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MANAGEMENT EFFICIENCY ANALYSIS OF INNOVATION PROCESS IN THE FINANCIAL AND ECONOMIC ACTIVITIES OF IT SPHERE ENTERPRISES

ABSTRACT

The purpose of the article is to substantiate the priority of increasing the management efficiency of innovative process of IT sphere as a factor contributing to the Ukraine's economic growth taking into account the current opportunities and limitations.

The study substantiated that maintaining a competitive advantage in the innovation space through the development of digitalization processes in Ukraine requires continuous improvement of the management of the innovative process in the IT sphere, and increasing the efficiency of implementing new technical, organizational and marketing solutions. It is shown that under the influence of an unstable external environment, there is a need to develop and implement a management system that would provide an opportunity to obtain competitive advantages in the IT sphere and maintain a competitive position of the Ukrainian IT business in the market. The priority of development is long-term growth, the driving force of development is innovation and modern technologies, as well as highly qualified human and institutional capital. At the same time, traditional factors of production (land, natural resources, labour) are losing their importance. The basic priorities of managing the innovation development of the IT sphere have been determined. The implementation of an innovation policy in the IT sector of Ukraine, based on the current opportunities and constraints, will ensure a systematic and sustainable increase in the efficiency of innovative development in this area and will contribute to the increase of the national economy of Ukraine.

The results of the study should be implemented for the development of the theory and methodology of innovative development at the macro- and meso-levels, as well as in stimulating model of innovative process in Ukraine based on the status of its leading economic sectors, in particular, the IT sphere.

Keywords: innovations, national economy, financial and economic activities, IT sphere, development priorities, management efficiency, management of the innovation process

JEL Classification: E62, M15, O31, O32

INTRODUCTION

The managerial aspect of ensuring the recovery and development of the Ukrainian economy covers a wide range of scientific, methodological, scientific and practical issues closely related to innovation, ranging from the management of innovation design to the management of the implementation of scientific developments in production [1; 2]. Compensation for the damage caused by Russia's military aggression against Ukraine, restoration of the most vulnerable sectors of the economy and increase in production is currently an important management task at the state level. In this context, it is important to identify priorities for the development of the state's economy, which should ensure the consistency and permanence of such development, taking into account the existing realities.

At the same time, given the macroeconomic aspect of the problem of ensuring the development of the state's economy, it is necessary to take into account the need to

form an effective regulatory toolkit in relation to the identified priority areas and directions of economic activity in the country. This requires purposefulness and reasonableness in the formation and implementation of the country's socio-economic development strategy, justification and implementation of tools aimed at increasing the competitiveness of the national economy in the world market, ensuring coherence of interests of economic participants, in particular, those related to the development, implementation and dissemination of innovations.

Given that in the modern business environment, innovations are increasingly considered by scientists and practitioners as one of the key priorities of economic development [13], attention is increasingly being paid to the problems of managing the innovation process in the sectors of the economy where innovative products are basic, in particular, in the IT sector. The ability to develop, implement and disseminate innovations, primarily technological, but also managerial, organizational and other, is crucial for the development of economic entities in this area, their competitiveness, ability to adapt to changing market conditions, and create high-tech IT products and services in demand by the market [3]. Under these conditions, for IT companies, significant investments in innovation activities are accompanied by high risks of irrational resource consumption [22] and therefore are characterized by a high potential for reducing profitability and incurring losses in the event of ineffective management of the innovation process and the activities of the enterprise as a whole, which actualizes the need to study the key aspects of the effectiveness of the innovation process in this area.

Thus, it is relevant to consider the innovation process in the IT sphere as a separate object of managerial influence, the efficiency of management of which significantly affects the sustainability and dynamics of the country's economy in modern conditions, taking into account internal and external trends in the development of this sphere, current limitations and opportunities inherent in this sphere and the country's economy as a whole. This context of forming the foundations of economic development, along with the need to systematize the organizational and methodological foundations of managing the innovation process in the IT sphere, and consideration of the financial and investment aspects of this issue, determined the relevance of the topic of this article, its purpose and the tools to be used in the study.

LITERATURE REVIEW

In the realm of innovation within the IT sector, the financial dimension plays a critical role in driving the development of both enterprises and the national economy. While existing research has delved into the essence, sequence, and structure of the innovation process, a more in-depth exploration of its financial intricacies is warranted. This financial dimension encompasses aspects such as investment, funding, and resource allocation, all of which are instrumental in the success of innovation initiatives.

Research on the management of the innovation process in the IT sphere not only provides insights into the essence, sequence, and structure of this phenomenon but also sheds light on its financial dimensions. Notably, these aspects are well-documented in works such as [14; 15]. Coverage of this issue in the works of modern scholars and practitioners makes it possible to identify the conditions and factors that contribute to the improvement of economic results at the micro, meso and macro levels and, thus, to realize the potential of using innovations in the IT sphere as a factor of economic growth of the country. To a large extent, this is facilitated by the coverage of the prospects for the development of the Ukrainian IT sector and consideration of the financial and investment aspects of this issue in works such as [9]. Scientific papers [3; 15] also show how it is proposed to improve the innovation process at the level of IT enterprises in order to realize their innovation potential and improve performance in the medium and long term.

It is also worth noting the successful attempts to analyze the impact of the digital economy on the country's economic development, in particular in [12], this study highlights the impact of specific factors of digitalization on macroeconomic and meso-economic drivers of development in a fairly structured manner. Based on the works that study the impact of technological innovations on economic development, such as [25; 26], it is advisable to structure the available tools and approaches at different levels, some of which are appropriate for use in the IT sector of Ukraine. The financial models, they propose, aid in the planning and execution of innovation projects. However, it is crucial to acknowledge the limitations of these models in capturing the full complexity of financial realities. The real world is influenced by myriad financial factors, and predicting the financial outcomes of innovation projects can be challenging.

Modern researchers agree that the assessment of the factors of economic development of the country should be based on a model that reflects the parameters and resource basis for the implementation of a particular innovation project [25; 30]. At the same time, such a model, although used to obtain and process relevant information about the project, cannot fully reflect reality and become the basis for an absolutely reliable forecast of the development of the innovative, financial and investment indicators within the planned strategy or program, since reality is too complex to assess, and the model only

partially represents reality and does not fully take into account all possible changes in the internal and external environment.

At the same time, the publications of Ukrainian and foreign researchers for this specific business area - IT business and consideration of the innovative, financial and investment aspects of this issue - do not pay sufficient attention to the problem of substantiating the link between the development of the national economy of Ukraine and the improvement of the efficiency of innovative, organizational and management activities in the IT sector and identifying key priorities for such development. To a large extent, this issue is considered primarily as a generalized fact, in particular, in [20; 26], which is quite understandable and obvious, without the necessary justification in the context of global and regional (European) trends, the realities of the current stage of development of the IT sphere of Ukraine and the problems of this development.

Nonetheless, improving the management of the innovation process in the IT sector, with a specific focus on its financial aspects, serves as a pivotal subject of scientific research and practical value. This emphasis holds relevance at the micro level (for IT companies), and at the meso (IT sector) and macro levels (national economy). These points actualize the context and discussion regarding, on the one hand, the relationship between Ukraine's economic development and the development of the IT sector as one of its priority industries, and, on the other hand, the framework, principles, and objectives of using the tools that, in the author's opinion, will help improve the management of the innovation process in the IT sector.

AIMS AND OBJECTIVES

The aim of this article is to substantiate the priority of increasing the efficiency of the innovation process in the IT sphere as a factor contributing to the development of the national economy of Ukraine under current conditions and based on the current opportunities and limitations.

Achieving the research goal is associated with the following tasks:

- a meticulous analysis of current global and Ukrainian conditions and trends in the innovation process, with a particular focus on their financial aspects;
- thoroughly identifying opportunities and limitations for enhancing the financial and operational efficiency of the innovation process;
- providing substantiated priorities for the effective management of the innovation process within the IT sphere, with the explicit aim of propelling economic growth within Ukraine.

METHODS

The theoretical basis for the research carried out in the course of work on the article was the key provisions of modern economic theory and modern concepts of innovative development at the global and macro levels, which are covered in the scientific works of leading scholars of the world. To achieve the tasks set out in the article, a system of general scientific and special methods of studying processes and phenomena in their interconnection and development was used: induction, deduction, analysis, synthesis, and dialectical - in identifying specific features of strategic innovative development of the IT sphere in Ukraine; abstraction, generalization, systemic, functional - in developing a strategy for the development of the IT sphere in Ukraine and forms of its practical implementation. The article uses conceptualization as an approach that allows achieving the complexity effect of the system of development priorities as the main results of the study.

RESULTS

Economic development is a long-term process of change that occurs in the economy, including quantitative changes related to production growth, employment, investment, capital formation, income, consumption and other economic variables, which characterize the economy from the quantitative side (economic growth), and accompanying qualitative changes (changes in social organization) and structural changes.

The innovative activity of enterprises and other entities is carried out in the specific institutional conditions existing in a given country. This opinion is expressed in the definition of B. Lundvall, who states that "...the national innovation system is created through institutions and economic entities that determine the pace and direction of technological change in

society" [16]. In the innovation process, economic relations between the inventors of innovations, i.e. resource owners, and consumers of innovations are realized in terms of their production, use and resource provision of the process participants [3]. In this regard, the organizational structure of innovation management should be seen in the economic relations between all participants in innovation activities.

We believe that in order to ensure the development of the national economy under the influence of external factors (the key ones being globalization, internationalization, transnationalization), there are:

- identification of key economic sectors, areas of activity, economic entities, the development of which will most contribute to the development of the country's economy as a whole, taking into account global economic trends;
- selection of optimal development options in relation to the existing economic potential of key sectors of the economy of a particular country and external conditions and financial potential;
- identification of target market areas (segments or niches) for the implementation of the selected development options, or the formation of new target markets.

At the same time, the consolidation of economic potential and economic development are extremely problematic without security, political and economic stability, as well as open markets. In the context of Ukraine, which at this stage is in a state of war unleashed against our country by the Russian Federation, it is important to assess which elements of innovation systems at different levels have the best chance of survival and development both in the context of active hostilities and in the process of post-war recovery. The adequacy of such an assessment depends on the validity of positions on resource needs at this stage and in the future with respect to key participants in these systems (in particular, enterprises, educational institutions, and the state), their readiness to create, implement, and disseminate innovations, technology transfer, and their current and expected competitive positions in international markets.

In developed economies, the IT sector is considered to be one of the high-tech sectors of the economy characterized by the highest degree of utilization and the greatest dependence on the so-called specialized factors of production [14; 15; 20]: knowledge and human capital. In the case of the IT business, these factors are constantly reproduced, which not only makes it possible for individual enterprises to be competitive but also has a positive impact on the environment (traditional sectors of the economy, the level of science, technology, engineering, etc.) On the other hand, the IT sector requires continuous intensive innovation, as well as high research and development expenditures, and is characterized by certain sectoral features. The most important of them are [8; 9; 26]:

- high capital investment (8% or more of the value of sales of IT products (services));
- high creativity, innovation, entrepreneurship, knowledge intensity and flexibility;
- high cash outlays and high investment risk;
- the rapid diffusion of IT innovations;
- rapid depreciation of developed and applied technologies;
- close scientific and technical cooperation and extensive partnerships;
- high flexibility of organizational structures;
- independence and autonomy of employees with knowledge and developed, often unique, competencies;
- information intensity (growth in the amount and diversity of information collected and transformed).

In our opinion, the rapid development of new-generation communication networks, provision of consumers with "portfolios" of complex high-tech goods and services (for example, telecommunication services), development of the regulatory sphere, and increased competition in the domestic and foreign markets are the factors that necessitate the development and introduction of new effective approaches to managing innovation in the Ukrainian IT sector, optimization of the consumer value of IT products (services), in order to realize the potential of this sector as a factor of development of the national economy of Ukraine [13; 22].

The Information Technology (IT) sector has rapidly evolved into a key driver of economic growth in many countries, including Ukraine. One of the key financial aspects of managing innovation in the IT sector is the decision to invest in various innovation projects. Making the right investment decisions is critical in driving innovation. Investors, business analysts, and managers must have a deep understanding of the risks and opportunities associated with specific projects. They need to evaluate potential returns on investment, the timeframe for realizing these returns, and the competitive advantages that innovative projects can provide. Financial decision-making in IT innovation involves:

- startups and financial challenges. Startups are the lifeblood of the IT sector. Many innovative ideas and breakthrough technologies originate from startups. However, startups often face financial constraints. They need to secure initial funding to develop their ideas and bring them to market. Effective financial planning and decision-making are essential for startups to navigate these challenges. This section will explore the financial aspects of supporting innovation within startups, including strategies for securing initial funding and managing cash flow effectively;
- government initiatives and financial support. Governments worldwide recognize the economic importance of the IT sector and often provide financial support and incentives for innovation. This support can take the form of research grants, tax incentives, or direct investments in research and development projects. Analyzing the effectiveness of government programs in fostering innovation in the IT sector is crucial. This section will evaluate the impact of government financial support on IT innovation and economic growth;
- investor activity in the IT sector. Investor activity plays a significant role in funding IT innovation. Venture capital firms, angel investors, and corporate investors all play a part in providing the necessary financial resources for innovative projects. Understanding the trends in investor activity, including the types of projects they support and the expected returns on investment, is crucial for both IT companies and policymakers.

Current trends in the global economy reflect the processes of globalization and the development of science and technology, the formation of the information society, and the impact of crisis phenomena on the global and local economies. These processes, against the general background of a decline in consumer demand for traditional goods and services, lead to increased competition between enterprises of high-tech sectors of the economy (in particular, the IT sector) for markets for goods and services, which necessitates the formation of effective innovation strategies as a system for realizing the competitive potential of these sectors.

Thus, according to Statista [11], global information technology spending amounted to USD 4.26 trillion in 2021 and is expected to grow to approximately USD 4.43 trillion in 2022. IT and communications services account for the largest share of expenditures, receiving the largest amounts of investment, as they form a set of various basic services and tools that remain the foundation for the vast majority of business functions of modern enterprises (Figure 1).

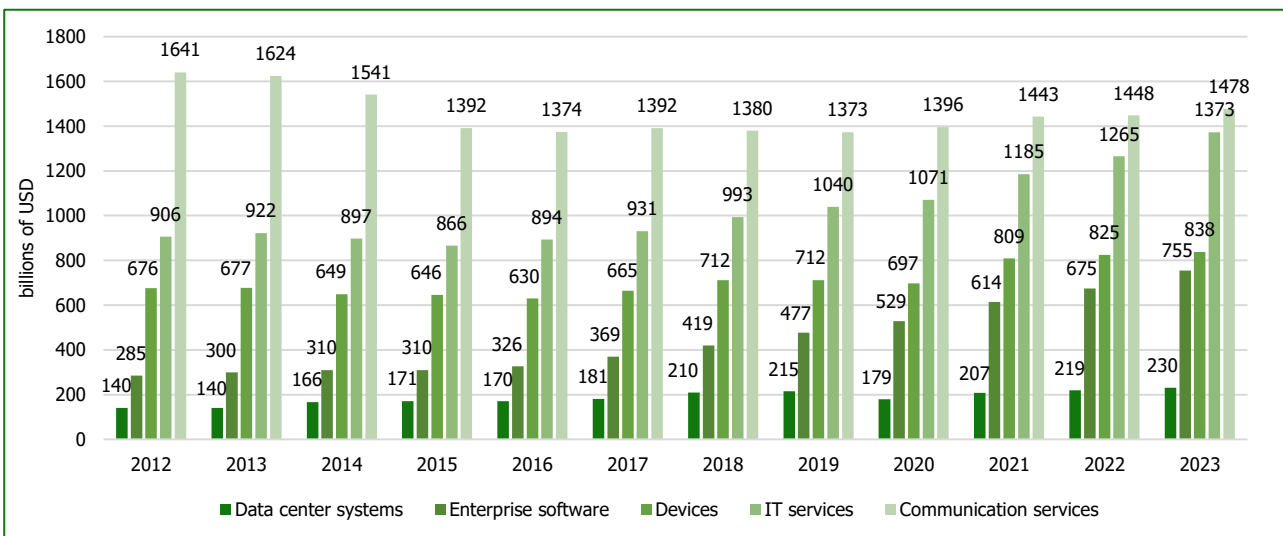


Figure 1. Expenditures on information technology worldwide from 2012 to 2023 (forecast) by segments (in billions of USD). (Source: according to [11])

Spending on various IT segments is forecast to increase, accelerating the digital transformation of the economy, which includes the use of artificial intelligence, process automation, and moving data to the cloud. These processes are being strengthened by strategic investments in innovation and development.

Characterizing the performance of the IT sector in Ukraine, according to the available data, it should be noted that the dynamics of income of economic entities in this sector is unstable, which is, at the same time, due to the influence of primarily external, crisis factors (the global economic crisis of 2008, socio-political instability and the beginning of Russia's military aggression against Ukraine in 2014, the spread of Russia's military aggression in Ukraine in 2022). In general, during the inter-crisis periods, the country's IT sector was characterized by significant positive values of the dynamics of profitability growth (Figure 2).

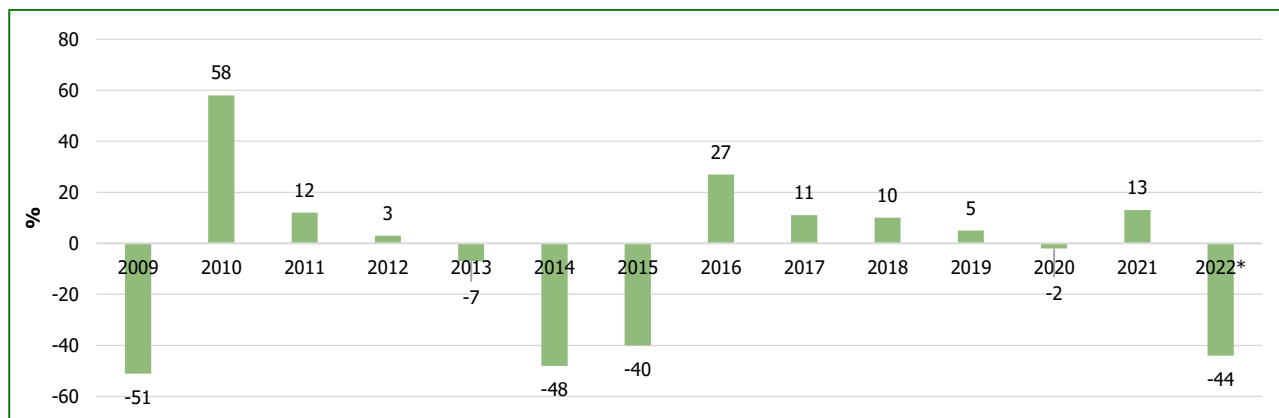


Figure 2. Revenue growth of the information technology market in Ukraine from 2009 to 2022. (Source: according to [10])

Characterizing the overall innovation of Ukraine's economy as the basis for ensuring the sustainable development of this economy, it is necessary to provide data on the value of the innovation index in Ukraine (which in 2021 amounted to 29.8) and its components (Figure 3).

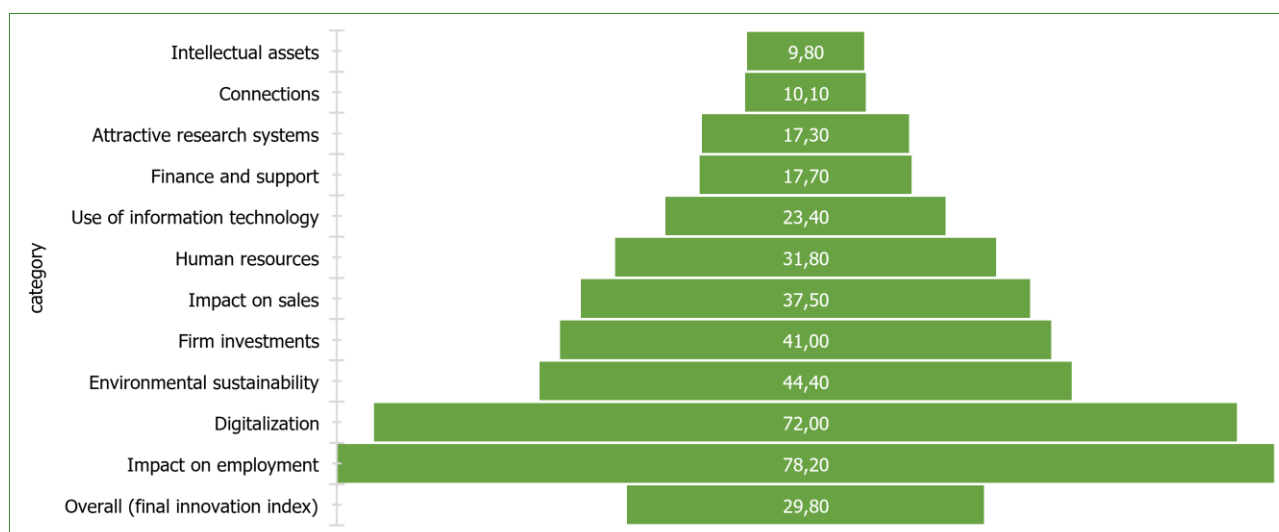


Figure 3. Innovation Index in Ukraine in 2022 by Components (100% EU average), % relative to the average European level. (Source: based on [6])

The values of the components of this index show that digitalization, which characterizes to some extent the activities of the IT sector in the country, had a significantly better impact on the national innovation process and the country's innovation system than the other sectors (72.0 vs. 29.8 on average). At the same time, such characteristics of the IT sector as "use of information technologies" (23.4) and intellectual assets (9.8) were slightly below average.

Given the development of the innovation systems of European countries and due to European integration processes, which are a priority for the development of the Ukrainian economy and determine the state and trends of the competitive field in which it is currently operating (based on the Association Agreement with the EU and agreements on opening EU markets to Ukraine during the war) and into which the national economy plans to actively integrate, we will analyze the innovation index of the Ukrainian economy in relation to such indicators for other European economies. Thus, Figure 4 shows the composite index of innovation in European countries in 2021 (relative to the European average, taken as 100%).

According to Figure 4. Ukraine has the lowest level of the index among all European countries in the ranking. This level is characterized by a downward trend over the past seven years (from 39 to 30%), as shown in Figure 5.

Under the influence of the external environment, there is an economic need to develop and implement a management system that would enable the implementation of new ways to gain competitive advantages in the IT sector of Ukraine and maintain the competitive position of Ukrainian IT business in the market. First of all, long-term growth is becoming the most important factor of development; along with physical capital, the driving force of development is innovations and

modern technologies, highly qualified human capital (productive social and intellectual capital) and institutional capital, which are necessary for the implementation of innovative ideas. Traditional factors of production, such as land and natural resources or labour as an unskilled personalized resource, are losing their importance.

Therefore, the effectiveness of IT management, which is a factor in the development of the national economy of Ukraine, depends on a number of factors that determine the problem field, as well as the direction of management influence, which will contribute to the formation of the foundations of innovative development [22]. The basic priorities for ensuring the effectiveness of the innovation process in the IT sphere as a factor contributing to the development of the national economy of Ukraine in modern conditions, based on the current opportunities and limitations, include the following (Figure 6). At the same time, the development of the IT sphere in Ukraine is subject to certain constraints, a list of which is also presented in Figure 6.

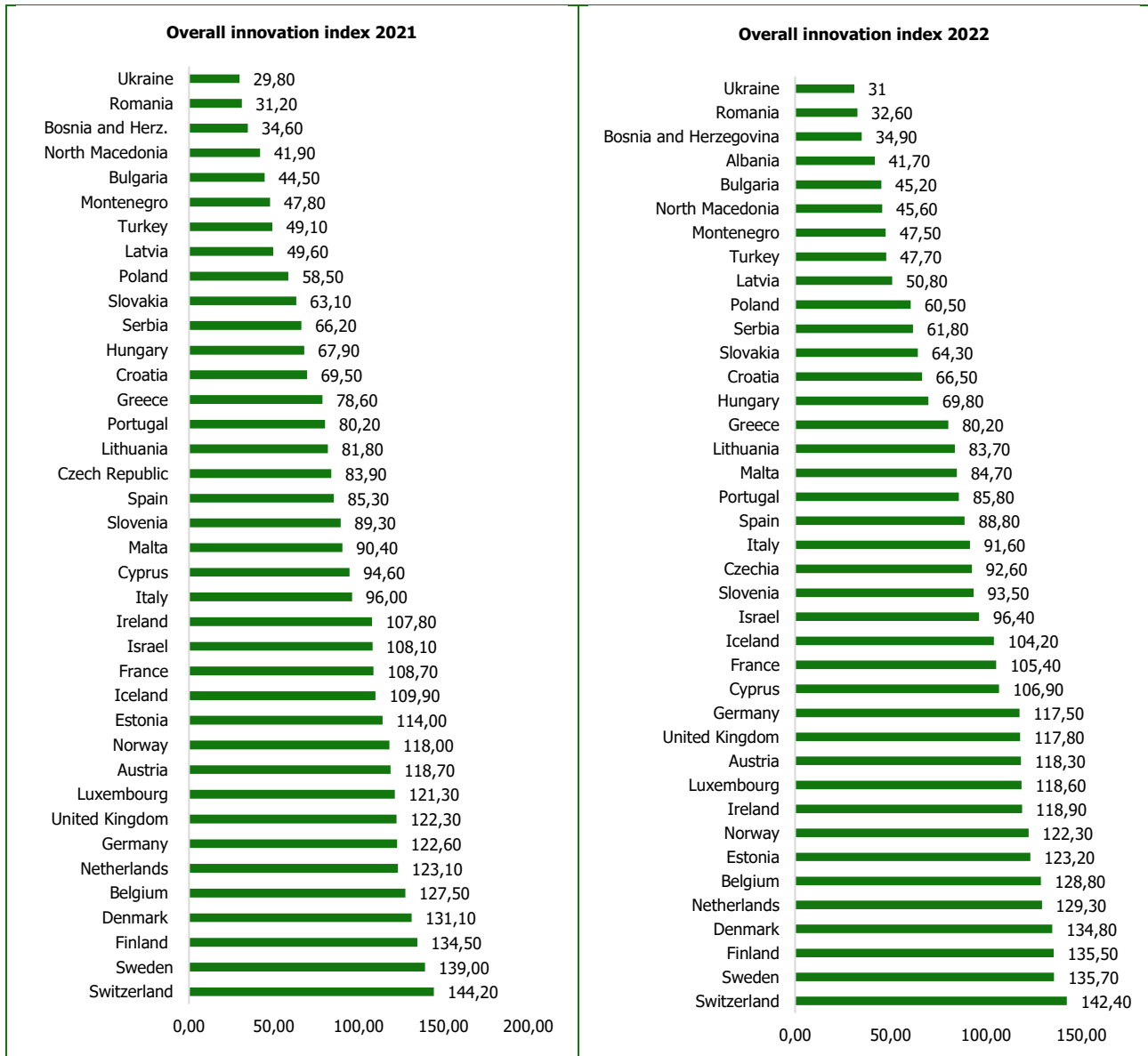


Figure 4. Consolidated Innovation Index in European countries in 2021 and 2022 (EU = 100) in general. (Source: based on [5, 7])

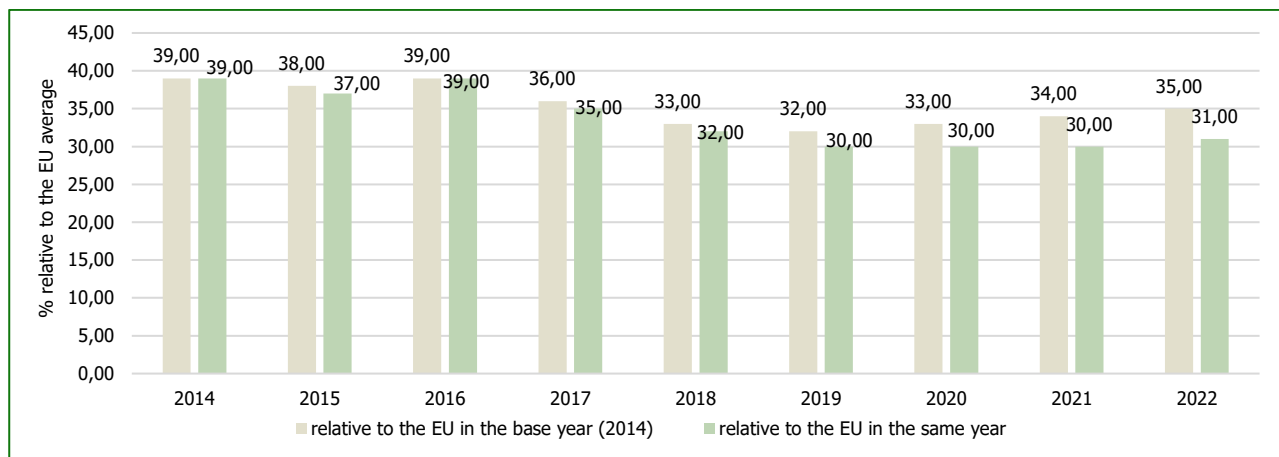


Figure 5. European Innovation Rating, Ukraine's data for 2014-2022 (EU average - 100%). (Source: based on [4, 5, 7])

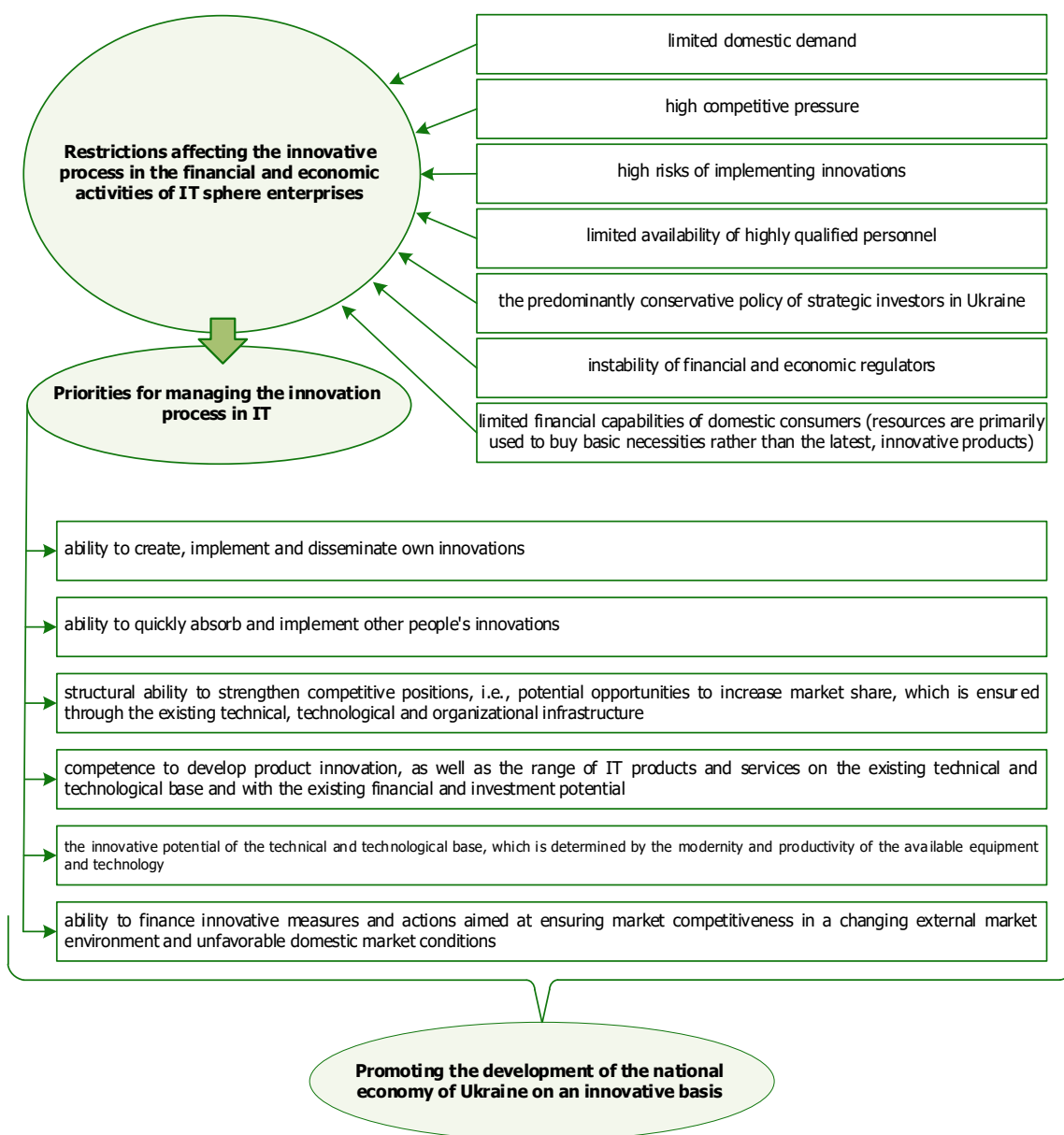


Figure 6. Priorities for managing the innovative process in the financial and economic activities of IT sphere enterprises to promote Ukraine's economic growth.

In the context of managing innovative development in the IT sphere, the assessment of financial efficiency and performance is a crucial element. Measuring financial efficiency provides:

- Return on investment (ROI). Return on Investment (ROI) is a central metric for evaluating the financial efficiency of innovation projects in the IT sector. It measures the ratio of net gains to the total investment cost. A high ROI indicates that the financial resources invested have been effectively leveraged to generate returns. ROI analysis allows IT companies and investors to prioritize projects that promise the best financial outcomes. This section will discuss the use of ROI as a financial benchmark and its role in decision-making;
- Cost-effectiveness. The concept of cost-effectiveness goes beyond ROI and delves into the efficiency of resource utilization. It involves a comprehensive assessment of costs incurred versus the value generated. Cost-effectiveness analysis considers factors such as resource allocation, time efficiency, and the overall economic benefit. In the IT sector, understanding cost-effectiveness is essential in optimizing the allocation of financial resources across various innovation initiatives;
- Budget adherence. Budget adherence is a fundamental aspect of financial efficiency. It involves monitoring and controlling project expenditures to ensure they align with the allocated budget. Effective budget adherence is a hallmark of sound financial management, as it prevents cost overruns and financial waste. This section will explore strategies for maintaining budget adherence in innovative IT projects.

Risk management and financial resilience:

- Risk assessment and mitigation. Innovation projects, by their nature, carry inherent risks. Financial decisions in the IT sector must account for these risks. Risk assessment involves identifying potential threats to the success of an innovation project, whether they be technological, market-related, or financial in nature. Once risks are identified, mitigation strategies are implemented to minimize their impact. Understanding risk and effectively managing it is an integral part of financial efficiency;
- Financial stability in uncertainty. The IT sector is dynamic and subject to rapid changes in technology and market conditions. Maintaining financial stability in times of uncertainty is a significant challenge. This involves having adequate financial reserves, diversifying financial investments, and adapting quickly to changing circumstances. Financial stability ensures that innovation projects can continue even when faced with external disruptions or market volatility. This section will explore the role of financial resilience in managing innovation in the IT sector.

Key Performance Indicators (KPIs). To assess financial efficiency and performance, various Key Performance Indicators (KPIs) are utilized. KPIs provide specific, measurable indicators of financial success and help stakeholders make informed decisions:

- Innovation expenditure ratio. This KPI measures the proportion of an IT company's budget allocated to innovation activities. A high innovation expenditure ratio indicates a strong commitment to innovation, but it should be balanced with adequate returns on these investments;
- Revenue growth rate. The revenue growth rate measures the increase in a company's income over a specific period. It is a fundamental KPI to evaluate the financial performance resulting from innovation. Sustainable innovation should ideally contribute to revenue growth;
- Innovation project payback period. This KPI calculates the time it takes for an innovation project to recoup the initial investment. A shorter payback period is generally more favourable as it represents a quicker realization of financial returns.

In the IT sector, managing financial efficiency and performance in the context of innovation is a multifaceted process. Effective use of financial resources, risk management, and adherence to budgets are essential for ensuring that innovation initiatives yield significant financial returns. Key Performance Indicators provide measurable insights into financial outcomes, helping IT companies and investors make informed decisions to support innovation. Overall, financial efficiency and performance are integral components of sustainable innovation in the IT sector, contributing to both company success and the sector's continued growth and development.

Efficiency in financial and economic activity is crucial for the success and sustainability of IT companies. The criteria for evaluating the efficiency of financial and economic activity in the IT sector can be multifaceted and may include the following:

1. Profitability Metrics:

- Return on Investment. Measures the return on financial investments made in IT projects;

- Gross Profit Margin. Indicates the profitability of IT services or products by measuring the difference between revenue and the cost of goods sold;
 - Net Profit Margin. Evaluates the overall profitability of the company by measuring net income as a percentage of revenue;
2. Cost Management:
 - Cost Control. The ability to manage and minimize operating and production costs;
 - Cost-to-Income Ratio. Measures the efficiency of cost control relative to the company's income;
 3. Revenue Growth:
 - Year-over-Year Revenue Growth. Measures the annual increase in revenue, reflecting the company's ability to attract new clients and expand services;
 4. Efficient Resource Utilization:
 - Resource Allocation. The efficient allocation of human resources, infrastructure, and technology to projects;
 - Resource Turnover. Measures the effectiveness of resource allocation by tracking how quickly resources are utilized and turned into revenue;
 5. Cash Flow Management:
 - Cash Flow from Operations. The ability to generate cash from core business activities, indicating liquidity.
 - Working Capital Management. Efficient management of working capital to meet short-term financial obligations;
 6. Return on Assets. Measures how effectively a company uses its assets to generate profit.
 7. Return on Equity. Evaluates the efficiency of using shareholders' equity to generate income.
 8. Debt Management:
 - Debt-to-Equity Ratio. Measures the balance between debt and equity financing, indicating financial risk;
 - Interest Coverage Ratio. Assesses the company's ability to meet interest payments on debt obligations;
 9. Client and Project Management:
 - Client Retention Rate. The ability to retain and expand existing client relationships;
 - Project Completion Rate. Measures the efficiency of project delivery, considering time and budget constraints;
 10. Innovation and Research & Development (R&D) Efficiency:
 - R&D Investment. The allocation of resources to innovative projects that lead to competitive advantages;
 - Innovation-to-Revenue Ratio. Measures the proportion of revenue generated from innovative products or services;
 11. Market Position and Competition:
 - Market Share Growth. Evaluates the company's ability to gain market share in a competitive environment;
 - Competitive Benchmarking. Comparing the company's financial performance with industry peers;
 12. Customer Satisfaction and Quality:
 - Customer Satisfaction Surveys. Feedback from clients on the quality and value of services;
 - Defect and Issue Rates. Evaluating the efficiency of delivering high-quality products and services;
 13. Regulatory and Compliance:
 - Adherence to Regulations. Ensuring compliance with legal and industry-specific regulations and standards;
 - Risk Management. Assessing the company's ability to mitigate risks associated with non-compliance;
 14. Sustainability and Environmental Impact:
 - Environmental Responsibility. Evaluating the company's efforts in reducing its environmental footprint and impact;

15. Corporate Social Responsibility (CSR). Assessing the company's commitment to ethical and responsible business practices;
16. Employee Productivity and Satisfaction:
 - Employee Turnover Rate. Measuring employee retention and satisfaction;
 - Productivity Metrics. Assessing the efficiency of employees in contributing to the company's financial goals;
17. Investor Relations:
 - Stock Performance. The performance of the company's stock in the market;
 - Dividend Yield. The company's ability to provide returns to shareholders through dividends.

These criteria, among others, can be used to assess the financial and economic efficiency of IT companies. The specific criteria that are most relevant may vary depending on the company's size, industry niche, and strategic goals. It's important for IT companies to regularly analyze and monitor these criteria to ensure their financial and economic activities remain efficient and aligned with their objectives.

XYZ Tech Solutions Inc. is a medium-sized IT company that specializes in providing software development services and IT consulting. Here, we'll assess their financial and economic efficiency using the criteria mentioned.

1. Profitability Metrics:
 - ROI: XYZ Tech invested USD 500,000 in developing a new software product. After a year, it generated a net gain of USD 150,000. The ROI is calculated as $(\text{USD } 150,000 / \text{USD } 500,000) * 100\% = 30\%$.
 - Gross Profit Margin: The company's total revenue for the year was USD 2,000,000, and the cost of goods sold (COGS) was USD 800,000. Gross Profit Margin is $(\text{USD } 2,000,000 - \text{USD } 800,000) / \text{USD } 2,000,000 = 60\%$.
2. Cost Management:
 - Cost Control: Operating costs for the year were USD 600,000, showing efficient cost control.
 - Cost-to-income Ratio: The cost-to-income ratio is 30%, indicating that 30% of the company's income is allocated to covering expenses.
3. Revenue Growth:
 - Year-over-Year Revenue Growth: XYZ Tech experienced a 15% increase in revenue compared to the previous year.
4. Efficient Resource Utilization:
 - Resource Allocation: The company's skilled workforce completed 10 major projects, each generating an average of USD 100,000. The resource allocation was effective.
 - Resource Turnover: On average, resources were utilized within 60 days, contributing to efficient cash flow.
5. Cash Flow Management:
 - Cash Flow from Operations: The company generated USD 400,000 in cash from its core business activities, ensuring liquidity.
 - Working Capital Management: The company maintained a positive working capital position, covering short-term obligations.
6. Return on Assets (ROA):
 - XYZ Tech had total assets of USD 2,000,000, and it generated a net income of USD 300,000. The ROA is $(\text{USD } 300,000 / \text{USD } 2,000,000) = 15\%$.
7. Return on Equity (ROE):
 - The company's shareholders' equity is USD 1,000,000, and it generated a net income of USD 300,000. The ROE is $(\text{USD } 300,000 / \text{USD } 1,000,000) = 30\%$.
8. Debt Management:
 - Debt-to-Equity Ratio: XYZ Tech has no long-term debt, resulting in a debt-to-equity ratio of 0.

- Interest Coverage Ratio: The company's interest coverage ratio is infinite, indicating that it can easily meet interest payments.
9. Client and Project Management:
 - Client Retention Rate: 85% of existing clients continued to work with the company.
 - Project Completion Rate: 90% of projects were completed within the planned time and budget.
 10. Innovation and Research & Development (R&D) Efficiency:
 - XYZ Tech invested 10% of its revenue in R&D, leading to the successful launch of a new product that contributed 20% of total revenue.
 11. Market Position and Competition:
 - The company gained a 5% increase in market share in the last year, outperforming key competitors.
 12. Customer Satisfaction and Quality:
 - Customer satisfaction surveys revealed a 90% satisfaction rate.
 - The defect rate in software products was below 3%.
 13. Regulatory and Compliance:
 - The company adheres to all industry regulations and maintains an effective risk management system.
 14. Sustainability and Environmental Impact:
 - XYZ Tech implemented energy-efficient practices, reducing its carbon footprint by 15%.
 15. Corporate Social Responsibility (CSR):
 - The company actively participates in community development initiatives and supports local education programs.
 16. Employee Productivity and Satisfaction:
 - Employee turnover was 10%, indicating a high level of satisfaction.
 - Employee productivity improved by 15% through training and development programs.
 17. Investor Relations:
 - The company's stock price increased by 25% in the last year.
 - It pays a dividend with a yield of 3%.

In this example, XYZ Tech Solutions Inc. demonstrates efficient financial and economic activity across various criteria, including profitability, cost management, client and project management, and innovation. These measures help assess the overall health and efficiency of the company's financial and economic operations.

DISCUSSION

Gaining and maintaining a competitive advantage in the innovation space through the development of digitalization processes in Ukraine requires continuous improvement of the management of the innovation process in the IT sector, as well as increasing the efficiency of implementing new technical, organizational and marketing solutions. In view of this, the search for and practical use of solutions in the IT sector that have not been used before is becoming an important goal of many domestic IT companies. At the same time, the implementation of innovative solutions is fraught with a high level of risk, which is especially relevant in the context of the war in Ukraine. This applies to both foreign and domestic (which are extremely limited) resources for development.

At the same time, the high risks of the innovation process in the IT sphere are a consequence of the unpredictability of the final results of the implemented innovative solutions, the difficulty of forecasting and controlling the costs of their implementation, the loss of funding sources [17], the limited availability of relevant qualified personnel, the uniqueness of the processes being implemented, and uncertainty about the future state of the security, legal, economic, technological and social environment in the country. However, the specificity of innovation processes in the IT sector is such that the identification process and the final set of risks may differ in each case. That is why, even in the current environment, a

number of national IT businesses show good results and develop, focusing on the needs of both international and domestic IT products and services markets.

In this context, a number of controversial issues arise as to what the system of management of innovative development of Ukraine's IT sector should be like in order to ensure the development of the country's economy. Here, a number of researchers are inclined to believe that such a model should be completely liberal, giving maximum freedoms and promoting the independent development of this sphere [2; 12]. Instead, other researchers propose a more conservative approach, justifying the need to stimulate the development of the IT sector in the country, create favourable conditions for the implementation of IT projects and preferential conditions for financing the creation and dissemination of innovations [3; 13]. This discussion determines the place of this study as one that focuses on creating favourable conditions for the development of the IT sector in Ukraine, while not involving the state in making specific decisions on financing individual projects and programs, which may be associated with corruption and other additional risks. Such general conditions should be based on the priorities for managing the innovation process in the IT sector identified in the article in order to promote the development of Ukraine's economy, but not to disturb the balance of rights and interests of market players and innovative enterprises operating in other sectors of the economy (whose development is also important for the country's economy). That is, the scientific and practical solutions of this article reflect the specific needs of the IT sector, which should be taken into account for the successful realization of its potential, and to a lesser extent actualize the uniqueness of this sector and the need for unconditional support for its development by any means possible. Such means must be balanced and justified, based on the needs and interests of society and the state, and take into account the capabilities and needs of the country's IT sector and global organizational and technological trends in IT development.

The results of this study can be interpreted in the context of the fact that Ukraine is currently using the model of catch-up development [23; 27], borrowing production and management technologies from leading countries. This is due to the available, rather limited, opportunities for financing innovation, underdevelopment of the innovation infrastructure and institutional framework for development, as well as problems of organization and management of innovation at the macro-, meso- and micro-level. Instead, the potential for successful functioning of the national economy in the medium and long term should be based on the realization of the need to move from catch-up economic development to development on a high-tech innovation basis. It is the dissemination, scientific substantiation, development and adaptation to the conditions of Ukraine of the ideas of innovative high-tech development, which is one of the key challenges of the modern innovation economy, that is associated with the increasing role of knowledge, innovation and intangible assets in economic processes. This requires the implementation of measures aimed at improving the efficiency of research activities, stimulating the transfer of scientific achievements to economic practice, and their effective commercialization [21; 29].

An important area that should be given considerable attention is the creation of conditions under which the implementation of specific innovation projects should be based on clear principles and priorities, including those outlined in this article. Instead, the decisive factors of economic growth should be the scientific content of products and the intellectual potential of human resources, which allows us to interpret the problem of resource support for the implementation of innovative projects in the context of sustainable satisfaction of the interests of society [27] and is based on organically combined systemic and integrated approaches.

In the IT sector, innovation is often the key to maintaining a competitive advantage. The financial efficiency metrics discussed provide a framework for IT companies to identify and prioritize innovative projects that have the potential to contribute significantly to their competitive positioning. By assessing ROI, cost-effectiveness, and adherence to budgets, companies can make informed decisions. The IT sector is characterized by its rapid pace of change. New technologies, market trends, and customer preferences can shift swiftly. Therefore, financial resilience and diversification of investments become crucial. Having financial reserves and a diversified portfolio allows companies to adapt to changing circumstances.

CONCLUSIONS

Financial efficiency and performance metrics provide a roadmap for IT companies to navigate the complex landscape of innovation. They help companies make informed decisions, manage risks, and ensure that their financial health is not compromised by their pursuit of innovation. By striking a balance between financial efficiency and innovation, IT companies can position themselves for long-term success and growth in a rapidly evolving industry.

A key factor in the effective management of the innovation process aimed at ensuring the development of the national IT sphere under the influence of globalization, internationalization, and transnationalization, as well as under the influence of

current conditions specific to the Ukrainian market (war and related security, economic, social instability and unpredictability) is to ensure effective actions to use the opportunities of the environment (including international markets) to create and develop new market positions for the implementation of high-tech products.

The article presents a study of current conditions and trends in the development of the innovation process in the world and in Ukraine. Opportunities, factors and limitations for improving the efficiency of the innovation process in Ukraine through the development of the IT sector are identified. The basic priorities for ensuring the effectiveness of the innovation process in the IT sphere as a factor contributing to the development of the national economy of Ukraine in modern conditions are outlined. It is shown that under the influence of an unstable external environment, there is an economic need to develop and implement a management system that would provide an opportunity to implement new ways to gain competitive advantages in the IT sector of Ukraine and maintain the competitive position of Ukrainian IT business in the market. The most important development priority is long-term growth, with innovations and modern technologies, as well as highly skilled human capital (productive social and intellectual capital) and institutional capital necessary for the implementation of innovative ideas, as the driving force for development. At the same time, traditional factors of production, such as land and natural resources or labour as an unskilled personalized resource, are losing their importance.

The results of the study of this article should be used in the context of studying the theory and methodology of innovative development and implementation of the concepts of innovative development, which determines the direction of further research. In particular, by substantiating specific tools, forms and methods of managing the innovation process that would contribute to the development of the country's economy.

Prospects for further research in this area are to deepen and structure the tools for managing the innovation process in the IT sphere, which can be applied to specific areas of activity, in particular, digitalization processes as drivers of innovative economic development, or to areas that require special attention as limiting the potential of the country's innovative development (use of information technology, intellectual assets).

ADDITIONAL INFORMATION

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REFERENCES

1. Bezverkhyi, K., Hnylytska, L., Yurchenko, O., & Poddubna, N. (2023). Analytical procedures of the audit of integrated reporting of corporate enterprises. *Financial and Credit Activity Problems of Theory and Practice*, 3(50), 87–101. <https://doi.org/10.55643/fcaptop.3.50.2023.4045>
2. Ding, C., Liu, C., Zheng, C., & Li, F. (2022). Digital Economy, Technological Innovation and High-Quality Economic Development: Based on Spatial Effect and Mediation Effect. *Sustainability*, 14, 216. [https://doi.org/10.1016/S0305-0548\(99\)00069-6](https://doi.org/10.1016/S0305-0548(99)00069-6)
3. Dovhan', L. Ye., & Kozynets' A. V. (2018). Rozvytok IT-sfery: problemy ta shlyakhy vyryshennya v zabezpechenni konkurentospromozhnosti vitchyznyanykh pidpryyemstv. *Actual problems of economy and management: electronic. version of the*

- coll. of science avenue of young scientists of KPI named after I. Sikorskyi, 12.
<https://ape.fmm.kpi.ua/article/view/130936/126662>
4. European innovation score in Ukraine from 2014 to 2021. (n.d.).
<https://www.statista.com/statistics/1245750/innovation-score-ukraine/>
 5. European summary innovation index scores in European countries 2022. (n.d.).
<https://www.statista.com/statistics/1246167/digitalization-performance-score-europe/>
 6. European innovation scores in Ukraine in 2022, by category. (n.d.).
<https://www.statista.com/statistics/1245941/innovation-score-ukraine/>
 7. European summary innovation index scores in European countries 2021. (n.d.).
<https://www.statista.com/statistics/1252589/summary-innovation-score-europe/>
 8. Goffee, R. (2015). *Entrepreneurship in Europe. The social Process*. Routledge: Routledge Revivals.
<https://doi.org/10.4324/9781315712925>
 9. Hal'kiv, L. I., Kulynyak, I. YA., Lisovs'ka, L. S., Kulinich, T. V., & Matviy, I. YE. (2019). *Otsinyuvannya ta pidvyshchennya efektyvnosti innovatsiynykh protsesiv: monohrafiya*. L'viv: Rastr-7.
 10. Information technology (IT) market revenue growth in Ukraine from 2009 to 2022. (n.d.).
<https://www.statista.com/statistics/1304891/it-market-growth-ukraine/>
 11. Information technology (IT) spending forecast worldwide from 2012 to 2023, by segment. (n.d.).
<https://www.statista.com/statistics/268938/global-it-spending-by-segment/>
 12. Jing, W. J., & Sun, B. W. (2019). Digital economy promotes high-quality economic development: A theoretical analysis framework. *Economist*, 2, 66–73.
<https://www.mdpi.com/2071-1050/14/1/216>
 13. Karyy, O. I., Hal'kiv, L. I., & Tsapulych, A. Yu. (2021). Rozvytok IT-sfery Ukrayiny: chynnyky ta napryamy aktyvizatsiyi. *Journal of Lviv Polytechnic National University Series of Economics and Management*, 5(1), 42–55.
<https://ena.lpnu.ua/items/e6ff6a0c-fc45-4bc8-b854-85f07c41fea9>
 14. Khandii, O. (2019). Government support for transformation of labor relations in IT-sphere in the digital economy. *Economy of Industry*, 2 (86), 126–145.
<http://dspace.nbuv.gov.ua/handle/123456789/158702>
 15. Kutsyk, P., & Protsykevych, A. (2017). Kontseptual'ni kharakterystyky ta osoblyvosti derzhavnoho rehulyuvannya rozvytku rynku IT-posluh. *Economic discourse*, 3, 47–54.
<http://ed.pdatu.edu.ua/article/view/123569>
 16. Lundvall, B-A. (1992). *National Innovation Systems: Towards a Theory of Innovation and Interactive Learning*. – London, Printer.
[https://www.scirp.org/\(S\(351jmbntvnsjt1aadkposzje\)\)/reference/ReferencesPapers.aspx?ReferenceID=1918818](https://www.scirp.org/(S(351jmbntvnsjt1aadkposzje))/reference/ReferencesPapers.aspx?ReferenceID=1918818)
 17. Nazarova, K., Bezverkhyy, K., Hordopolov, V., Mel'nyk, T., & Poddubna, N. (2021). Analiz ryzkykiv diyal'nosti kompaniy na osnovi nefinansovykh i finansovykh zvitiv. *Agricultural and Resource Economics: International Scientific E-Journal*, 7 (4), 180–199.
<https://doi.org/10.51599/are.2021.07.04.10>
 18. Nazarova, K., Zaremba, O., Nezhyva, M., Hordopolov, V., Harbar, V., & Gorovyj V. (2021). Business analysis and audit of foreign economic activity of the enterprise. *Studies of applied economics*, 39(5).
<http://dx.doi.org/10.25115/eea.v39i5.5332>
 19. Nazarova, K., Hotsuliak, V., Miniailo, V., Nezhyva, M., & Mysiuk, V. (2020). Accounting, analysis and environmental audit as an imperative of the development of green economy in the state's economic security system. *E3S Web Conferences*, 166. <https://doi.org/10.1051/e3sconf/202016613003>
 20. Noha I. M., & Skryn'kovs'kyi R. M. (2016). Diahnostyka efektyvnosti zastosuvannya informatsiynykh tekhnolohiy v upravlinni pidpryemstvamy. *Biznes Inform*, 9, 241–245.
http://nbuv.gov.ua/UJRN/binf_2016_9_39
 21. Pansera, M., & Sarkar, S. (2016). Crafting Sustainable Development Solutions – Frugal Innovations of Grassroots Entrepreneurs. *Sustainability*, 8 (51). <https://www.mdpi.com/2071-1050/8/1/51>
 22. Pavlov, V. V. (2018). Innovatsiynyy rozvytok vysokotekhnolohichnoho sektoru ekonomiky: vzayemozv'yazok katehoriy ta spetsyfika. *Effective economy*, 6. <http://www.economy.nayka.com.ua/>
 23. Pererva, P., Usov, M., Chernobrovkina, S., Larka, L., & Rudyka, V. (2021). Methods for Assessing the Investment Attractiveness of Innovative Projects. *Studies of Applied Economics*, 39 (6).
<https://doi.org/10.25115/eea.v39i6.5167>

24. Ren, B. P. (2020). The logic, mechanism and path of digital economy leading high-quality development. *J. Univ. Financ. Econ.*, 2, 5–9.
<http://kns.cnki.net/kcms/detail/detail.aspx?doi=10.19331/j.cnki.jxufe.2020.02.001>
25. Ren, X. Y., & Yang, S. L. (2020). Technological innovation, industrial structure upgrading and high-quality economic development: Analysis based on the measurement of independent effects and synergistic effects. *East China Econ. Manag.*, 11, 72–80.
https://scholar.google.com/scholar_lookup?title=Technological+innovation%2C+industrial+structure+upgrading+and+high-quality+economic+development%3A+A+measurement+analysis+based+on+independent+and+synergistic+effects&author=Y.+Ren&author=L.+Yang&publication_year=2020&journal=East+China+Economic+Management&pages=72-80
26. Sołoducho-Pelc, L., & Sulich, A. (2020). Between Sustainable and Temporary Competitive Advantages in the Unstable Business Environment. *Sustainability*, 12. <http://dx.doi.org/10.3390/su12218832>
27. Trusova, N., & Hryvkivska, O. (2021). The development of integrated business structures of Ukraine on innovative and investment basis. *VUZF Review*, 6 (1), 87–97.
<https://doi.org/10.38188/2534-9228.21.6.09>
28. Vasil'yeva, L. M. (2016). Formuvannya innovatsiyanoi modeli rozvytku natsional'noi ekonomiky. *Bulletin of the Dnipropetrovsk State Agrarian and Economic University*, 1 (39), 121–124.
http://nbuv.gov.ua/UJRN/vddau_2016_1_24
29. von Weizsaecker, E., & Wijkman, A. (2018). *Come On! Capitalism, Short-termism, Population and the Destruction of the Planet*. Springer, 220 p.
<https://doi.org/10.1007/978-1-4939-7419-1>
30. Zhang, W., Zhao, S., Wan, X., & Yao, Y. (2021). Study on the effect of digital economy on high-quality economic development in China. *PLoS ONE* 16(9), e0257365.
<https://doi.org/10.1371/journal.pone.0257365>

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АНАЛІЗ ЕФЕКТИВНОСТІ УПРАВЛІННЯ ІННОВАЦІЙНИМ ПРОЦЕСОМ У ФІНАНСОВО-ГОСПОДАРСЬКІЙ ДІЯЛЬНОСТІ ПІДПРИЄМСТВ ІТ-СФЕРИ

Метою дослідження є обґрунтування пріоритетності підвищення ефективності інноваційного процесу в ІТ-сфері як чинника, що сприяє розвитку національної економіки України з урахуванням поточних можливостей та обмежень.

У дослідженні обґрунтовано, що утримання конкурентної переваги в інноваційному просторі через розвиток процесів цифровізації в Україні вимагає постійного вдосконалення управління інноваційним процесом в ІТ-сфері, підвищення ефективності впровадження нових технічних, організаційних і маркетингових рішень. Показано, що за умов впливу нестабільного зовнішнього середовища існує необхідність розробки та впровадження системи управління, яка б надавала можливість отримання конкурентних переваг ІТ-сфери й підтримання конкурентних позицій українського ІТ-бізнесу на ринку. Пріоритетом розвитку визначено довгострокове зростання, рушійною силою – інновації й сучасні технології, а також висококваліфікований персонал та інституційний капітал. Водночас традиційні фактори виробництва (земля, природні ресурси, робоча сила) втрачають своє значення. Визначено пріоритети управління інноваційним розвитком в ІТ-сфері. Реалізація інноваційної політики в ІТ-сфері України, виходячи з поточних можливостей та обмежень, забезпечуватиме системне й стає зростання ефективності інноваційного розвитку в цій царині, сприятиме розвитку національної економіки України.

Результати дослідження доцільно імплементувати для розвитку теорії та методології інноваційного розвитку на макро- та мезорівнях, а також у стимулюючій моделі інноваційного процесу України з урахуванням стану її провідних секторів економіки, зокрема ІТ-сфери.

Ключові слова: інновації, національна економіка, фінансово-господарська діяльність, ІТ-сфера, пріоритети розвитку, ефективність управління, управління інноваційним процесом

JEL Класифікація: E62, M15, O31, O32