enterprise.

In an unstable external environment characterized by a rapidly increasing degree of uncertainty, it is critically important to develop the ability to remain in a state of equilibrium and to continue implementing the development strategy despite existing and potential threats. One of the critical areas of work of the top management of domestic industrial enterprises is the management of their economic stability. Management of the economic sustainability of the

enterprise is a cyclical process that consists of five main stages:

- 1) determination of the current level of economic sustainability of the enterprise;
- 2) development of a strategy to ensure economic stability;
- 3) implementation of the formed strategy;
- 4) assessment of the obtained results for compliance with strategic goals;
- 5) monitoring.

Therefore, the first of the above stages involves, among other things, an assessment of the enterprise's economic sustainability level. The economic literature contains many methodological approaches to evaluating economic sustainability described by scientists, the main ones of which are summarized in Table 2.

Having studied various methods of assessing enterprises' economic sustainability and considering their shortcomings, we have proposed our approach. During its development, the emphasis was placed on studying the level of economic sustainability of domestic enterprises in the metallurgical industry. Therefore, when assessing the economic sustainability of entities of economic activity in another sector of the economy, the methodology may require some adaptation, considering the peculiarities of the sphere of activity of the enterprises whose level of economic sustainability is being investigated.

Therefore, to assess the level of economic sustainability of an enterprise in the metallurgical industry, taking into account the components mentioned above of the economic sustainability of industrial enterprises, it is worth highlighting the subsystems of the enterprise, which are the main groups of factors influencing economic sustainability: financial-production, personnel-organizational, investment, environmental, technical-technological.

The level of stability of the financial and production subsystem of the enterprise is assessed using a group of indicators, one of which is the probability of bankruptcy of the enterprise according to the universal discriminant model, which is calculated according to the following formula [6, p. 78]:

Internal components:	External components:
<ul style="list-style-type: none"> – financial stability – production sustainability – raw material stability – commercial sustainability – personnel stability – organizational sustainability – marketing stability – management stability – investment stability – environmental sustainability – technical and technological stability 	<ul style="list-style-type: none"> – market stability – information stability – communication stability – external relations

Figure 1. Constituent elements of economic sustainability of an industrial enterprise

Source: compiled by the authors

Table 2

Approaches to assessing the economic sustainability of the enterprise

Name of the approach		Essence	Disadvantages
Assessment of the financial and economic stability of the enterprise		It involves the study of the financial state of the enterprise and the calculation of the probability of its bankruptcy.	Models for estimating the probability of bankruptcy of American scientists, such as Altman, are most often used, which are not relevant in the conditions of the functioning of domestic enterprises. In addition, these calculations are not enough when assessing the economic sustainability of the enterprise.
Integral approach	The method of combining disparate indicators	The approach is more individual, because when calculating the level of economic sustainability, only those indicators that correspond to the specifics of the enterprise are taken into account. The calculation mechanism consists in comparing the actual data with the data of the base period, and also takes into account the rank (weight) of each indicator.	Difficulty in determining the rank (weight) for a large number of heterogeneous indicators.
	Unranked method	It consists in identifying the constituent elements of the economic sustainability of an industrial enterprise and assigning each of them a certain coefficient of the level of sustainability.	When forming an integral indicator, the importance of each component is not taken into account due to the lack of weighting factors.
	Method of comparisons	Comparison of each component of the economic sustainability of the enterprise with the best value of the indicator of economic sustainability in the selected group of similar enterprises using a weighting factor.	No disadvantages were found.
	The method of dynamic series	Among the set of indicators divided into 4 groups, the stability coefficient of each indicator is first calculated by comparing the number of increases (decreases) to the total number of changes in the indicator (even when the change is zero). When calculating the integral indicator of the economic stability of the enterprise, the arithmetic average is calculated among the previously determined coefficients of stability for each group of indicators.	The approach does not take into account the magnitude of changes and weighting factors.
	Ranking method	The methodology provides for the selection and calculation of indicators of economic stability and their ranking (transfer to a point system of 3, 6, 9, 12). The integral indicator is calculated as a weighted geometric mean, taking into account the correction coefficients (part of the i-th indicator in the integral indicator).	No disadvantages were found.
	Matrix method	It consists of compiling a matrix with selected indicators and calculating matrix parameters (column-to-row ratio). The obtained relative indicators in the lower part of the matrix are used as parameters for assessing economic sustainability. The integral index of the economic stability of the enterprise is calculated as the arithmetic mean among the indices of dynamics of previously calculated parameters of the matrix in comparison with previous periods.	The method does not take into account weighting factors; the obtained result indicates the nature of the enterprise's sustainability, and not the level of economic sustainability.
	The method of threshold values	The method consists of calculating two generalizing indicators for a group of selected indicators: stimulators and destimulators, respectively. The calculation of the specified generalizations is carried out after the normalization of private indicators by calculating the arithmetic average.	The method does not take into account weighting factors.

Source: compiled by the authors based on [5]

$$Z = 1,5 * \frac{CF}{L} + 1,08 * \frac{A}{L} + 10 * \frac{NP}{A} + 5 * \frac{NP}{R} + 0,3 * \frac{(I + PE)}{R} + 0,1 * \frac{R}{A}, \quad (1)$$

where CF – Cash flow (Net profit + Depreciation); L – Liabilities; A – Assets; NP – Net profit; R – Revenue; I – Inventories; PE – Prepaid expenses.

The values obtained as a result of the calculations are interpreted according to the scale [6, p. 78]:

- $Z > 2$ – the enterprise is financially stable, there is no threat of bankruptcy;
- $1 < Z < 2$ – the financial stability of the enterprise is violated, but it is not threatened with bankruptcy if it is transferred to anti-crisis management;
- $0 < Z < 1$ – there is a threat of bankruptcy, it is necessary to carry out rehabilitation measures;
- $Z < 0$ – the enterprise is semi-bankrupt.

The company's liquidity indicators [7] are evaluated as follows: absolute (2), critical (3) and current (4).

$$L_{abs.} = \frac{\text{Cash and cash equivalents}}{\text{Current liabilities}} \quad (2)$$

$$L_{crit.} = \frac{(\text{Current assets} - \text{Inventories})}{\text{Current liabilities}} \quad (3)$$

$$L_{cur.} = \frac{\text{Current assets}}{\text{Current liabilities}} \quad (4)$$

A group of indicators characterizing the enterprise's capital structure is also evaluated [7] (5–9).

$$C_{fin.indep.} = \frac{\text{Equity}}{\text{Assets}} \quad (5)$$

$$C_{fin.risk} = \frac{\text{Liabilities}}{\text{Equity}} \quad (6)$$

$$C_{L/A} = \frac{\text{Liabilities}}{\text{Assets}} \quad (7)$$

$$C_{NL/A} = \frac{\text{Non-current liabilities}}{\text{Assets}} \quad (8)$$

$$C_{NL/NA} = \frac{\text{Non-current liabilities}}{\text{Non-current assets}} \quad (9)$$

Next, a group of profitability indicators is evaluated, among them profitability of production [6, p. 39] (10) and profitability of operating activities (11).

$$P_{pr.} = \frac{\text{Net profit}}{\text{Revenue}} * 100\% \quad (10)$$

$$P_{op.act.} = \frac{\text{Net profit}}{\text{Income from operating activities}} * 100\% \quad (11)$$

In order to bring disparate indicators to a single form, it is proposed to simultaneously evaluate several enterprises of the industry in comparison and for each indicator to rank relative to normative values or compare with the indicators of other enterprises, or both. The rating can take values in the range from 0 to 5 points, where 5 points means that the level of the indicator is within the recommended values, 0 points – according to the evaluated indicator, the company is far from the threshold values or the results of other enterprises, respectively, or both. The enterprise's financial and production stability is calculated as the sum of ratings for each indicator, considering the weight of the factor's influence. The stability levels for other selected blocks are calculated according to the same principle.

The assessment of the level of personnel and organizational stability of the enterprise is carried out using indicators of staff turnover (12) and labor productivity (in value terms) (13).

$$ST = \frac{\text{Number of employees who left the company}}{\text{Average number of employees}} * 100\%, \quad (12)$$

where the Average annual number of employees is – the arithmetic average of the number of employees at the beginning of the period (year) and the number of employees at the end of the period (year).

$$LP_{(v.t.)} = \frac{\text{Revenue}}{\text{Average number of employees}} * 100\% \quad (13)$$

The level of investment sustainability is proposed to be assessed by calculating the profitability of investment activity according to the formula:

$$P_{inv.act.} = \frac{\text{Net profit}}{\text{Income from investing activities}} * 100\% \quad (14)$$

In the context of Ukraine's intentions to become a full member of the European Union, the issue of synchronization with the European Green Deal is particularly relevant. Therefore, studying an enterprise's environmental sustainability level is an important part of assessing the level of economic sustainability for business entities in energy-intensive industries, particularly metallurgy. It is proposed to determine the level of environmental sustainability of an industrial enterprise by calculating the ratio of the amount of paid environmental taxes to revenue from sales of products (15), the specific CO2 emission per unit of production (16), and the ratio of the amount of paid environmental taxes to total operating expense (17).

$$C_{env.t./r} = \frac{\text{Environmental taxes paid}}{\text{Revenue}} \quad (15)$$

$$\begin{aligned} \text{Specific CO2 emission}_{un.pr.} &= \\ &= \frac{\text{Volume of manufactured products}}{\text{Volume of CO2 emissions}} \end{aligned} \quad (16)$$

$$C_{env.t./op.ex.} = \frac{\text{Environmental taxes paid}}{\text{Operating expense}} \quad (17)$$

The last but not least important subsystem of the economic sustainability of an industrial enterprise is technical and technological. To assess the level of technical and technological stability, we use indicators of return on capital (18), profitability of fixed assets (19), depreciation load coefficient (20), and wear coefficient (21).

$$ROC = \frac{\text{Revenue}}{\text{Property, plant and equipment}} \quad (18)$$

$$P_{FA} = \frac{\text{Profit before income tax}}{\text{Property, plant and equipment}} \quad (19)$$

$$C_{DL} = \frac{\text{Depreciation}}{\text{Revenue}} \quad (20)$$

$$C_w = \frac{\text{Depreciation of property, plant and equipment}}{\text{Acquisition cost of property, plant and equipment}} \quad (21)$$

Then, the general level of economic sustainability of the business entity is calculated according to the formula:

$$\begin{aligned} EcS &= 0,31 * FPS + 0,2 * POrS + \\ &+ 0,08 * InvS + 0,2 * EnvS + 0,21 * TTS, \end{aligned} \quad (22)$$

where FPS – level of financial-production sustainability; POrS – level of personnel-organizational sustainability; InvS – level of investment sustainability; EnvS – level of environmental sustainability; TTS – level of technical-technological sustainability.

The result of the calculations is a numerical value that is in the range from 0 to 10 and makes it possible to identify the level of economic sustainability of the enterprise:

– $8 < Ec.C \leq 10$ – High – The enterprise functions and responds to the challenges of the external environment effectively, and the state of its resources is sufficient for the implementation of the development strategy;

– $5,5 < Ek.C \leq 8$ – Satisfactory – The economic stability of the enterprise is violated, financial and other resources are used inefficiently, external environmental factors have a negative impact on the company's activities;

– $2,5 < Ek.C \leq 5,5$ – Low – The enterprise loses financial, personnel, and other resources, which leads to a significant decrease in its production and sales potential;

– $0,1 < Ek.C \leq 2,5$ – Critical (crisis) – The enterprise operates at a loss, anti-crisis management is absent or

ineffective, and in the absence/ineffectiveness of remedial measures, there is a high probability of initiating termination or bankruptcy procedures.

Our proposed approach to determining the level of economic sustainability of the enterprise was tested on the example of one of the largest metallurgical plants of Ukraine – ArcelorMittal Kryvyi Rih PJSC, which before the full-scale invasion produced 23–26% of steel from all steel production in the country. In comparison, relevant

Table 3

Assessment of the level of economic sustainability of the largest Ukrainian metallurgical enterprises

Group of influencing factors	Impact factor	Weight of the influence of the factor	ArcelorMittal Kryvyi Rih			Metinvest Holding			Zaporizhstal			
			Value	Rating	Overall assessment	Value	Rating	Overall assessment	Value	Rating	Overall assessment	
Financial-production sustainability	Probability of bankruptcy of the enterprise (universal discriminant model)	0,2	–2,82	1,5	0,3	1,35	3	0,6	1,31	3	0,6	
	Liquidity	absolute	0,08	2,1%	1	0,08	1,0%	0,5	0,04	1,4%	0,5	0,04
		critical	0,08	88,2%	5	0,4	76,2%	5	0,4	142,8%	5	0,4
		current	0,04	42,1%	3	0,12	74,3%	3	0,12	119,4%	4	0,16
	Capital structure	Coefficient of financial independence	0,06	0,341	3,5	0,21	–0,240	2	0,12	0,473	4	0,24
		Financial risk factor	0,06	1,936	4	0,24	–5,158	1	0,06	1,114	4	0,24
		Ratio of total liabilities to total assets	0,06	0,659	4	0,24	1,240	3	0,18	0,527	5	0,3
		Ratio of non-current liabilities to total assets	0,06	0,136	4	0,24	0,007	3	0,18	0,023	3	0,18
		Ratio of non-current liabilities to non-current assets	0,06	0,253	5	0,3	0,117	3	0,18	0,082	3	0,18
		Profitability of production	0,2	–28%	3	0,6	3%	5	1	–6%	4	0,8
	Profitability of operating activities	0,1	–22%	3	0,3	7%	5	0,5	–6%	4	0,4	
The level of financial-production sustainability		0,31	X	X	3,03	X	X	3,38	X	X	3,54	
Personnel-organizational sustainability	Staff turnover	0,4	13,4	4	1,6	31,3	3	1,2	8,3	5	2	
	Labor productivity (in value terms)	0,6	2592,4	3	1,8	54559,1	5	3	6313,5	4	2,4	
The level of personnel-organizational sustainability		0,2	X	X	3,4	X	X	4,2	X	X	4,4	
Investment sustainability	Profitability of investment activities	1	–78172%	3	3	3024%	5	5	–39%	4	4	
The level of investment sustainability		0,08	X	X	3	X	X	5	X	X	4	
Environmental sustainability	Ratio of the amount of paid environmental taxes to revenue from sales of products	0,35	0,3%	5	1,75	2,7%	3	1,05	0,6%	4	1,4	
	Specific CO2 emission per unit of production	0,4	198,03	4	1,6	375,23	3	1,2	7,00	5	2	
	Ratio of the amount of paid environmental taxes to total operating expense	0,25	0,7%	5	1,25	14,1%	4	1	0,4%	5	1,25	
The level of environmental sustainability		0,2	X	X	4,6	X	X	3,25	X	X	4,65	
Technical-technological sustainability	Return on capital	0,3	2,27	3	0,9	54,97	5	1,5	2,89	3	0,9	
	Profitability of property, plant and equipment	0,2	–63,5%	3	0,6	231,8%	5	1	–20,4%	3	0,6	
	Depreciation load coefficient	0,2	0,086	3,5	0,7	0,017	5	1	0,040	4	0,8	
	Wear coefficient	0,3	0,856	3	0,9	0,615	3	0,9	0,252	4	1,2	
The level of technical-technological sustainability		0,21	X	X	3,1	X	X	4,4	X	X	3,5	
The general level of economic stability of the enterprise		X	3,4			3,9			4,0			

Source: calculated by the authors based on data from the companies' financial statements

players of the metallurgical industry market are taken – Metinvest Holding LLC and Zaporizhstal PJSC, which significantly influence the state's economic development and are among the largest exporters of the industry's products. Export-oriented sectors, including metallurgy, were the most affected by the full-scale invasion. Therefore, the analysis of the selected companies' economic stability level allows us to evaluate the effectiveness of the proposed approach and determine their adaptability to modern economic challenges. The results of calculations using this method are shown in Table 3.

Based on the results of the calculations, it was determined that all of the companies considered have a low level of economic sustainability as of the 2023 fiscal year. The studied PJSC «ArcelorMittal Kryvyi Rih» showed the worst result in the assessment of economic sustainability because, with the beginning of a full-scale invasion, its functioning is affected by factors of the external environment, among which it is possible to highlight the increase in the price and complexity of the logistics of finished products due to the closure of seaports, the shortage of electricity and the increase in tariffs, relocation and mobilization of workers and others.

The results of the analysis of the components of the economic stability of the enterprise make it possible to identify a high level of risk of non-payment of bills due to a critical lack of liquidity. As for the capital structure, servicing current debt obligations does not burden the company, so attracting additional loan funds can be used as one of the tools of anti-crisis policy. Profitability indicators are negative due to unprofitable activity, and the margin of safety is insufficient. Operating and other costs are too high, making positive profitability impossible. The company has a critical shortage of workers to resume operations at the full capacity of production equipment. Cash flow from investment activities is negative. The production equipment is outdated and non-ecological, which leads to high costs for paying for environmental pollution and waste generation, as well as increased attention from eco-activists, a significant decrease in the loyalty of the local community, including the workers of the plant, a negative impact on the reputation among public authorities and potential consumers, in particular from European countries.

In order to increase the level of economic sustainability of PJSC «ArcelorMittal Kryvyi Rih», it is proposed to carry out a set of measures, including attracting additional financing on favorable terms, in particular from the majority shareholder ArcelorMittal Duisburg Beteiligungsgesellschaft mbH, which will increase liquidity; to implement a talent attraction strategy through cooperation with educational institutions that train specialists for vacancies for which the company has a shortage of personnel; growing sales by entering new, logistically close markets and conducting marketing activities; continue efforts to reduce the impact on the environment and introduce more energy-efficient technologies, in particular, replacing the oxygen-converter technology of steel production with direct recovery technology, which can be implemented through the construction of an electric steel-making plant. This large-scale project will require significant funding. For this, it is suggested to find partners in the EU member states and use grants from the programs «Horizon Europe», «LIFE» and others. A mandatory part of implementing the proposed measures is constantly monitoring their impact on the enterprise's economic sustainability level.

Conclusions. Therefore, financial stability and economic stability are not identical concepts. Financial stability is one of the other blocks (personnel-organizational, investment, environmental, technical-technological) that together form the concept of economic stability of the micro-level system, that is, the enterprise. The study of the enterprise's financial state is insufficient in the conditions of military challenges and general economic instability, which emphasizes the importance of a comprehensive approach to assessing the economic stability of industrial enterprises, particularly metallurgical enterprises. The method we proposed for determining a metallurgical enterprise's economic sustainability level allows for a detailed assessment of the financial, production, personnel-organizational, investment, environmental-technical, and technological aspects of the enterprise's sustainability. Approbation of the methodology on the example of the largest Ukrainian metallurgical enterprises demonstrated its effectiveness in identifying key risks and identifying directions for improvement. This assessment technique can be adapted to assess the sustainability of enterprises in other branches of the national economy, making it a universal tool for managing domestic companies.

References:

1. Ob'yednannya pidpnyemstv «Ukrmetallurgprom»: veb sayt. [Association of enterprises «Ukrmetallurgprom»: website]. Available at: <https://www.ukrmetprom.org/> (in Ukrainian)
2. The World Steel Association: website. Available at: <https://worldsteel.org/>
3. U yakykh sferakh zakryvayet'sya naybil'she biznesiv? [In which areas are the most businesses closed?]. Opendatabot (2023). Available at: <https://opendatabot.ua/analytics/bankrupts-and-closed-companies-2023> (in Ukrainian)
4. Savchenko M. (2019) Rozvytok katehorial'noho bazysu «ekonomichna stiykist'». *Halyts'kyi ekonomichnyy visnyk*, vol 2, pp. 5–17. Available at: <http://elartu.tntu.edu.ua/handle/lib/27974> (in Ukrainian)
5. Sitak I. L., Murashko I. M. (2019) Kharakterystyka metodyk otsinky ekonomichnoyi stiykosti pidpnyemstv. *Teoriya ta metodolohiya formuvannya investytsiyno-finansovoyi stratehiyi rozvytku sub'yektiv natsional'noho gospodarstva* : Monohrafiya. [Characteristics of methods for assessing the economic sustainability of enterprises. Theory and methodology of formation of investment and financial strategy for the development of subjects of the national economy: Monograph]. Vyd-vo Zhurfond, pp. 270–285. Available at: <https://repository.kpi.kharkov.ua/server/api/core/bitstreams/26c6a6c0-8ce2-4d4f-836b-473c3c6179d3/content> (in Ukrainian)
6. Dropa Y. B. (2021) Finansovyy analiz. [Financial analysis]. *Praktykum dlya studentiv ekonomichnykh spetsial'nostey*. L'viv: LNU im. I. Franka, 181 p. (in Ukrainian)
7. Kravchenko M. O., Leontovska M. A. (2022) Pidkhody do otsynuyannya finansovoyi stiykosti innovatsiyno-aktyvnykh pidpnyemstv. [Approaches to assessing the financial stability of innovatively active enterprises]. *Ekonomichnyy visnyk Natsional'noho tekhnichnoho universytetu Ukrainy «Kyivskyy politehnichnyy instytut»*, vol. 24, pp. 93–98. DOI: <https://doi.org/10.20535/2307-5651.24.2022.274831> (in Ukrainian)