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INTELLECTUAL CAPITAL IN CONDITIONS OF DIGITALIZATION: METHODOLOGICAL APPROACHES TO EVALUATING EFFICIENCY IN THE ENTERPRISE MANAGEMENT SYSTEM

ІНТЕЛЕКТУАЛЬНИЙ КАПІТАЛ В УМОВАХ ЦИФРОВІЗАЦІЇ: МЕТОДИЧНІ ПІДХОДИ ДО ОЦІНЮВАННЯ ЕФЕКТИВНОСТІ В СИСТЕМІ УПРАВЛІННЯ ПІДПРИЄМСТВОМ

The purpose of the research is the integration of innovative technological solutions and modern theoretical approaches in the process of evaluating of intellectual capital in order to increase its strategic value for companies in the modern business environment. Considering the rapid development of digital technologies and the globalization of markets, which create new challenges in the management of intellectual capital, traditional assessment methods often do not account for the dynamic development of the intellectual potential of economic entities. The results aim to highlight the advantages and limitations of existing methods and tools for evaluation in the management of intellectual capital, offering recommendations for their optimization and adaptation to evolutionary economic challenges, thereby fostering competitive advantage in the digital era.

Keywords: *intellectual capital, BSC, KPI, digitalization, management effectiveness, digital assets.*

Метою дослідження є вивчення інтеграції інноваційних технологічних рішень й сучасних теоретико-методичних підходів щодо оцінювання інтелектуального капіталу з метою підвищення його стратегічної цінності для компаній. З огляду на інтенсивний розвиток цифрових технологій та глобалізацію ринків, які формують нові виклики у сфері управління інтелектуальним капіталом, традиційні методи оцінювання часто не враховують динамічність розвитку інтелектуального потенціалу суб'єктів господарювання. Вивчаючи можливості більш ефективної інтеграції сучасних передових технологій стосовно можливостей оцінювання інтелектуального капіталу, дослідження прагне надати уявлення про необхідність вдосконалення процесів планування управління інтелектуальним капіталом на підприємствах. Результати представленого дослідження мають на меті висвітлити переваги існуючих методів та інструментарію оцінювання інтелектуального капіталу, пропонуючи рекомендації щодо їх оптимізації та адаптації до еволюційних економічних викликів. Практичне значення дослідження полягає у наданні орієнтирів для компаній щодо покращення стратегічного використання їхнього інтелектуального капіталу, тим самим сприяючи інноваціям та конкурентній перевазі у цифрову епоху. Для подальшого вдосконалення існуючих методів необхідні комплексні дослідження, спрямовані на вивчення впливу цифрових інновацій на оцінку інтелектуального капіталу, враховуючи той факт, що в контексті цифровізації з'являються нові форми інтелектуального капіталу, такі як цифрові активи, бази даних, програмне забезпечення та інші технологічні ресурси. У статті зазначено, що при цьому особливу увагу слід приділити інтеграції засобів штучного інтелекту (AI) та машинного навчання (ML) для прогнозування ефективності використання інтелектуальних активів у системі управління компанією, що безпосередньо впливає на ефективність управління інтелектуальним капіталом, загальну вартість підприємства, рівень ефективності управління фінансово-економічною діяльністю, його конкурентоспроможність.

Ключові слова: *інтелектуальний капітал, збалансована система показників, ключові показники ефективності, цифровізація, ефективність управління, цифрові активи.*

Problem statement. In the modern business environment, the rapid development of digital technologies and the globalization of markets pose new challenges for enterprises in managing intellectual capital. Traditional evaluation methods often do not take into account the value of intellectual assets, which limits their effectiveness in strategic planning and managerial decision-making. This article aims to explore the possibilities of integrating the latest technological solutions and modern theoretical approaches into the process of evaluating of intellectual capital in order to enhance its strategic value for companies.

Analysis of recent research and publications. At the current stage, the development of science in the field of intellectual capital management is significantly influenced

by the research of scholars such as I. M. Zelisko, G. Y. Ponomarenko, O. A. Khilukha, O. Y. Kuzmin, L. G. Lipych, S. M. Illyashenko, Y. O. Golysheva, A. V. Kolodka, O. S. Litvinov, among others. However, there remains a need for further research into the problem of identifying key indicators of effectiveness that most accurately reflect the contribution of intellectual capital to the development and competitiveness of enterprises, which in its turn has a significant impact on enterprise development. It is also important to explore the possibilities for improving the process of management of intellectual capital based on integrating the results of assessing the performance indicators of financial and economic activities of the enterprise and managing its labor potential.

Formulating the purposes of the article. The purpose of this work is to analyze the existing methods and tools for assessing the effectiveness of managing of intellectual capital of enterprises in the context of digitalization, to identify their advantages and limitations, and also to develop recommendations for their optimization and adaptation to the contemporary economic challenges.

Methodology. This research methodology combines qualitative and quantitative approaches to the analysis, synthesis and comparison of methods for assessing the intellectual capital of an enterprise in a synergy with the methodological tools of the balanced scorecard and key indicators of business success. The study is aimed at the interrelation and possibility of further integration of theoretical approaches and practical recommendations towards improving the management of intellectual capital of the companies.

Presentation of the main research material. Modern enterprises, to maintain competitiveness, must focus on building of a creative space that stimulates the development of intellectual capital. There is a clear need to assess and optimize the use of intellectual capital at domestic enterprises. The variety of methods for evaluating this capital requires adaptation to the specific conditions of each enterprise, complicating their widespread implementation [1]. In the context of continuous digital transformation of enterprises and a new economic paradigm, where intellectual capital becomes a key to evaluating the value of enterprises, the importance of accurate and effective evaluation of intellectual capital significantly increases. Intellectual capital, which encompasses knowledge, skills, innovative processes, and corporate culture, is a key asset in achieving competitive advantages of a company. Examining existing methods and tools for assessment allows for the identification of the most effective approaches to managing this valuable resource.

One widely used methodology is *the Balanced Scorecard (BSC)*, developed by D. Norton and R. Kaplan (Figure 1) [2; 3; 4], which in modern business conditions can be adapted to the strategic objectives of the enterprise and integrated with the results of analyzing and evaluating the state of development of its intellectual capital according to components: financial, customer, internal business processes, and staff training. This approach provides a multifaceted view of the contribution of intellectual capital to the overall results of the effectiveness of financial and economic activity management of the entity.

The Balanced Scorecard (BSC) is a strategic management tool that helps companies to measure not only financial outcomes but also other key aspects of business that impact success and sustainable growth. Figure 1 illustrates the four main perspectives of the BSC [2; 3]:

1. Financial Perspective (How Do We Look to Shareholders?) reflects financial goals and indicators that

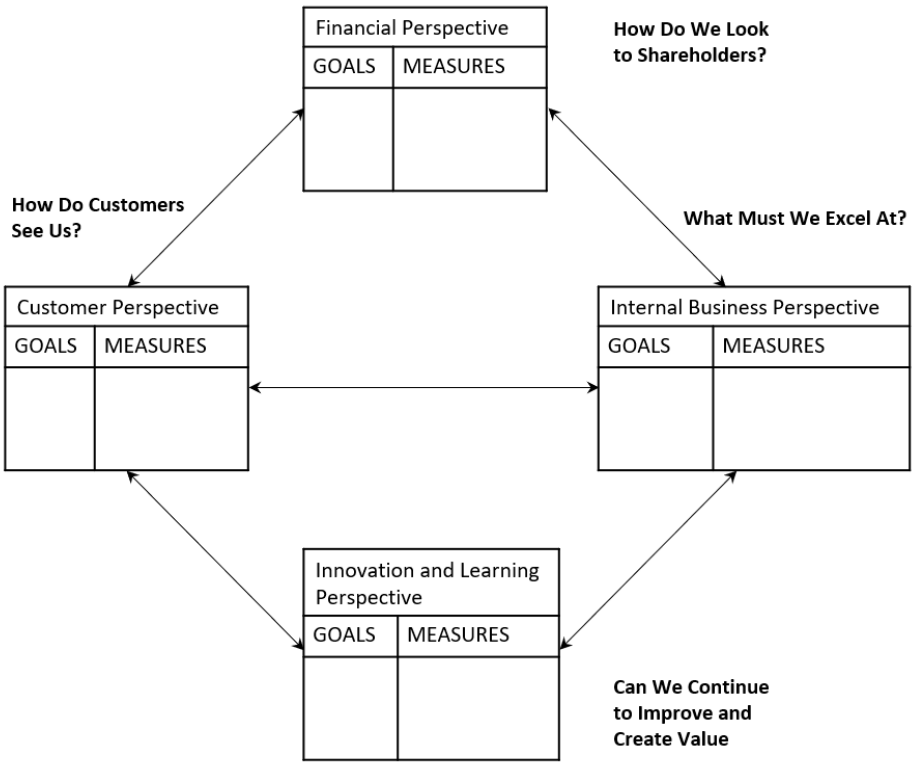

Figure 1. The Balanced Scorecards Links Performance Measures by Kaplan and Norton (1992)

Source: [1; 2; 3]

show how the company is perceived by its shareholders, including profits, revenue growth, and overall financial stability.

2. Internal Business Processes Perspective (What Must We Excel At?) focuses on the efficiency and optimization of the company's internal operations, which affect the ability to meet customer needs and financial goals.

3. Customer Perspective (How Do Customers See Us?) includes goals and indicators that assess how the company is perceived externally, including customer loyalty, market share, and reputation.

4. Staff Learning and Growth Perspective (Can We Continue to Improve and Create Value?) emphasizes the importance of investing in staff training and development to support innovation and ensure sustainable growth of the company.

Each of these perspectives includes specific goals and indicators (metrics) that help determine whether the company is achieving its strategic objectives. Together, these perspectives form a strategically integrated management system that ensures synergy between the internal and external organizational environments and acts as a catalyst in the process of transforming strategic vision into specific actions and evaluative parameters. The BSC helps ensure the balanced management, focusing not only on short-term financial indicators but also on factors that promote long-term growth and enhance enterprise competitiveness. Substantiating the results of scientific works [2–5], it can be concluded that the features of using and implementing the BSC methodology require further research in the directions of expanding its application in specific industries and businesses. An important aspect is conducting empirical studies that would assess the real effectiveness of using the BSC in practice. The integration of the BSC with classical methods of evaluating of the effectiveness of enterprise management could become the basis for developing more complex methodologies. In-depth *case studies* will help identify practical problems and the dynamics of applying the BSC in various organizational contexts. Defining opportunities for improving the BSC will be a significant contribution for companies seeking to optimally use this methodological tool in operational and strategic management of enterprises.

Key Performance Indicator (KPI) – another methodological tool that allows measuring the effectiveness of managing intellectual capital by defining key indicators of company success directly related to its development goals. Properly selected KPIs can serve as reliable markers of the effectiveness of the use and development of intellectual capital of the enterprise.

Key Performance Indicators (KPIs) are an integral part of strategic company management, allowing the assessment of how effectively the organization achieves its main objectives. It is important to understand that KPIs are divided into two major groups: quantitative and qualitative indicators, each playing a unique role in the process of evaluating and analyzing business effectiveness. Quantitative KPIs are usually presented in numerical data, which allows them to be easily tracked and analyzed. These indicators have clear metrics and can be directly linked to the financial results of the company, the efficiency of operations, or workforce productivity. For example, the number of units sold, the total profit of the company, or the percentage increase in its market share are important quantitative indicators that provide a clear understanding of financial stability and business development success. On the other hand, qualitative KPIs measure aspects that are less specific and often based on subjective assessment. These indicators may include customer satisfaction levels, quality of corporate governance, corporate culture, and employee engagement. Qualitative indicators often require conducting detailed surveys, questionnaires, or interviews to collect feedback and impressions that cannot be easily measured numerically but are extremely important for ensuring long-term success and sustainable development of the company.

Effective use of KPIs involves a proper balance between quantitative and qualitative indicators. Focusing solely on quantitative indicators can lead to neglecting key qualitative aspects of business development that have a significant impact on the company's reputation, customer loyalty, and employee motivation. Conversely, excessive attention to qualitative indicators can complicate the quantitative assessment of achieving business goals and measuring specific outcomes. Therefore, it is important to find a certain balance in their use, integrating both types of indicators to obtain a complete picture of the results of company's activities. For example, increasing customer satisfaction levels (a qualitative KPI) can have a direct impact on increasing sales (a quantitative KPI), which in turn strengthens the company's market position. On the other hand, investments in training and development of employees (a qualitative KPI) can increase their productivity, which affects the reduction of production costs (a quantitative KPI).

Using KPIs to determine business efficiency outcomes requires not only setting significant indicators for the company but also regular monitoring, analysis of the data obtained, and timely adjustments to the strategy and business processes of the enterprise. This includes the ability of the companies themselves to quickly adapt to changes in the business environment, as well as to predict future trends of business development and market challenges to remain competitive. Furthermore, effective KPI management requires engaging and open communication with all stakeholders, including management, employees, customers, and investors, to ensure understanding and support of the overall strategic goals. Thus, it can be noted that KPIs are vitally important methodological tools for measuring success of own business and managing the strategic development of an organization. A balanced approach to quantitative and qualitative indicators allows companies not only to achieve short-term financial goals but also to support sustainable growth, innovation, and a strong corporate culture in the long term. Key Performance Indicators (KPIs), when carefully selected and appropriately applied, are important indicators for enterprises to track their progress in achieving strategic goals [6].

Each of these approaches has its advantages and disadvantages. For example, the methodological tool BSC provides a comprehensive view of the strategic management of the company, but it can be complex to implement and require significant resources for continuous updating. The methodological tool KPI, on the other hand, is relatively simpler to use but may lead to focusing attention only on short-term goals, ignoring more strategic aspects of the possibilities of evaluating the state of development of the company's intellectual capital. Therefore, choosing the

appropriate methodology for evaluating the effectiveness of enterprise management depends on the specifics of its financial and economic activities, strategic goals, and available resources.

An important aspect is also the integration of these methodologies with digital technologies. Modern data analytics tools and artificial intelligence offer new opportunities to increase the accuracy of evaluating the effectiveness of managing financial and economic activities of enterprises in connection with the possibility of prompt response by executives and managers to the influence of external and internal environmental factors of companies and the timely formation of necessary managerial decisions. For example, the application of *machine learning* can help in identifying complex relationships between various aspects of managing intellectual capital and their impact on the results of the financial and economic activities of enterprises. In addition, in the conditions of digitalization, new forms of intellectual capital appear, such as digital assets, databases, software, and other technological resources. This requires the refinement of the mentioned methodological tools (BSC and KPI) in the context of the need to improve the methods of analysis and evaluation of the intellectual capital of enterprises for their necessary adaptability in modern business conditions and the appropriate reflection of their impact on the overall value of the company and the results of the effectiveness of managing financial and economic activities.

Conclusions. Summarizing the above, it has been proven that the methodological toolkit for evaluating the intellectual capital of business entities should be developed in accordance with integration with modern digital technologies and requires the improvement of the BSC and KPI methods with the aim of their necessary reflection of the results of the impact on the total value of the company and the level of efficiency of financial and economic management activity. The integration of digital technologies into enterprise management processes ensures greater efficiency in the implementation of management decisions and the accuracy of information, including when determining the contribution of the value of the development of intellectual capital to the development of the enterprise as a whole. Modern means of data analysis and artificial intelligence open up new opportunities for increasing the accuracy of the results of evaluating the effectiveness of management of financial and economic activities of enterprises in connection with the possibility of prompt response of leaders and managers to the influence of factors of the external and internal environment of companies and the timely formation of necessary management decisions.

In order to further improve of the existing methods, comprehensive research aimed at studying the impact of digital innovations on the assessment of intellectual capital is needed, taking into account the fact that in the context of digitalization new forms of intellectual capital appear, such as digital assets, databases, software and other technological resources. At the same time, special attention should be paid to the integration of artificial intelligence (AI) and machine learning (ML) tools to predict the effectiveness of the use of intellectual assets in the enterprise management system. The introduction of artificial intelligence and machine learning is an important step in the improvement of intellectual capital assessment methodologies, given that they also affect the effectiveness of intellectual capital management, the overall value of the company and the level of efficiency of financial and economic management. These technologies offer strategic advantages for optimizing the management of intellectual assets. In particular, the automation of data collection and analysis with the help of artificial intelligence and machine learning can significantly improve the effectiveness of the assessment of intellectual capital. These technologies allow deep analysis of large volumes of unstructured data, helping to more accurately determine the contribution of each type of intellectual property to the overall success of the company.

In addition, using machine learning to predict future trends and adjust intellectual capital allows companies not only to respond to current changes, but also to anticipate future challenges and opportunities. An important aspect is continuous learning and adaptation of AI tools to changes in the market environment and internal business processes, which ensures constant improvement and relevance of assessment methodologies.

Given the above, future research and development in this direction should be focused on studying of potential strategies for integrating AI and ML into existing intellectual capital assessment methods. This will not only open up new opportunities for managing intellectual assets, but will also contribute to increasing competitiveness and innovative development of enterprises on a global scale.

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