https://doi.org/10.33271/nvngu/2022-3/141

I. Vysochyn[1],
orcid.org/0000-0002-1738-8553,
H. Sytnyk[1],
orcid.org/0000-0003-4189-180X,
T. Zhuk[1],
orcid.org/0000-0001-5866-8837,
Yu. Mazur[2],
orcid.org/0000-0002-4728-4640,
L. Shykova[3],
orcid.org/0000-0002-3941-1566,
Ye. Gordeyeva[4],
orcid.org/0000-0001-9638-6777

1 – Kyiv National University of Trade and Economics, Kyiv, Ukraine, e-mail: i.vysochyn@knute.edu.ua
2 – Interregional Academy of Personnel Management, Kyiv, Ukraine
3 – Mariupol State University, Mariupol, Ukraine
4 – Buketov Karagandy University, Karaganda, the Republic of Kazakhstan

INFORMATION TOOLS FOR ENTERPRISE MANAGEMENT IN ECONOMICS 4.0

Purpose. To develop the structural and systematic approach to the efficient use of information tools for industrial enterprise management and to assess the level of impact of information technology on the growth in financial and economic indicators applying the analysis of financial and economic activities of the enterprise.

Methodology. The results of the presented research were obtained using general and special methods of cognition (methods of comparative analysis, content analysis, logical generalization, method of scientific abstraction, analysis and synthesis, induction and deduction, methods of quantitative and qualitative comparison, the method of mathematical analysis).

Findings. A structural and systematic approach to the use of information tools for industrial enterprise management has been developed. Using a comprehensive analysis of financial and economic activities of the enterprise, high importance and effectiveness are established of information technology Economics 4.0 to increase the effectiveness of management decisions to ensure the appropriate level of financial and economic performance of mining enterprises. It was proved that with the proper level of investment in modern energy efficient equipment and integrated application of information tools, due to combining technical and technological approaches with organizational, motivational, marketing and investment approaches to effective management decisions, energy efficiency of production is improved and production costs are reduced.

Originality. A structural scheme of effective use of information tools for industrial enterprise management has been developed. This allowed conducting a rigorous scientific analysis of the application of these tools, stratifying their stages, identifying areas of managerial influence on the production, economic and financial aspects of the enterprise. High correlation dependence of financial and economic indicators of the enterprise on the value of intangible assets, in particular information and analytical purposes, has been established.

Practical value. The value lies in the possibility of using the results of the study for research and development. The expediency of using information tools in the practical activities of mining enterprises was proved, the procedure, stages and directions of implementation of these tools were indicated.

Keywords: *information tools, Economics 4.0, financial and economic results, systems approach, correlation analysis, mining industry*

Introduction. The movement of the economies of the world's leading countries to the goal – Economy 4.0 is defined not only in the scientific literature but is also supported by government decisions, implemented in practice by enterprise management. Delays in the implementation of specific measures aimed at implementing Economy 4.0 will mean loss of competitiveness of specific enterprises and economies of entire countries. Therefore, it is not a question of substantiating the expediency of implementing these measures, but of the ability of management at all levels, from business managers to government officials and civil servants, to meet the challenges of today. The effectiveness of the implementation of management decisions is determined by the use of modern technologies and tools tested by those who precede in the implementation of Economy 4.0. First of all, it concerns information, management, and organizational technologies in all aspects. This applies not only to the material management of these resources, but also the acquisition of skills to use them in the most effective way, which determines the adequacy of human, organizational resources, structural and systemic decisions, in particular the implementation of information technology. In Ukrainian realities, the introduction of information technology in the management of enterprises often has signs of an unsystematic, eclectic process. The introduction of modern technologies is accelerated by the economic crisis, exacerbated by the military confrontation, which necessitates the formation of a rapid and effective response of management at all levels to new risks in real time.

The introduction of modern technologies in the practice of management is done step by step – often in response to another urgent challenge of the regional or global market. In particular, the use of these information tools is intensified when Ukrainian companies get access to the leading stock exchanges.

Literature review. Hutsaliuk, et al. [1] analyzed the formation of tools for effective management of enterprises by theoretical and functional approaches. Wang [2] studied approaches to management reform and proposed an innovative approach to the formation of a modern model of enterprise economics management based on the knowledge economy. Dobrova, et al. [3] detailed the impact of innovation factors on the effectiveness of reforming the management of energy sector enterprises. Belás, et al. [4] studied the features of small business management and its relationship with the growth in economic performance of these enterprises. Bogachevska and Alieksieieva [5] studied the fundamental components of information tools for business management. Kwilinski, et al. [6] studied the tools of enterprise management and their variability in modern conditions. Orlova, et al. [7] proposed the structure of analytical support for enterprise development management and identified the indicators needed to substantiate management decisions. Chukurna, et al. [8] applied the method for evaluating the effectiveness of the enterprise management system by defragmenting the control system into components. Revin [9] applied a situational cybernetic approach to the reorganization of

enterprise management. Hanson [10] discusses in detail the tools to increase the efficiency of public enterprise development management. Nitsenko, et al. [11] presents a detailed analytical review of tools and methods of effective management decision-making. The analytical review by Wilson, et al. [12] focuses on the formation of effective business models as a guarantee of effective management. Shtal, et al. [13] proposed a formalized approach to the formation of effective management decisions that would meet the requirements of the global market. Bondarchuk, et al. [14] analyzed the features of the formation of effective management of mining companies using information technology. Ivanov, et al. [15] studied aspects of management of mining enterprises in the conditions of formation of Industry 4.0. Fernández-Portillo, et al. [16] studied the role of innovation management and communication of digital technologies and financial performance of the enterprise. Gomes, et al. [17] proposed an indicative approach to the evaluation of business models and management systems for manufacturing enterprises. Potkany, et al. [18] studied the impact of quality management on business performance using the example of Slovak manufacturing enterprises. Alglawe et al and Koval, et al. [19, 20] proposed an analytical approach to quality management using system dynamics.

Unsolved aspects of the problem. The review of literature sources indicates the considerable attention of scientists to the formation of tools for effective management of industrial enterprises. At the same time, systemic approaches to the implementation of information and intellectual tools, the use of which is typical for the transition to Economy 4.0 in various sectors of Ukrainian industry, need further research. This primarily applies to the mining industry, in particular, the peculiarities of ensuring the appropriate level of competitiveness of mining and processing plants. It would be appropriate to pay special attention to the substantiation of the analysis of the effectiveness of the use of information tools by the financial and economic indicators of specific enterprises

The purpose. To develop a structural and systematic approach to the effective use of information tools for industrial enterprise management and to assess the level of influence of the use of information technology on the growth in financial and economic indicators applying the analysis of financial and economic activities of the enterprise.

Methods. The results of the presented research were obtained using general and special methods of cognition. Methods of comparative analysis, content analysis, and logical generalization were used to form the topic, purpose of research and critical analysis of the existing collection of special scientific literature.

The method of scientific abstraction was used to develop and identify stages of implementation of the structural scheme of the use of information tools for industrial enterprise management. The analysis of the main factors of influence, directions of work of the enterprises directed on formation of effective result, was carried out using the methods of the analysis and synthesis, induction and deduction. The analysis of financial and economic and production activities of the Pivnichnyi Mining and Processing Plant was carried out using the method of ascending from the abstract to the concrete.

Methods of quantitative and qualitative comparison and the method of mathematical analysis were used to identify the correlation of financial and economic indicators.

Results. Analysis of the use of information tools to influence the elements of industrial enterprise management indicates the importance and indispensability of these tools in all areas of work. It is the use of information tools that makes it possible to effectively achieve this goal. Goal formation is the task of strategic management of the enterprise. This can be a specific operational goal, for example, increasing the energy efficiency of the enterprise to a specified value or a set of operational goals, the achievement of which leads to the realization of a strategic goal. As an example, Fig. 1 shows the achievement of the goals "Growth in production" and "Growth in product quality" on which the implementation of the strategic management goal "Growth in profit" obviously depends.

Stages of using information tools by the elements of industrial enterprise management are detailed in Fig. 1. Thus, after the stage of research into the economic environment, analysis of markets, activities of competitors and consumer needs, comes the stage of modeling and forecasting. The result is the development of a competitive strategy of the enterprise. The use of information tools at this stage is unalterable. Then comes the stage of choosing a set of methods for implementing this strategy: economic, financial, organizational, production and their specification to manage the activities of the enterprise. Previously, this stage was formed by the willful decisions of management and its effectiveness depended on the managerial skills of senior and middle management. Nowadays, the effectiveness of management decisions at this stage is ensured by the use of de-

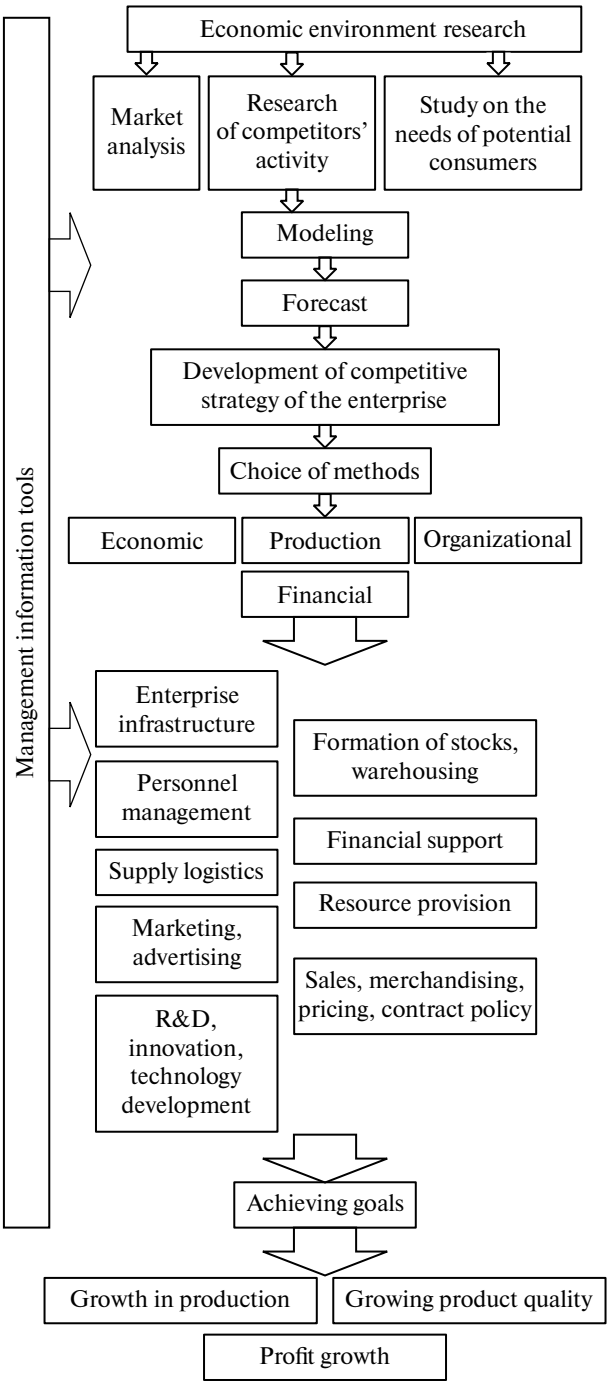

Fig. 1. Block diagram of the use of information tools for industrial enterprise management

cision support systems and specialized information systems. These systems guarantee the success of achieving the goals.

The analysis of the main factors that have formed the preconditions for the operation of mining and processing plants (hereinafter – MPP) in the domestic and world markets over the past decade, were competitive factors: a significant level of competition, in particular, powerful "big three" (Vale (Brazil), BHP Billiton and Rio Tinto (Australia); significant volatility of demand at the world market and its impact on the Ukrainian market. To do this, companies had to ensure proper product quality; to form an acceptable market price and ensure guaranteed deliveries of products within the specified time. The policy of forming a reliable nature of contractual relations with prompt response to consumer needs, which ensured reliable work of information and analytical departments in forecasting market trends, provided growth in production and increase in MPP profits.

The defining direction of the organization of MPP was the rapid response to projected changes in demand at regional markets and maneuvering to ensure reorientation from markets where demand for growing markets is declining. This creates the preconditions for guaranteeing sustainable production volumes. In addition, the work in this direction is to expand markets, enter new markets, strengthen positions in promising and capacious markets. A good example of this is the activities of the Pivnichnyi MPP (Table 1). According to an analytical study – a quick maneuver in a short period of time guarantees the stability of total sales.

To ensure the goal, the task is to form a positive image of a reliable and financially stable business partner. To achieve the related goal which is to increase the competitiveness of the enterprise, there are operational goals; reducing the cost of production, increasing its quality, development of new technological means of production of other types of raw materials that the market will need, introduction of the appropriate range of forms of payment to ensure convenience and the appropriate level of financial comfort, creating attractive financial conditions for consumers. Information tools for the management of industrial enterprises continue to play an increasingly important role in this.

The importance of increasing the efficiency of each of the operational tasks with the use of information and intelligent technologies determines the achievement of the overall goal. Thus, an example of the approach to reducing the cost of production of mining enterprises in the growing shortage of energy resources is the introduction of energy-saving technologies using the capabilities of intelligent information systems.

This is especially true of energy consumption of enterprises with underground ore mining. The obstacles to increasing energy efficiency so far have been: insufficient control of energy consumption, lack of cost accounting for all their types; non-integration with production volumes in real time; inefficient use of organizational tools, financial incentives, technological optimization of equipment, lack of information support for energy audit.

Experience shows that with a certain level of investment in modern energy efficient equipment and integrated use of information tools, combining technical and technological approaches with organizational, motivational, marketing and investment approaches to effective management decisions, energy consumption is reduced several times, which helps reduce production costs.

As it is shown by the analysis of marginal financial and economic indicators of the Pivnichnyi MPP (Fig. 2, Table 2) after a period of significant fluctuations of these indicators in 2014–2017, the effective use of information support has formed an effective management policy – EBITDA margin fluctuates within interval 47.5–56 % (Table 2). These results are confirmed by the analysis of the dynamics of the main financial and economic indicators of the Pivnichnyi MPP (Fig. 3).

It is not difficult to notice that the use of information tools also provides the preconditions for the implementation of Economy 4.0 for Ukrainian enterprises. That is, in general, aimed at increasing the competitiveness of the country's economy at the world market.

The first operational goals of MPP in this way are to reduce costs, in particular, by investing in energy efficiency, improving product quality, technological upgrades to improve product quality, strict adherence to contractual discipline to implement a guaranteed sales policy.

In the last months of 2021, there was a significant increase in demand for pellets relative to the level of 2020, accompanied by a corresponding increase in the premium for pellets at the world market. Premium increased by 110 % in Europe – up to $62 per ton of product, and 160 % in the Chinese market – up to $56 per ton of product. Forecasting such drastic changes at the market allows making significant profits. Estimation of the level of profit makes it possible to assess the level of expediency of investments in software, information systems and the formation of the appropriate level of staffing of information and analytical services. It also provides an opportunity to assess the rapid return on investment in intellectual capital and information resources. Together, this illustrates the opportunities and ways to generate revenue from the implementation of Economics 4.0 approaches.

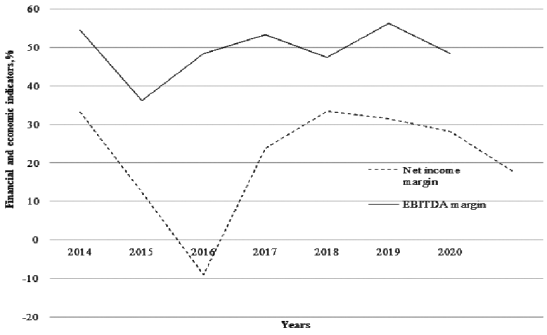

Fig. 2. Marginal financial indicators of the Pivnichnyi MPP, %

Table 1

Change in the share of markets in sales of Pivnichnyi MPP, %

Countries	2020	2021	2021/2020
Ukraine	34	33	↓ 97.06
EU countries	17	28	↑ 164.7
Countries of the Middle East and North Africa	3	7	↑ 233.3
Asian countries	45	30	↓ 66.7
North American countries	1	1	~
Other countries	0	1	↑ 100.0
Total	100	100	–

Table 2

Dynamics of financial indicators of the Pivnichnyi MPP, $ million

Years	Indexes					
	Sales, $ million	EBITDA, $ million	CAPEX, $ million	Net income, $ million	Net income margin, %	EBITDA margin, %
2014	1,056.4	575.7	88.3	129.9	12.3	54.5
2015	611.4	221.3	49.9	–55.6	–9.1	36.2
2016	590.1	285.5	40.7	141.1	23.9	48.4
2017	875.3	466,9	62.5	292.9	33.5	53.3
2018	960	456	113	302	31.46	47.5
2019	1,101	619	156	309	28.1	56.2
2020	893	432	48.4	161	18.0	48.4

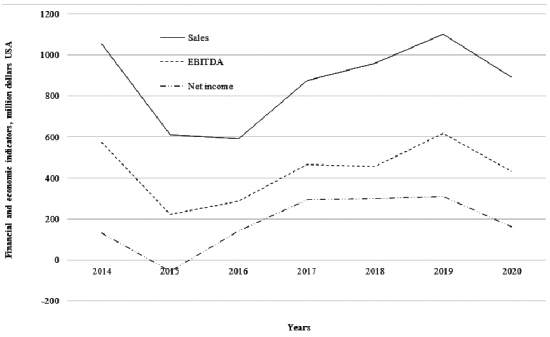

Fig. 3. Financial and economic indicators of the Pivnichnyi MPP, $ million

To assess the effectiveness of the use of information tools, it is proposed to use the indicator ε – the effectiveness of investments in information tools. Optimization of the use of information tools is carried out using the following analytical approach

$$opt\,\varepsilon = f(\vec{\sigma}_i),$$

where $\vec{\sigma}_i$ is a vector of correlation coefficients of costs for information tools and i = 1, 2, 3, ... financial and economic results in the enterprise activity indexed by value.

For example, a characteristic feature of the financial and economic reporting indicators of the Pivnichnyi MPP (Table 3) is the significant growth of intangible assets since 2017, including the cost of patents and licenses, software, exploration and evaluation assets. Intangible assets are becoming significant in size and, as an analytical study shows, their increase is accompanied by an increase in gross profit with relatively stable production volumes in physical terms (Table 4).

Studies on financial and economic indicators demonstrate a significant correlation in the entire studied time interval of the net book value of intangible assets of the Pivnichnyi MPP (Table 3) with gross profit – a correlation coefficient of 0.976; with fixed assets – the correlation coefficient is smaller but significant – 0.47; with administrative costs – 0.836; with sales (Table 2) – 0.537; with the indicator Net income – 0.7987; with CAPEX indicator – 0.67; with EBITDA (Table 2) it is also smaller but significant – 0.4.

This confirms the growing importance of intangible assets for the enterprise, information tools in production processes for the implementation of the approaches of Economics 4.0, the importance of intelligent tools for managing economic processes, even in mining, which has traditionally been considered far from modern information technology.

On the other hand, this refutes the thesis of a "gap in function" between the systems of obtaining and capitalizing knowledge. Intellectualization of all aspects of the production enterprise sometimes indirectly, sometimes directly brings dividends, investment in information and analytical support, as it was proved by the analysis of the practical activities of the mining and processing enterprise and also brings profit.

Conclusions. The analysis of the use of information tools to influence the elements of industrial enterprise management allowed stratifying their impact and forming a structural scheme of effective use of information tools for industrial enterprise management. This is useful both from a scientific point of view, in particular for a comparative analysis of the use of information and intelligent systems in enterprises, and from a practical point of view – for the implementation of such systems in production.

The analysis of the main factors that created the preconditions for sustainable development of mining and processing plants, allowed identifying factors of external influences on them and identifying key factors for building the competitiveness of enterprises in adapting to the challenges of Economy 4.0: ensuring proper product quality; formation of an acceptable market price and ensuring the supply of products to consumers in a timely manner. Sustainable formation of reliable nature of contractual relations with prompt response to consumer needs, provided by effective forecasting of market trends by information-analytical systems to support management decisions, guarantees growth of production and increase profits of MPP. This is proved by the analysis of the maneuver in the volume of sales of Pivnichnyi MPP products at regional markets. The effectiveness of the use of information tools to achieve operational goals – reducing the cost of production, increasing energy efficiency of production – is also analyzed.

It is proved that with the right level of investment in modern energy efficient equipment and integrated application of information tools as a result of combining technical and technological approaches with organizational, motivational, marketing and investment approaches to effective management decisions, energy consumption is reduced several times, which helps reduce production costs.

Using the economic analysis of financial and economic indicators of the Pivnichnyi MPP and the application of analytical correlation analysis, a significant correlation dependence of the results of the Pivnichnyi MPP on the cost of information tools was established.

Table 3

Indicators of financial and economic reporting of the Pivnichnyi MPP, $ million

Indexes	Years						
	2014	2015	2016	2017	2018	2019	2020
Equity	1 809 357.0	1 083 477.0	1 162 678.0	901 935.5	1 126 380.0	31 762 307	754 463.3
The cost of fixed assets	1 057 073	624 146.3	529 389.5	520 145.5	521 117.7	559 917.0	643 218.1
Long-term liabilities	250 207.2	87 438.72	745 206.7	693 845.5	70 330.43	134 203.3	141 262.5
Current liabilities	46 435.94	5566.85	228 329.1	808 730.0	872 597.4	839 304.5	539 424.2
Gross profit	399 987.2	139 043.6	210 410.5	444 570.5	455 844.8	488 031.3	407 485.7
Administrative expenses	5906.65	4505.93	4011.01	4545.72	6643.69	5930.91	6614.55
Selling expenses	83 296.29	89 164.72	31 883.01	30 638.86	120 001.5	94 412.99	119 475.2
Intangible assets (net book value)	125.89	256.58	201.97	9214.89	8765.42	9070.08	8310.09

Table 4

Dynamics of production volumes of Pivnichnyi MPP by types of products, million tons

Production volumes	Years						
	2014	2015	2016	2017	2018	2019	2020
Concentrate	13,421	13,152	11,637	11,365	10,755	12,010	12,650
Pellets	8,634	7,690	8,882	7,420	8,495	8,010	6,500

References.

1. Hutsaliuk, O., Koval, V., Tsimoshynska, O., Koval, M., & Skyba, H. (2020). Risk management of forming enterprises integration corporate strategy. *TEM Journal*, *9*(4), 1514-1523. https://doi.org/10.18421/TEM94-26.

2. Wang, L. (2019). Research on the Reform and Innovation of Modern Enterprise Economic Management Model based on Knowledge Economy. *Advances in Economics, Business and Management Research*, *91*, 228-232. Retrieved from https://www.atlantis-press.com/article/125914951.pdf.

3. Dobrova, K.B., Danilochkina, N.G., Cherner, N.V., Dobrov, V.P., Dobrov, P.P., & Sepiashvili, E.N. (2018). Innovational Management of Industrial Enterprises in the Energy Sector. *European Research Studies Journal, 21*(1), 447-458. Retrieved from https://www.ersj.eu/dmdocuments/2018_XXI_1_37.pdf.

4. Belás, J., Bartoš, P., Habánik, J., & Novák, P. (2014). Significant Attributes of the Business Environment in Small and Meduim-Sized Enterprises. *Economics and Sociology*, *7*(3), 22-39. https://doi.org/10.14254/2071-789X.2014/7-3/2.

5. Bogachevska, I., & Alieksieieva, K. (2020). The Techno-Humanitarian Balance and Modernity. *Philosophy and Cosmology*, *25*, 78-87. https://doi.org/10.29202/phil-cosm/25/7.

6. Kwilinski, A., Ruzhytskyi, I., Patlachuk, V., Patlachuk, O., & Kaminska, B. (2019). Environmental taxes as a condition of business responsibility in the conditions of sustainable development. *Journal of Legal, Ethical and Regulatory Issues*, *22*(2S).

7. Orlova, K., & Ovander, N. (2019). Analytical support for enterprise's development management under conditions of economy digitalization. *Economics, Management and Sustainability*, *4*(2), 21-29. https://doi.org/10.14254/jems.2019.4-2.2.

8. Chukurna, O., Nitsenko, V., Kralia, V., Sahachko, Y., Morkunas, M., & Volkov, A. (2019). Modelling and Managing the Effect of Transferring the Dynamics of Exchange Rates on Prices of Machine-Building Enterprises in Ukraine. *Polish Journal of Management Studies, 19*(1), 117-129. https://doi.org/10.17512/pjms.2019.19.1.09.

9. Revin, F. (2021). The Shifting Image of Social Capital: Digitizing Cooperative Ties. *Future Human Image*, *16*, 75-82. https://doi.org/10.29202/fhi/16/7.

10. Hanson, A.H. (2019). *Public Enterprise and Economic Development*. London: Routledge. https://doi.org/10.4324/9780429058981.

11. Nitsenko, V., Mardani, A., Streimikis, J., Ishchenko, M., Chaikovsky, M., Stoyanova-Koval, S., & Arutiunian, R. (2019). Automatic Information System of Risk Assessment for Agricultural Enterprises of Ukraine. *Montenegrin Journal of Economics*, *15*(2), 139-152. https://doi.org/10.14254/1800-5845/2019.15-2.11.

12. Wilson, M., Wnuk, K., Silvander, J., & Gorschek, T. (2018). A Literature Review on the Effectiveness and Efficiency of Business Modeling. *e-Informatica Software Engineering Journal, 12*(1), 265-302. https://doi.org/10.5277/e-Inf180111.

13. Shtal, T.V., Polyakova, Y.O., Hasanov, E.L., Ukubassova, G.S., & Kozhabaeva, S.A. (2018). Formalization of the Enterprise International Economic Activity Efficiency Management. *Utopía y praxis latinoamericana, 23*, 64-82. https://doi.org/10.5281/zenodo.1495795.

14. Bondarchuk, O.M., Temchenko, H.V., & Maksymova, O.S. (2018). Efficiency optimization of industrial mining companies' activity. *Economic Bulletin, 1*, 89-101. Retrieved from https://ev.nmu.org.ua/docs/2018/1/EV20181_089-101.pdf.

15. Ivanov, S.V., & Chekina, V.D. (2020). Development of mining in the conditions of Industry 4.0: new challenges and opportunities. *Economy of Industry, 1*(89), 45-74. https://doi.org/10.15407/econindustry2020.01.045.

16. Fernández-Portillo, A., Almodóvar-González, M., Sánchez-Escobedo, M.C., & Coca-Pérez, J.L. (2022). The role of innovation in the relationship between digitalisation and economic and financial performance. A company-level research. *European Research on Management and Business Economics, 28*(3), 1-27. https://doi.org/10.1016/j.iedeen.2021.100190.

17. Gomes, J.G.C., Okano, M.T., & Otola, I. (2020). Creation of indicators for classification of business models and business strategies in production systems. *Polish Journal of Management Studies, 22*, 142-157. https://doi.org/10.17512/pjms.2020.22.2.10.

18. Potkany, M., Gejdos, P., Lesnikova, P., & Schmidtova, J. (2020). Influence of quality management practices on the Business performance of Slovak manufacturiong eterprises. *Acta Polytechnica Hungarica, 17*(9), 161-180. Retrieved from http://acta.uni-obuda.hu/Potkany_Gejdos_Lesnikova_Schmidtova_106.pdf.

19. Alglawe, A., Schiffauerova, A., & Kuzgunkaya, O. (2019). Analysing the cost of quality within a supply chain using system dynamics approach. *Total Quality Management & Business Excellence, 30*, 1630-1653. https://doi.org/10.1080/14783363.2017.1400376.

20. Koval, V., Mikhno, I., Udovychenko, I., Gordiichuk, Y., & Kalina, I. (2021). Sustainable natural resource management to ensure strategic environmental development. *TEM Journal*, *10*(3), 1022-1030. https://doi.org/10.18421/TEM103-03.

Інформаційні інструменти управління підприємствами в Економіці 4.0

І. В. Височин[1], *Г. В. Ситник*[1], *Т. В. Жук*[1], *Ю. В. Мазур*[2], *Л. В. Шикова*[3], *О. А. Гордєєва*[4]

1 – Київський національний торговельно-економічний університет, м. Київ, Україна, e-mail: i.vysochyn@knute.edu.ua

2 – Міжрегіональна академія управління персоналом, м. Київ, Україна

3 – Маріупольський державний університет, м. Маріуполь, Україна

4 – НАТ «Карагандинський університет імені академіка Є.А. Букетова», м. Караганда, Республіка Казахстан

Мета. Розробити структурно-системний підхід для ефективного використання інформаційних інструментів управління промисловим підприємством.

Методика. Результати представленого наукового дослідження отримані за використання загальних і спеціальних методів пізнання (методи порівняльного аналізу, контент-аналізу, логічного узагальнення, метод наукового абстрагування, методи аналізу й синтезу, індукції та дедукції, методи кількісного та якісного порівняння, метод математичного аналізу).

Результати. Розроблено структурно-системний підхід для використання інформаційних інструментів управління промисловим підприємством. За використання комплексного аналізу фінансово-економічної діяльності підприємства встановлена висока значущість і результативність упровадження інформаційних технологій Економіки 4.0 для збільшення ефективності управлінських рішень щодо забезпечення належного рівня фінансово-економічних показників підприємств гірничої галузі. Доведено, що за належного рівня капіталовкладень у сучасне енергоефективне обладнання та комплексного застосування інформаційних інструментів, у результаті поєднання технічних і технологічних підходів з організаційними, мотиваційними, маркетинговими та інвестиційними підходами до формування ефективних управлінських рішень, поліпшуються показники енергозбереження виробництва, зменшується собівартість продукції.

Наукова новизна. Розроблена структурна схема ефективного задіяння інформаційних інструментів для управління промисловим підприємством Це дозволило провести суворий науковий аналіз застосування вказаних інструментів, стратифікувати їх етапність, виділити напрями управлінського впливу на виробничі, економічні та фінансові сторони діяльності підприємства. Встановлена висока кореляційна залежність фінансово-економічних показників підприємства від величини нематеріальних активів, зокрема інформаційно-аналітичного призначення.

Практична значимість. Полягає в можливості використання результатів проведеного дослідження для наукових розробок і практичної діяльності. Доведена доцільність використання інформаційних інструментів у практичній діяльності гірничих підприємств, вказані порядок, етапи й напрями впровадження вказаних інструментів.

Ключові слова: *інформаційні інструменти, Економіка 4.0, фінансово-економічні результати, системний підхід, кореляційний аналіз, гірнича галузь*

The manuscript was submitted 29.09.21.