

DOI: [10.55643/fcapter.2.67.2026.5059](https://doi.org/10.55643/fcapter.2.67.2026.5059)
Petro Kutsyk

D.Sc. in Economics, Professor of the Department of Accounting, Control, Analysis, and Taxation, Lviv University of Trade and Economics, Lviv, Ukraine; ORCID: [0000-0001-5795-9704](https://orcid.org/0000-0001-5795-9704)

Ruslan Lupak

D.Sc. in Economics, Professor of the Department of Economics, Lviv University of Trade and Economics, Lviv, Ukraine; e-mail: economist_555@ukr.net; ORCID: [0000-0002-1830-1800](https://orcid.org/0000-0002-1830-1800) (Corresponding author)

Larysa Liubokhynets

D.Sc. in Economics, Associate Professor of the Department of Economic Theories, Entrepreneurship and Trade, Khmelnytskyi National University, Khmelnytskyi, Ukraine; ORCID: [0000-0003-1578-615X](https://orcid.org/0000-0003-1578-615X)

Ksenia Protsykevych

Candidate of Economic Sciences, Department of Economics, Lviv University of Trade and Economics, Lviv, Ukraine; ORCID: [0000-0002-9070-5033](https://orcid.org/0000-0002-9070-5033)

Arsen Protsykevych

PhD in Economics, Department of Economics, Lviv University of Trade and Economics, Lviv, Ukraine; ORCID: [0000-0002-9933-9164](https://orcid.org/0000-0002-9933-9164)

Oleh Mykytyn

PhD in Technical Sciences, Associate Professor of the Department of Foreign Trade and Customs, Lviv Polytechnic National University, Lviv, Ukraine; ORCID: [0000-0001-9016-6757](https://orcid.org/0000-0001-9016-6757)

Received: 06/11/2025

Accepted: 11/02/2026

Published: 30/04/2026

© Copyright
2026 by the author(s)



This is an Open Access article distributed under the terms of the [Creative Commons CC-BY 4.0](https://creativecommons.org/licenses/by/4.0/)

MODELING THE PROCESSES OF FORMATION AND REALIZATION OF HIGH-TECH STARTUPS' POTENTIAL IN THE IT SECTOR: TESTING THE RESOURCE-FUNCTIONAL AND ECONOMETRIC APPROACHES

ABSTRACT

The article provides a scientific and applied substantiation for improving the modeling of the processes of formation and realization of the potential of high-technology startups in the ICT sector through the approbation of resource-functional and econometric approaches. The methodological and applied framework of the study is based on the use of correlation-regression, variance, and covariance analyses to substantiate the influence of resource-provision factors on the realization of the potential of business entities in Ukraine's ICT sector. The key characteristics of the formation and realization of the potential of high-technology ICT startups include the processes of intellectual and human resources provision, financial and investment support, material and technical support, as well as innovation and technological provision. The renewal and modernization of managerial decisions aimed at improving the realization of the potential of high-technology startups in the ICT sector are proposed to be carried out by expanding the traditional analysis of the state and development trends of the ICT sector with methodological recommendations focused on forming generalized conclusions regarding the qualitative and quantitative characteristics of the development of industry-specific high-tech startups, using descriptive, comparative, and structural-temporal analytical tools. A systemic information-analytical model for the realization of the potential of business entities in the ICT sector has been developed and tested through econometric calculations. The main emphasis is placed on identifying interrelations and dependencies between the selected components of the analysis, assessing the level of influence of resource-provision trends on the ability to achieve set objectives, identifying statistically significant differences between the mean integral values of the components and the degree of homogeneity of the samples, as well as determining the impact of qualitative factors on the results of the formation and realization of the studied potential, taking into account the components and their elements that may distort the solution of the defined tasks.

Keywords: information and communication technologies, digitalization, high-tech startups, business entities, management, innovation and technological activity, public policy, resource provision, potential, growth

JEL Classification: O32, L26, C51

INTRODUCTION

Comprehensive digitalization has become a defining trend and a key driver of competitiveness, global economic integration, and technological and innovation sovereignty for many countries. Increasingly, the development of the IT sector serves as a foundation for the structural transformation of national economies and the transition toward a knowledge-based economy. It contributes to the creation of new market opportunities, the implementation of innovative business models, and the formation of an information society.

In fact, high-tech startups have become the main drivers of these processes, as they are capable of adapting flexibly to new challenges, generating unique market propositions, and rapidly implementing and scaling innovative digital products and services. Consequently, the task of forming and effectively utilizing the potential of high-tech startups in the IT sector becomes increasingly relevant. It requires a purposeful combination of mechanisms, tools, and instruments aimed at introducing necessary changes in their functioning and development.

At the same time, despite possessing significant innovative potential, Ukrainian high-tech startups face a number of barriers that hinder their development and limit their scalability in the modern digital environment. Notably, the full-scale military invasion has significantly increased risks and threats to their innovation and technological activity, which necessitates a rethinking of approaches to the utilization of internal resource potential within the IT sector.

The successful formation and stable improvement of the efficiency of resource provision for high-tech startups in the IT sector primarily depend on the effective combination of economic and organizational factors. Within this context, state regulation plays a key role, as it ensures the creation of a favorable institutional environment, stimulation and support of innovation and technological activities, compliance with standards and norms, and protection of the rights and interests of startups.

Addressing these challenges largely depends on the formation of a sufficient information and analytical foundation capable of providing clear recommendations for startup entrepreneurs, government authorities, investors, and other stakeholders whose interests intersect at various stages of IT startup development. Their cooperation is essential for supporting innovative initiatives and developments, implementing high-tech business projects, conducting innovation-driven modernization, and developing the digital environment.

All these factors highlight the importance of continuous modeling of the processes of formation and realization of high-tech startup potential in the IT sector, focusing on developing sustainable resource provision and organizing systems of functioning and development. In doing so, it is crucial to adhere to the principles of objectivity and reliability, which require the use of modern economic and mathematical tools in modeling the processes of forming and realizing the potential of high-tech startups in the IT sector.

LITERATURE REVIEW

The development of high-tech startups in the IT sector has been the subject of numerous scientific studies, with the main emphasis placed on justifying and improving:

- the theoretical and methodological foundations of modeling IT startup potential;
- the conceptual frameworks of empirical research on IT startup development;
- digitalization processes, particularly through the implementation of labor intellectualization approaches and the enhancement of innovation performance;
- econometric models and analytical approaches within high-tech management systems;
- managerial, institutional, and strategic processes of startup development;
- domestic models ensuring the economic security of startups.

Conceptual foundations for modeling IT startup potential were explored by Granstrand & Holgersson (2020), who proposed a number of innovative ecosystems for practical testing, and Möller et al. (2020), who examined approaches to fostering interactions between innovation and technology networks and market systems as key elements of the business environment for high-tech startups. According to Metaiche (2024), strategic analysis and multicriteria evaluation of the performance of high-tech startup systems are of critical importance, while Mbanefo & Grobbelaar (2025) studied the role of platform ecosystems for small and medium-sized businesses in generating and implementing entrepreneurial ideas. The influence of market factors on the innovative potential of startups within ecosystems was also highlighted by Marcon et al. (2021).

Empirical research on IT startup development focuses primarily on clustering, networking strategies, and business models. For example, Chung et al. (2021) compared the efficiency of different types of startup clusters, while Park et al. (2022) and Kim et al. (2020) examined which networking and business strategies improve the technological and operational efficiency of IT companies. In contrast, Picken (2017) and Zhu et al. (2022) emphasized the fundamental principles of establishing startups as scalable enterprises, including financing strategies and sustainable business model formation.

Meanwhile, Shon et al. (2021) demonstrated that global digital platforms can serve simultaneously as catalysts for innovation and as potential disruptive factors influencing the formation and realization of high-tech startup potential in the IT sector.

Digitalization and knowledge management play a pivotal role in forming the potential of high-tech startups, especially in the IT sector, where the enhancement of data transmission processes and business communication is crucial. Han et al. (2024) argue that digitalization enhances the efficiency of high-tech firms when integrated with appropriate business models and entrepreneurial orientation. Similarly, Cheng et al. (2025) and Cabrilo et al. (2024) highlight the importance of digital technologies for innovation activities and the interaction between intellectual capital and knowledge management. Conversely, Zhang et al. (2020) and Chen & Kim (2023) investigate how knowledge management and digital transformation influence the dynamics of innovation and technological activities, as well as organizational efficiency.

Globalization and market volatility have accelerated the emergence of entirely new technologies characterized by high levels of integration into both business and society. Olan et al. (2022) emphasize the role of artificial intelligence and knowledge sharing in improving the performance of high-tech IT startups. In turn, Mulska et al. (2025) demonstrate the significant impact of socio-demographic factors on the intellectualization of society, and consequently, on the state's ability to create favorable conditions for the formation and effective use of human capital to foster high-tech startup development.

Econometric approaches and forecasting models are increasingly applied by startup practitioners to predict high-tech development. Ilyash et al. (2021, 2022) developed multidimensional models for analyzing and forecasting the relationships between technological development indicators and economic security, enabling quantitative assessment of the impact of various components on startup performance. Additionally, Vasylytsiv et al. (2022), Tkachenko et al. (2022), and Kutsyk et al. (2022) analyze the factors influencing the digital economy's development and state policy concerning investment in IT services, thus providing a national context for studying startup potential.

The managerial and strategic aspects of startup development also encompass issues related to organizational adaptation to change and the implementation of digital technologies. Havlovska et al. (2020) view strategic adaptation as a tool for managing organizational changes in startups; Li et al. (2022) examines the impact of the digital economy on startup transformation; and Urbinati et al. (2020) explore the role of open innovation in the creation of new startup products. Meanwhile, Ghezzi & Cavallo (2020) and Carvalho et al. (2022) analyze how agile business innovation models and leadership styles affect startup performance, while Kutsyk & Moiseenko (2019) address regulatory mechanisms of corporate responsibility, which should also be considered integral components of high-tech enterprise operations and startup project implementation.

A number of studies address the Ukrainian context of forming and realizing the potential of high-tech startups in the IT sector. The applied value of Kutsyk et al. (2016) lies in the concept of a "national capitalism" economic model in innovation and technological activity. Ilyash et al. (2021) and Rudnichenko et al. (2020) focus on the structural components of investment and innovation support for economic security across various sectors, while Gomes et al. (2022) examine the impact of digitalization on the socio-economic development of businesses.

During periods of significant economic shocks, the formation of high-tech startup potential may slow, and its utilization may fail to yield the expected economic outcomes. Hence, studies on risk management processes and mechanisms for preventing or mitigating adverse impacts, such as those by Yang et al. (2022), Rudnichenko et al. (2022), Lin et al. (2020), and Kutsyk et al. (2019), are gaining prominence.

In summary, the research on IT startup potential has evolved toward a multidimensional perspective encompassing conceptual models of innovation ecosystems, empirical analyses of startup environments, the role of digitalization and knowledge management, and econometric methodologies for evaluating startup activity. However, there remains insufficient substantiation for the integrated application of resource-functional and econometric approaches, which together allow for the incorporation of managerial, technological, and economic processes into a unified framework for modeling the formation and realization of high-tech startup potential.

AIMS AND OBJECTIVES

The purpose of this article is to provide a scientific and applied justification for improving the modeling of processes involved in the formation and realization of the potential of high-tech startups in the IT sector through the application and testing of resource-functional and econometric approaches.

The main objectives of the study are to:

- enhance the methodological approach to identifying and overcoming barriers that hinder the development and realization of startup potential;
- substantiate managerial decisions aimed at activating and realizing the potential of high-tech IT startups;
- develop a systemic model that integrates the results of correlation, regression, variance, and covariance analyses of business entities operating in the IT sector.

This approach is designed to provide a structured framework for evaluating interdependencies between the resource components of startup development and for identifying statistically significant relationships that determine the effectiveness of their high-tech growth.

METHODS

To achieve the stated objectives, a combination of general scientific and specialized research methods and techniques was employed. To identify the methodological principles underlying the implementation of state policy for supporting high-tech startups in the IT sector, inductive and deductive methods were applied. These made it possible to determine the fundamental provisions of high-tech activity regulation, emphasizing the importance of resource provision and the interrelations among its individual components. This approach is essential for drawing conclusions about the influence of various factors on the performance of high-tech startups, as it accounts for both internal organizational and external processes that shape the foundation for managerial decision-making.

The quality of business idea generation in the IT sector is largely determined by the current state and trends of the entrepreneurial environment within a country. Therefore, methods of economic and statistical analysis were used to build an adequate information base for econometric calculations and for modeling high-tech processes. As the complexity of information and analytical support increases, the demand for statistical computations also grows. Consequently, the management of high-tech startups must focus on establishing effective communication links with IT market participants to ensure efficient business planning and scalability.

Despite the availability of information resources, the quality of managerial decision-making depends significantly on the chosen method of processing and utilizing the collected data, which must meet the criteria of objectivity, validity, and reliability. In this regard, the application of the econometric approach is of particular importance. It incorporates a set of analytical methods, including correlation, regression, variance, covariance, comparative, factor, and component analyses.

The study is based on several scientific assumptions and hypotheses emphasizing the importance of economic and mathematical modeling in assessing the level of activation and realization of the potential of high-tech startups in the IT sector. Within this framework, the components of resource provision are evaluated separately, and the obtained results are processed using structural and functional analysis, with special attention paid to assessing interdependencies among the elements and their relationships in solving tasks related to scalability and the efficiency of business idea implementation.

RESULTS

With the onset of the full-scale military invasion, Ukraine's IT sector did not experience destabilization; on the contrary, certain changes partially stimulated its structural transformation. The sector continues to maintain a significant number of small and medium-sized enterprises specializing in digital services – in 2023, the sector's share reached 14.9%, exceeding the combined indicators of such industries as manufacturing, agriculture, and construction.

Ukrainian IT specialists remain highly competitive, characterized by flexible forms of employment and consistently high levels of remuneration. The sector also features a well-developed IT outsourcing ecosystem and a high profitability rate – in 2023, profitability exceeded 60% across all types of economic activity within the sector. These trends collectively confirm the strengthening of the IT sector's competitive potential in the context of expanding high-tech startup development.

The results of the analysis of the IT sector's state and development trends in Ukraine demonstrate the formation of a favorable environment for the growth of high-tech startups. Even under the extreme conditions of war, no systemic disruption occurred; instead, the sector demonstrated resilience and adaptive restructuring. Between 2010 and 2023, the number of IT enterprises increased 5.3 times, while the share of IT services in national exports rose 6.7 times – from 5.6% in 2010 to 37.6% in 2023.

Furthermore, labor productivity across all types of IT activities exhibited steady growth: for example, in computer programming and consulting services, productivity increased nearly 22-fold over the same period. These findings clearly illustrate that the IT sector has become one of the most dynamic and export-oriented components of the Ukrainian economy, providing a foundation for further expansion of high-tech startup ecosystems.

It is essential to identify the factors whose influence must be prioritized in order to maximize the effectiveness of public regulation. To accomplish this, researchers typically apply economic and mathematical analysis methods, including correlation, regression, variance, and covariance analysis. It is crucial that the use of econometric tools comprehensively encompasses the processes of formation and realization of the potential of high-tech startups, providing an integrated representation of modeling results. These results, in turn, form the information and analytical foundation for determining the strategic priorities of public policy in the IT sector.

Given these considerations, it is advisable to apply the resource-functional approach to the evaluation of the level of activation and realization of the potential of high-tech startups in the IT sector. The main advantages of this approach include:

- comprehensive assessment of the core components of startup potential – intellectual and human, financial and investment, material and technical, and innovation and technological;
- evaluation not only of the existence but also of the efficiency of resource utilization in high-tech IT activities;
- identification of those resource elements that restrict the realization of high-tech potential, along with the development of tools to enhance their effective use;
- flexibility and adaptability of evaluation, which allows researchers to account for market dynamics and to assess the influence of external and internal trends on startup performance and technological development;
- clear substantiation of resource needs and determination of optimal ways to utilize them efficiently to ensure sustainable high-tech growth.

Accordingly, the model for realizing the potential of high-tech startups in the IT sector can be interpreted as a systemic function primarily oriented toward key trends in the development of business entities within the industry (Equations 1–2).

$$RPHTS_t^{ICT} = f \begin{pmatrix} IHS \\ MTS \\ FIS \\ ITS \end{pmatrix} = f \begin{pmatrix} VPSE_t \\ CATR_t \\ FR_t \\ SIP_t \end{pmatrix}, \quad (1)$$

where, $RPHTS_t^{ICT}$ – a systemic model for the realization of the potential of economic entities in the IT sector in period t ; IHS – a system of indicators of intellectual and human resource support for the development of economic entities in the IT sector; MTS – a system of indicators of material and technical support for the development of economic entities in the IT sector; FIS – a system of indicators of financial and investment support for the development of economic entities in the IT sector; ITS – a system of indicators of innovation and technological support for the development of economic entities in the IT sector; $VPSE_t$ – volume of products sold per employed person in period t , UAH thousand/person; $CATR_t$ – current assets turnover ratio in period t ; FR_t – fixed assets productivity (capital productivity) in period t , UAH; SIP_t – share of innovative products in the total volume of products sold in period t , %.

$$f \begin{pmatrix} VPSE_t \\ CATR_t \\ FR_t \\ SIP_t \end{pmatrix} = \begin{pmatrix} IUE_t, FRC_t, MOC_t, EPE_t, \\ DFA_t, AMR_t, AR_t, CR_t, \\ CCR_t, CI_t, LBR_t, PFA_t, IR_t, \\ CIS_t, CIE_t, LWF_t, PMT_t, \\ SIC_t, CIE_t, ERW_t, SEC_t, \\ ICU_t, IUI_t, CII_t \end{pmatrix}, \quad (2)$$

where IUE_t – income per UAH 1 of equity capital in the period t , UAH; FRC_t – financial risk ratio in period t ; MOC_t – own working capital maneuverability ratio in period t ; EPE_t – equity capital per employee in period t , UAH thousand; DFA_t – depreciation rate of fixed assets in period t , %; AMR_t – asset mobility ratio in period t ; AR_t – asset ratio in period t ; CR_t – current ratio (overall liquidity ratio) in period t ; CCR_t – ratio of own working capital to current assets in period t ; CI_t – capital-labor ratio in period t , UAH thousand/person; LBR_t – long-term borrowing ratio in period t ; PFA_t – return on fixed assets in period t , %; IR_t – investment ratio in period t ; CIS_t – capital investments per UAH 1 of products sold in period t , UAH; CIE_t – capital investment efficiency ratio in period t ; LWF_t – wage fund share in total sales volume in period t , %; PMT_t – total staff turnover ratio in period t ; SIC_t – share of incentive and compensation payments in the total wage fund in period t , %; CIE_t – capital investments per employee

in period t , UAH thousand; ERW_t – efficiency of working time fund utilization in period t , %; SEC_t – share of employees covered by a collective agreement in period t , %; ICU_t – innovation expenditures per UAH 1 of equity capital in period t , UAH; IUI_t – innovation expenditures per UAH 1 of capital investments in period t , UAH; CII_t – cost intensity of innovation activity in period t , UAH (Protsykevych, 2025).

The analysis of selected indicators revealed no excessive multicollinearity (Pearson's $r < 0.9$), confirming the objectivity and adequacy of the adopted methodology. This result is particularly important for validating the reliability and impartiality of conclusions concerning the realization of IT enterprise potential. Although some indicators exhibited relatively high correlation values (r ranging between 0.70 and 0.89), such dependencies are considered objectively justified due to their interrelated nature within the system of resource provision for the IT sector.

Special attention is drawn to the significant dependence of IT startups on financial and investment provision, which remains a critical determinant of their ability to realize high-tech potential. Indicators describing the level of financial and investment support display strong correlations with other evaluation variables, reflecting the systemic interdependence necessary for stable startup development.

A strong impact of investment processes is observed on the ability of IT sector enterprises to establish and maintain stable partnership relations during the implementation of business projects with a high level of financial intensity ($IR_t \leftrightarrow AMR_t = 0,828$). Investment activity also determines the capacity of firms to maintain a sufficient volume of current assets for prompt responses to financial needs ($IR_t \leftrightarrow MOC_t = 0,811$), to sustain an adequate level of business activity and to flexibly adapt to market fluctuations ($IR_t \leftrightarrow AR_t = 0,777$), as well as to accumulate internal equity necessary for solving complex tasks at the early stages of startup design and confirming its sufficiency during the testing of business ideas in the innovation and technology market ($IR_t \leftrightarrow LBR_t = 0,741$).

In the context of financial and investment support for the management of high-tech startups in the IT sector, it is also essential to consider the importance of avoiding excessive dependence on external borrowing, particularly in the long-term perspective, as such dependence constrains financial flexibility and limits opportunities for further development ($LBR_t \leftrightarrow FRC_t = 0,874$).

With regard to the material and technical component of the potential of high-tech IT startups, it is appropriate to emphasize the importance of enhancing the efficiency of capital investment utilization, which serves as an indicator of the growth of production capacity, the implementation of advanced high-tech developments, and the technological readiness for scaling innovative business projects. This conclusion is based on the results of a correlation analysis of trends in the IT sector, which revealed a strong relationship between the efficiency of capital expenditures and the management's ability to ensure the continuity of high-tech development and the speed of commercialization of innovations ($CIE_t \leftrightarrow CCR_t = 0,858$), as well as between investment attractiveness and its stable maintenance at a high level across all stages of business project design ($CIE_t \leftrightarrow CR_t = 0,825$).

It is noteworthy that the efficiency of utilizing material and technical potential is largely determined by the completeness and quality of human resource staffing, which reflects the actual level of technical equipment and the degree of automation in production and managerial processes within an IT startup. Therefore, when addressing the challenges of improving productivity and technological capability, IT entrepreneurs must consider the numerous interdependencies between human resource quality and the availability of modern technical equipment ($CI_t \leftrightarrow EPE_t = 0,801$), as well as between the efficiency of capital investment utilization and the improvement of working conditions ($CIS_t \leftrightarrow ERW_t = 0,800$).

In our view, the relationship between the development of intellectual and human potential and the advancement of innovation and technological activities in the IT sector should be regarded as a key determinant of successful startup project implementation. At the same time, there exists a strong interdependence between the indicators of intellectual and human resource capacity and the financial and economic performance of high-tech IT startups. Specifically, the expansion of intellectual and human resources demonstrates a strong positive correlation with income growth and equity utilization efficiency ($ERW_t \leftrightarrow IUE_t = 0,862$), since in the process of creating IT products, a substantial portion of value is generated through highly skilled labor, which ensures their innovative character and technological sophistication.

It is well established that the formation and effective utilization of potential components, including those of high-tech startups in the IT sector, are determined by numerous internal and external factors whose influence is not constant over time. Such variability necessitates a flexible approach to potential management, enabling IT startups to adapt successfully to emerging challenges and external shocks.

A particular emphasis should be placed on the information and analytical foundation, which captures the interrelationships among indicators and their mutual influence on the development of high-tech startups. Based on this, a set of correlation

relationships was identified between the parameters and regression variables within the model of potential realization for IT enterprises (Table 1). The importance of each parameter is reflected in the magnitude of the detected correlations. A Pearson correlation coefficient above 0.5 was adopted as the interpretative threshold, since, according to conventional statistical interpretation, such a value indicates a strong and statistically significant relationship between the analyzed variables.

Table 1. Correlation relationships among the indicators for assessing the level of activation and realization of potential in Ukraine's IT sector during 2010–2023.

Parameters	Regression variables			
	VPSE _t	CATR _t	FR _t	SIP _t
IUE _t	0,82653	0,86009	0,94906	0,42039
FRC _t	0,30718	0,47383	0,54171	0,44201
MOC _t	-0,59966	-0,30901	-0,77933	-0,31108
EPE _t	0,71189	0,10336	0,34406	0,11339
DFA _t	-0,09939	0,56285	-0,44426	-0,80991
AMR _t	0,41740	-0,05752	0,67587	0,46950
AR _t	0,45287	0,54162	0,61879	0,44887
CR _t	0,43874	-0,17085	0,41439	0,43071
CCR _t	0,45569	-0,09929	0,43211	0,44960
CI _t	0,55701	0,72555	0,12683	0,71055
LBR _t	0,20901	0,43419	0,40732	0,42919
PFA _t	-0,69954	-0,36062	-0,81790	0,67070
IR _t	-0,70235	0,66572	0,47257	0,59191
CIS _t	0,42306	0,60091	-0,85208	0,44070
CIE _t	0,59596	0,59381	0,54085	0,45002
LWF _t	-0,13586	-0,00630	-0,01676	0,19401
PMT _t	0,84340	0,48624	0,87260	-0,70954
SIC _t	-0,69389	-0,65185	-0,51961	0,12912
CIE _t	-0,81346	-0,23002	-0,59696	0,38012
ERW _t	0,77665	0,70447	0,47015	0,22004
SEC _t	0,58226	0,35126	0,60317	-0,22902
ICU _t	0,13012	0,42410	0,40022	0,71447
IUI _t	0,39412	0,30018	0,46983	0,77005
CII _t	0,21704	0,30718	0,47383	0,58015

In the intellectual and human resource dimension of the IT business, clear correlation relationships can be observed among several indicators: the efficiency of equity utilization in foreign economic activities ($r = 0.843$), equity profitability ($r = 0.827$), the intensity of innovation financing ($r = -0.813$), the quality of personnel policy ($r = 0.777$), the level of employee financial provision ($r = 0.712$), and the shares of investment expenditures and current (short-term) liabilities in the overall structure of financing sources ($r = -0.702$ and $r = -0.700$, respectively).

Regarding the material and technical component of potential realization among IT sector enterprises, several factors exert a notable influence: equity profitability ($r = 0.861$), personnel policy quality ($r = 0.704$), the provision of employees with basic production assets ($r = 0.726$), investment activity ($r = 0.666$), and the capitalization level of business operations ($r = 0.601$).

A similarly high level of correlation with the efficiency of equity utilization is characteristic of the financial and investment component of potential among IT enterprises. This refers to income generation ($r = 0.949$), the conduct of foreign economic activity ($r = 0.872$), the avoidance of financial dependence ($r = -0.779$), and the strengthening of innovation and technological activity ($r = -0.597$). Additionally, a strong relationship was identified between financial and economic development and such parameters as the quality of short-term borrowing policy ($r = -0.818$), asset mobility ($r = 0.676$), and asset balance ($r = 0.619$).

The variability of the studied indicators confirms the high dynamism and dependence of the high-tech development of IT enterprises on the degree of formation and expansion of their resource potential (Figures 1–4). The analysis demonstrates that many key trends in the intellectual and human, financial and investment, material and technical, and innovation and technological domains exhibit an unstable character.

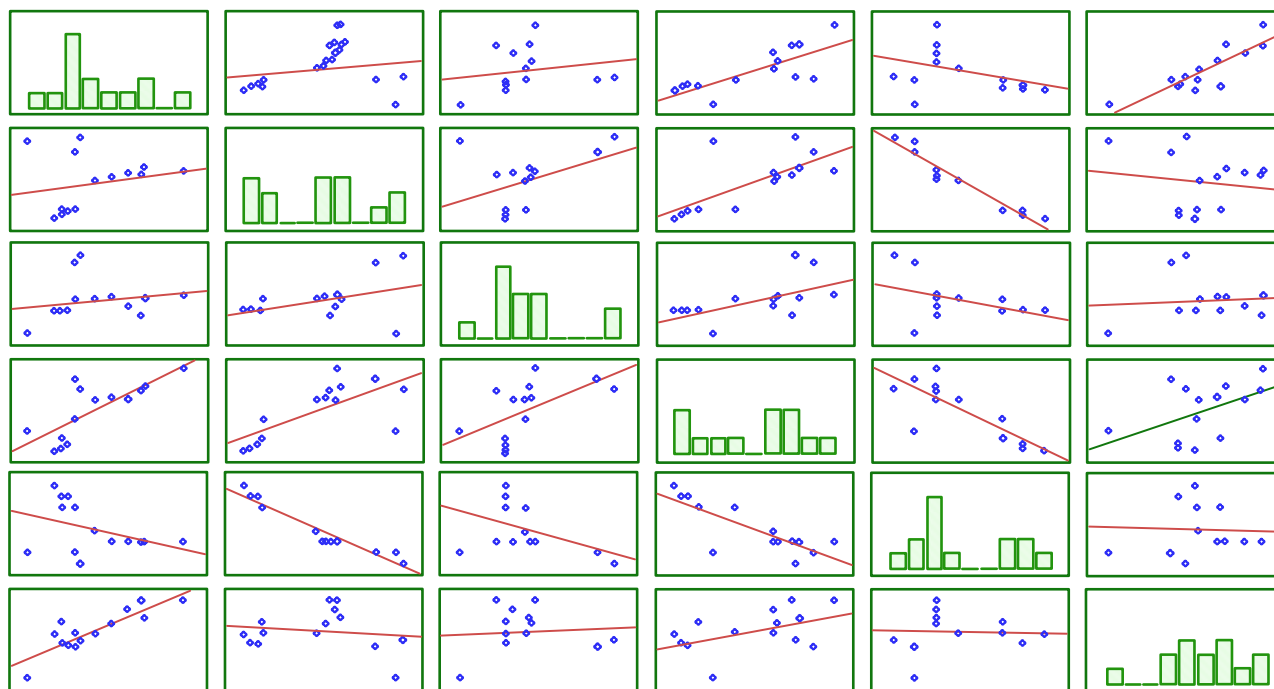


Figure 1. Scatter histograms of indicators assessing the level of activation and realization of potential among business entities in Ukraine's IT sector during 2010–2023: Intellectual and Human Resource Component. (Source: Author's research and calculations)

In recent years, this dynamism in Ukraine's IT sector has been driven, on the one hand, by the prolonged war and its profound consequences for the national economy, including the destruction of market infrastructure, the loss of human capital, and reduced investment activity. On the other hand, it is reinforced by the intensification of integration challenges and the increasing competition in the global IT services market. These developments require Ukrainian startup founders to enhance their flexibility and adaptability to rapid environmental changes.

In this context, the importance of implementing an adaptive state policy aimed at developing high-tech IT startups is increasing. Such a policy should be based on systematic monitoring, real-time analysis, and comprehensive evaluation of the impact of internal and external transformation factors on the dynamics of the national IT sector.

A gradual reduction in the dispersion of the evaluated indicators of intellectual and human resource provision among business entities in Ukraine's IT sector ($rVPSEt > 0,7$) is observed, indicating the formation and structural stability of the socio-labor environment within their operations. It can be assumed that maintaining such dynamics is largely determined by the ability of domestic IT startups to actively integrate into the educational and research ecosystem. At the same time, the success of socio-labor transformations, including those within the IT sphere, depends significantly on the quality of state support. Therefore, one of the main tasks of high-tech startup management is to strengthen cooperation with institutional structures and, through joint efforts, to implement the necessary reforms.

As shown in Figure 2, the dispersion of material and technical resource indicators for IT sector enterprises in Ukraine displays a homogeneous character and a gradual tendency toward reduction. This confirms the overall consistency and balance of modernization and production capacity renewal processes among the business entities operating in the sector studied.

Another important characteristic of the variation in the analyzed indicators is the confirmation of growing uniformity and systematization in the approaches to material and technical provisioning of IT startups. However, this trend has slowed down since the onset of the full-scale invasion in 2022, and the application of existing approaches is no longer sufficient to ensure stable growth in production capacities. This, in turn, may lead to a decline in the technological competitiveness of domestic IT startups and the loss of their positions in foreign markets.

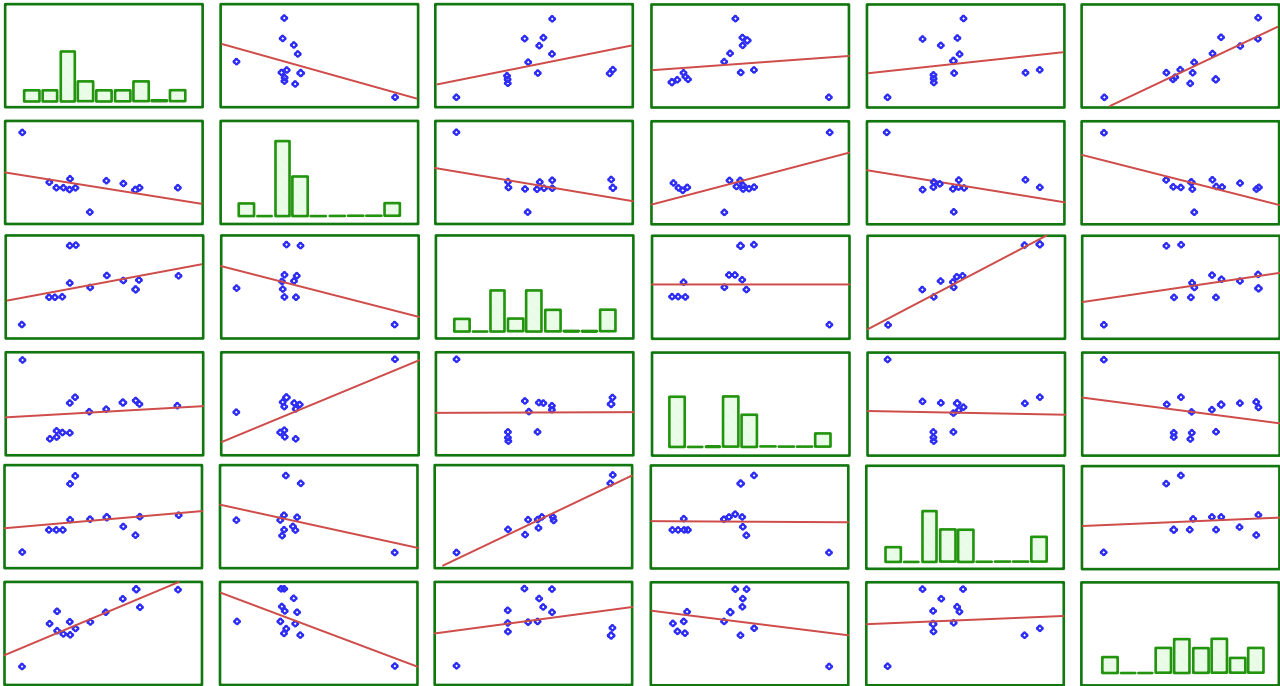


Figure 2. Scatter histograms of indicators assessing the level of activation and realization of potential among business entities in Ukraine's IT sector during 2010–2023: Material and Technical Component. (Source: Author's research and calculations)

Under these conditions, the role of state policy becomes increasingly important. Priority attention should be directed toward the expansion of innovation and technological capacities of startups, the stimulation of investment in the development and modernization of IT sector infrastructure, and the creation of an environment conducive to sustainable high-tech growth.

Conversely, a high degree of variation is characteristic of the indicators describing financial and investment support for IT sector enterprises in Ukraine. This is primarily due to the uneven access to financial resources and the limited opportunities to attract venture capital (Figure 3).

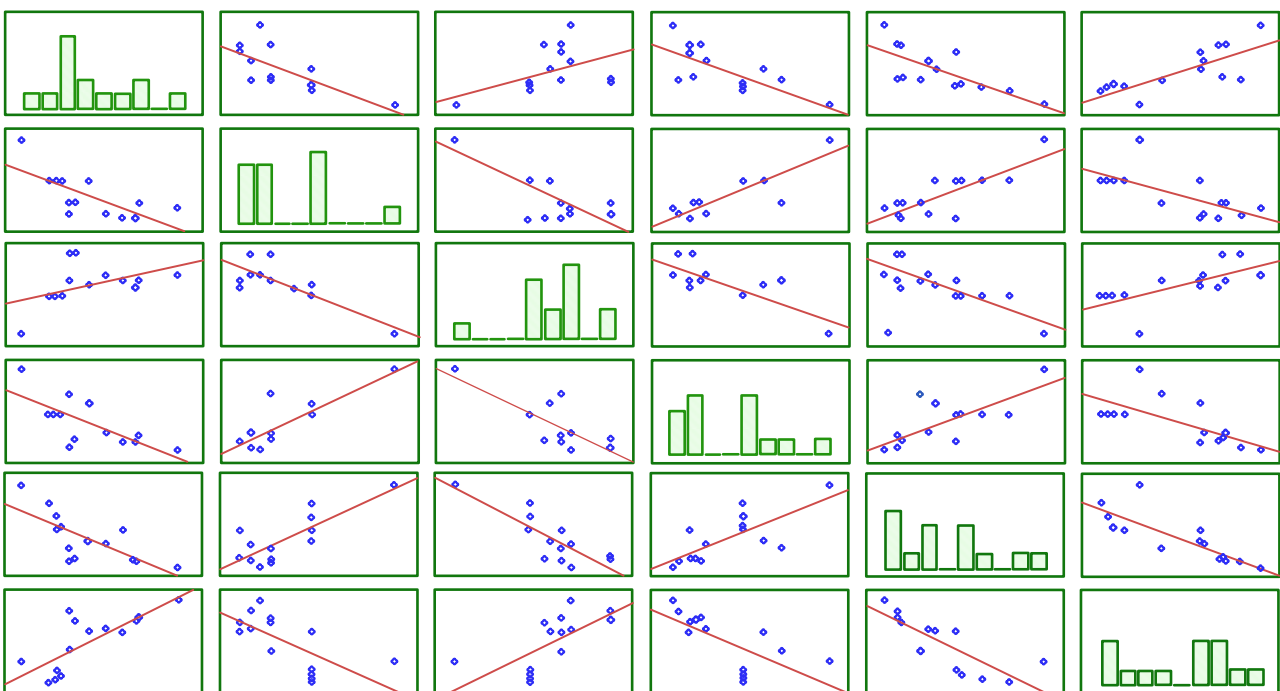


Figure 3. Scatter histograms of indicators assessing the level of activation and realization of potential among business entities in Ukraine's IT sector during 2010–2023: Financial and Investment Component. (Source: Author's research and calculations)

A similar trend is observed in the innovation and technological activities of the IT sector, which is likely to have a persistent character due to the high dynamics of global digitalization and digitization processes (Figure 4).

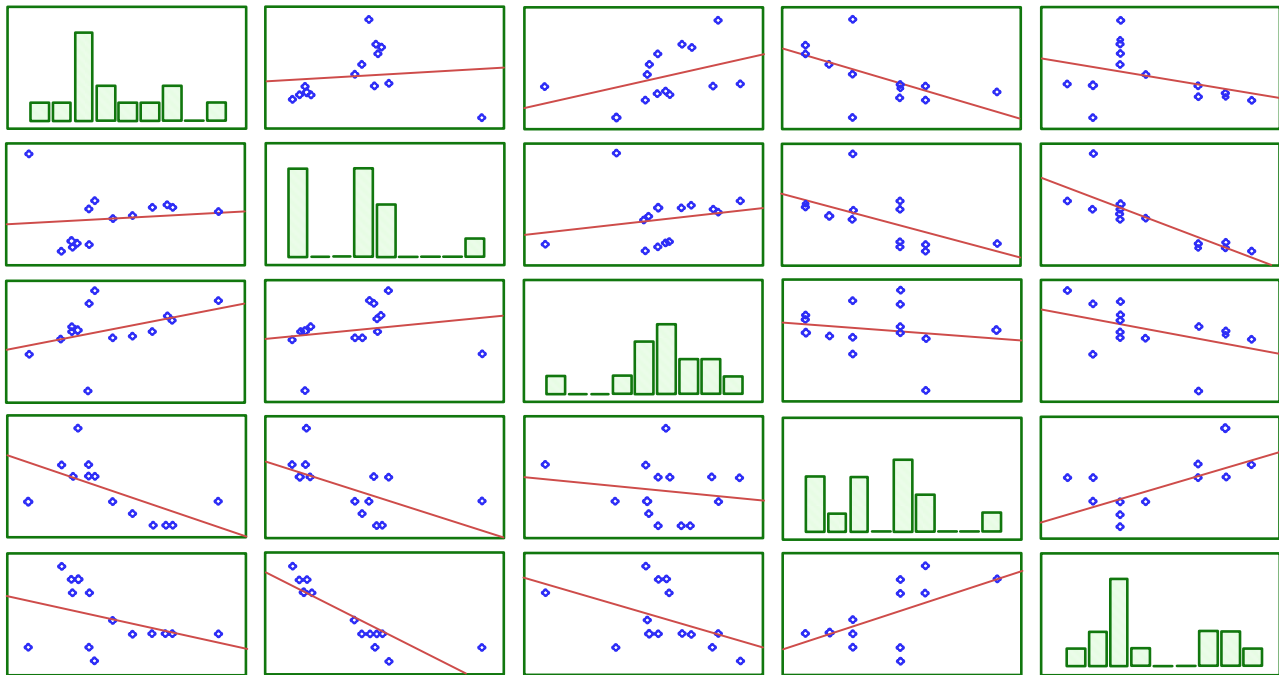


Figure 4. Scatter histograms of indicators assessing the level of activation and realization of potential among business entities in Ukraine's IT sector during 2010–2023: Innovation and Technological Component. (Source: Author's research and calculations)

The results of the correlation analysis indicate a gradual strengthening of the innovation and technological component in the activities of IT business entities. These strengthening results are both from their internal efforts aimed at modernizing and upgrading production processes, and from external factors associated with structural and cyclical changes in the global market for innovations and technologies.

The resource base exerts varying degrees and types of influence on IT sector trends; therefore, it is important to determine the individual contributions of specific resource components—intellectual and human, financial and investment, material and technical, and innovation and technological—to the overall variation in the realization of high-tech potential within the studied domain. For this purpose, it is appropriate to apply the stepwise regression analysis method with F-inclusion, which allows identifying the most significant determinants and constructing a robust econometric model.

The results of building a regression model for intellectual and human resource provision in the IT sector confirmed the hypothesis of a substantial impact of initial capital formation on the quality of personnel policy. It should be noted that a sufficient level of internal financial resources is a key prerequisite for forming a competitive IT startup team and motivating it to create innovative digital products.

The results of regression modeling revealed a relationship whereby a 1.0% increase in output per employee in the IT sector corresponds to a 0.23% improvement in the quality of personnel participation in equity formation and a 0.17% increase in capital investment inflows (Equation (3)).

$$VPSE_t = (2,395^{***})EPE_t + (2,545^*)LWF_t - (-2,737^{**})PMT_t + (3,216^{***})CIE_t + (4,623^*)ERW_t, \quad (3)$$

$R^2 = 0,889; F(8,18) = 20,95; p < 0,0001; Std. Error = 1,83; DW = 2,15$

where $VPSE_t$ – volume of output per employed person in period t ; EPE_t – equity per employee in period t ; LWF_t – share of the labor compensation fund in total sales in period t ; PMT_t – overall personnel turnover ratio in period t ; CIE_t – capital investment per employee in period t ; ERW_t – efficiency coefficient of working time utilization in period t (Protsykevych, 2025).

In the IT sector, there exists a direct relationship between the realization of intellectual and human potential and the efficiency of working time utilization. Specifically, an increase in this indicator by 0.91% contributes to a 1.0% rise in labor

productivity, with a 99.0% confidence level. This relationship confirms that worktime optimization is one of the key determinants of IT startup development, as it ensures a more rational allocation of available resources, timely task execution, and the maintenance of the necessary intensity of employees' productive activity.

As is well known, business development – particularly in high-tech startups – is often constrained by increasing employee turnover. Studies indicate that a 0.33% rise in staff turnover in the IT sector, with a 95.0% confidence level, leads to a 1.0% decline in labor efficiency. In our view, these negative effects are mainly due to the fact that workforce losses disrupt team cohesion, weaken intellectualization and motivation processes, cause delays in startup project implementation, and increase training costs for new employees, who need time to acquire the necessary experience and knowledge in the specific technological and business processes of the IT domain.

It should be noted that the above dependencies are not constant and therefore require continuous monitoring and adjustment. Empirical results indicate a potential deviation range of $\pm 2.0\%$ for these indicators in the IT sector, with an 88.9% confidence level, which should be carefully considered by startup management when developing and implementing current managerial decisions and strategic plans for high-tech development.

With regard to the realization of financial and investment potential, IT sector enterprises are characterized by a dependency on maneuverability, balance, mobility, and other trends in the formation and utilization of working capital (Equation (4)).

$$CATR_t = (3,405^{**})MOC_t + (2,048^{**})AR_t + (6,568^{**})AMR_t + (5,119^{**})CR_t + (4,221^{**})CCR_t, \quad (4)$$

$$R^2 = 0,906; F(9,18) = 29,11; p < 0,0001; Std. Error = 2,21 DW = 2,05$$

where $CATR_t$ – current asset turnover ratio in period t ; MOC_t – maneuverability coefficient of own working capital in period t ; AR_t – asset ratio coefficient in period t ; AMR_t – asset mobility coefficient in period t ; CR_t – current ratio (overall liquidity) in period t ; CCR_t – coefficient of provision of current assets with own funds in period t (Protsykevych, 2025).

It is important to emphasize the necessity of improving the efficiency of equity utilization by IT startups when financing their current needs. This conclusion is supported by the identified dependence between current asset turnover and the maneuverability of own working capital in the sector analyzed, with a 95.0% confidence level: a 1.0% change in capital maneuverability results in a 0.20% increase in asset turnover.

At the same time, the greatest influence on the stability of financing high-tech activities in the IT sector is exerted by asset mobility (at 1.01%, with a t-statistic of 6.57), the level of current liabilities coverage (2.10 and 5.12, respectively), and provision with own funds (1.80 and 4.22). The high t-statistic values for each of these parameters (ranging from 4.22 to 6.57) confirm their statistical significance and reliability, which, in turn, highlights the necessity of their mandatory consideration by IT startup management when implementing policies for high-tech development.

Similar tendencies are also observed for the material and technical component of the potential of IT sector enterprises, where the investment process, as well as the provision and efficient utilization of available resources, plays a decisive role (Equation (5)).

$$FR_t = (-3,055^{**})DFA_t + (4,145^*)PFA_t + (2,437^{**})AMR_t + (4,112^{**})IR_t + (5,623^*)CIS_t + (4,623^*)CIE_t, \quad (5)$$

$$R^2 = 0,869; F(7,22) = 10,01; p < 0,0001; Std. Error = 41,21 DW = 2,72$$

where FR_t – fixed asset productivity (funds return) in period t ; DFA_t – depreciation rate of fixed assets in period t ; PFA_t – profitability of fixed assets in period t ; AMR_t – asset mobility coefficient in period t ; IR_t – investment ratio in period t ; CIS_t – capital investment per UAH 1 of realized output in period t ; CIE_t – capital expenditure efficiency coefficient in period t (Protsykevych, 2025).

It should be noted that in Ukraine's IT sector, each 1% increase in the depreciation level of material and technical assets leads to a 0.23% decrease in their efficiency (with a 95.0% confidence level). At the same time, effective management of this component of resource provision results in a 1.0% improvement in fixed asset productivity when the asset mobility level rises by 0.13% (with a 95.0% confidence level).

The investment policy improvement process requires significant attention from the management of domestic IT businesses. According to the analysis, several positive effects can be expected:

- a 1.0% increase in the investment ratio enhances the efficiency of material and technical potential realization by 0.37% (with a 95.0% confidence level);
- a 1.0% growth in capital investment per UAH 1 of realized output accelerates the expansion of material and technical resources by 1.24%.

Regarding the innovation and technological component, it is important to emphasize that the realization of IT business potential is determined primarily by the policy of investment expenditure allocation. According to Equation (6), a 1.0% increase in the share of innovative products in the total output of the IT sector depends on:

- a 0.20% increase in innovation expenditures financed from equity;
- a 0.21% increase in innovation expenditures financed from capital investments;
- a 0.30% increase in innovation expenditures financed from current financial results.

Together, these factors explain 80.9% of the variance in the analyzed indicator. Although the F-statistic confirms the overall significance of the model, the relatively high standard error (Std. Error = 150.59) somewhat limits the precision of the obtained results.

$$SIP_t = \frac{0,204}{(2,105^{***})}ICU_t + \frac{0,208}{(2,007^{***})}IUI_t + \frac{0,301}{(3,217^{***})}CII_t$$

(6)

$R^2 = 0,809; F(5,01) = 7,17; p < 0,0001;$
 $Std. Error = 150,59; DW = 2,78$

where SIP_t – share of innovative products in the total volume of realized output in period t ; ICU_t – innovation expenditures per UAH 1 of equity in period t ; IUI_t – innovation expenditures per UAH 1 of capital investment in period t ; CII_t – cost intensity of innovation activities in period t (Protsykevych, 2025).

As a result of the conducted correlation and regression analysis, a number of factors with the greatest influence on the performance and potential realization of domestic business entities in the IT sector were identified. In particular, the analysis made it possible to determine the key trends in the utilization of the intellectual and human, financial and investment, material and technical, and innovation and technological components, which should serve as strategic benchmarks for improving state policy on IT startup development in Ukraine.

DISCUSSION

Unlike typical proposals for analyzing state regulation of economic activities, including high-tech sectors, there has emerged a need to identify, firstly, the challenges facing the current period of Ukraine's national economy and the nature of their impact on the development of high-tech startups, particularly in the ICT field, as well as the shortcomings, advantages, and achievements of state policy in this area; and, secondly, the opportunities, especially at the stage of post-war reconstruction of Ukraine's national economy. The identification of factors influencing the formation and realization of high-tech startup potential in the IT sector remains a matter of scholarly discussion. A number of constraining factors and processes continue to hinder sectoral growth, including:

- limited domestic market capacity, which restricts stable resource provision and scalability of startup projects;
- insufficient mechanisms for guaranteeing investment protection and property rights, leading to investor uncertainty and higher perceived risks;
- low business activity and poor quality of business processes within the IT startup ecosystem;
- inadequate levels of digital literacy and insufficient maturity of the information society.

The conceptual provisions for substantiating the basic structure of the potential of high-tech startups in the ICT sector should, unlike other approaches, firstly, take into account the conditions for proper formation, rational allocation, and effective utilization of resources, as well as the full implementation of management functions; and, secondly, the state and trends of a high-quality management organization system and the development of infrastructure to support and promote the high-tech startup sector. The author's interpretation of the potential of high-tech startups in the ICT sector focuses on substantiating the sector's capacity to achieve the maximum possible quantitative and qualitative outcomes in its functioning and development, including the realization of the socio-economic interests of its stakeholders at the macro-, meso-, and micro-levels of national economic management. Given these challenges, the modeling of resource-functional processes

should encompass those trends that currently impede the development of high-tech IT startups in Ukraine. In this context, state intervention becomes critically necessary to mitigate or neutralize the negative effects of such limitations.

Existing approaches to managing the potential of high-tech startups in the IT sector are largely limited to descriptive and statistical analyses of the sector. However, such approaches do not capture the systemic relationships between resources and startup outcomes, which reduces the effectiveness of managerial decisions. This study proposes integrating descriptive, comparative, and structural-temporal analyses with econometric methods (correlation, regression, and variance analysis). This integration enables a quantitative assessment of the interdependencies among key resource and performance indicators, providing a more robust methodological foundation for the strategic management of the formation and realization of high-tech startups' potential in the ICT sector.

The use of a broad range of econometric tools (F-statistics, t-tests, coefficient of determination, Durbin–Watson statistics, regression standard error, and p-testing) significantly enhances the reliability of conclusions and ensures the methodological completeness of the analysis. Accordingly, the proposed approach provides a systematic, quantitative, and practically oriented framework for aligning the managerial, technological, and economic aspects of startup development. This, in turn, facilitates the effective promotion of the exponential growth of high-tech IT startups in the context of global digital competition.

CONCLUSIONS

The application of various econometric tools – including correlation, regression, variance, and covariance analyses – within the framework of the resource-functional approach has made it possible to quantitatively assess the influence of intellectual and human, financial and investment, material and technical, and innovation and technological factors on the level of potential realization of business entities in Ukraine's IT sector.

A number of statistically significant dependencies were modeled, allowing for the identification of interrelations among the selected indicators across all components of resource provision:

1. For the intellectual and human component, the volume of output per employed person was found to depend on the level of equity per employee, the share of the labor compensation fund in total sales, the overall personnel turnover ratio, capital investment per employee, and the efficiency of working time utilization.
2. For the financial and investment component, the turnover of current assets depends on the maneuverability of own working capital, the asset ratio, asset mobility, the level of current liabilities coverage, and the coefficient of provision of current assets with own funds.
3. For the material and technical component, the efficiency of fixed asset utilization depends on the depreciation level of fixed assets, their profitability, capital investment per unit of output, and coefficients of asset mobility, investment activity, and efficiency of capital expenditures.
4. For the innovation and technological component, the share of innovative products in total sales depends on innovation expenditures per unit of equity, per unit of capital investment, and the cost intensity of innovation activities.

The results obtained serve as baseline benchmarks for the development and implementation of public policies aimed at shaping a favorable environment for the advancement of high-tech startups in the IT sector. Achieving these benchmarks requires a comprehensive and proactive state policy, which should be directed, on the one hand, toward eliminating systemic weaknesses and shortcomings in the functioning of the national economic system and, on the other hand, toward mobilizing the key drivers of progress – institutional transformation, structural modernization, and innovation-based growth.

Future research should focus on the further refinement of methodological and applied tools for evaluating the potential of high-tech startups in the IT sector, particularly through the development of integral indices and models that reflect the interrelations among the components of the resource-functional approach. Another promising direction involves scenario modeling of IT startup potential realization within the context of Ukraine's digital economic transformation and the enhancement of state policy for supporting high-tech entrepreneurship.

ADDITIONAL INFORMATION

AUTHOR CONTRIBUTIONS

All authors have contributed equally.

FUNDING

The Authors received no funding for this research.

CONFLICT OF INTEREST

The Authors declare that there is no conflict of interest.

REFERENCES

1. Granstrand, O., & Holgersson, M. (2020). Innovation ecosystems: A conceptual review and a new definition. *Technovation*, 90–91, 102098. <https://doi.org/10.1016/j.technovation.2019.102098>
2. Möller, K., Nenonen, S., & Storbacka, K. (2020). Networks, ecosystems, fields, market systems? Making sense of the business environment. *Industrial Marketing Management*, 90, 380–399. <https://doi.org/10.1016/j.indmarman.2020.07.013>
3. Metaiche, M. (2024). Linking national innovation systems and innovation capacity. *Management and Entrepreneurship: Trends of Development*, 4(30), 8–26. <https://doi.org/10.26666/2522-1566/2024-4/30-01>
4. Mbanefo, C. C., & Grobbelaar, S. S. (2025). Unveiling the core elements of platform ecosystem development. *Management Review Quarterly*, 75, 1575–1618. <https://doi.org/10.1007/s11301-024-00416-1>
5. Marcon, A., & Duarte Ribeiro, J. L. (2021). How do startups manage external resources in innovation ecosystems? A resource perspective of startups' lifecycle. *Technological Forecasting and Social Change*, 171, 120965. <https://doi.org/10.1016/j.techfore.2021.120965>
6. Chung, W. Y., Jo, Y., & Lee, D. (2021). Where should ICT startup companies be established? Efficiency comparison between cluster types. *Telematics and Informatics*, 56, 101482. <https://doi.org/10.1016/j.tele.2020.101482>
7. Park, I., Lee, J., Nam, J., Jo, Y., & Lee, D. (2022). Which networking strategy improves ICT startup companies' technical efficiency? *Managerial and Decision Economics*, 43(6), 2434–2443. <https://doi.org/10.1002/mde.3536>
8. Kim, E., Euh, Y., Yoo, J., Lee, J. G., Jo, Y., & Lee, D. (2020). Which business strategy improves ICT startup companies' technical efficiency? *Technology Analysis & Strategic Management*, 33(7), 843–856. <https://doi.org/10.1080/09537325.2020.1849612>
9. Picken, J. C. (2017). From startup to scalable enterprise: Laying the foundation. *Business Horizons*, 60(5), 587–595. <https://doi.org/10.1016/j.bushor.2017.05.002>
10. Zhu, Z., Liu, J., & Zhang, M. (2022). Rethinking investors' herding behavior under the conditions of reward-based crowdfunding platform. *Industrial Management & Data Systems*, 122(12), 2762–2782. <https://doi.org/10.1108/IMDS-06-2022-0383>
11. Shon, M., Lee, D., & Kim, J. H. (2021). Are global over-the-top platforms the destroyers of ecosystems or the catalysts of innovation? *Telematics and Informatics*, 21, 101581. <https://doi.org/10.1016/j.tele.2021.101581>
12. Han, W., Li, X., Zhu, W., Lu, R., & Zu, X. (2024). Knowledge digitization and high-tech firm performance. *Technology in Society*, 77, 102536. <https://doi.org/10.1016/j.techsoc.2024.102536>
13. Cheng, Q., Peng, C., Wan, H., Dai, Y., & Zhang, S. (2025). How to realize digital knowledge innovation through digital technology? *Technology in Society*, 82, 102905. <https://doi.org/10.1016/j.techsoc.2025.102905>
14. Cabrilo, S., Dahms, S., & Tsai, F.-S. (2024). Synergy between multidimensional intellectual capital and digital knowledge management. *Journal of Innovation & Knowledge*, 9(4), 100568. <https://doi.org/10.1016/j.jik.2024.100568>
15. Zhang, H., Zhang, X., & Song, M. (2020). Does knowledge management enhance or impede innovation speed? *Journal of Knowledge Management*, 24(6), 1393–1424. <https://doi.org/10.1108/JKM-08-2019-0460>
16. Chen, P., & Kim, S. (2023). The impact of digital transformation on innovation performance. *Heliyon*, 9(7), e17500. <https://doi.org/10.1016/j.heliyon.2023.e17500>
17. Olan, F., Arakpogun, E. O., Suklan, J., Nakpodia, F., Damij, N., & Jayawickrama, U. (2022). Artificial intelligence and knowledge sharing: Contributing factors to organizational performance. *Journal of Business Research*, 145, 605–615. <https://doi.org/10.1016/j.jbusres.2022.03.008>
18. Mulska, O. P., Vasylytsiv, T. G., Lupak, R. L., Baranyak, I. Ye., Levytska, O. O., & Pykus, I. O. (2025). Social Resilience and Vulnerability: a Novel Methodology for Identifying Bifurcation Points. *Science and Innovation*, 21(4), 3–20. <https://doi.org/10.15407/scine21.04.003>
19. Ilyash, O., Smoliar, L., Lupak, R., Duliaba, N., Dzhadan, I., Kohut, M., & Radov, D. (2021). Multidimensional analysis

- and forecasting of the relationship between indicators of industrial and technological development and the level of economic security. *Eastern-European Journal of Enterprise Technologies*, 5/13(113), 14–25. <https://doi.org/10.15587/1729-4061.2021.243262>
20. Ilyash, O., Lupak, R., Kravchenko, M., Trofymenko, O., Du-liaba, N., & Dzhadan, I. (2022). A forecasting model for assessing the influence of the components of technological growth on economic security. *Business: Theory and Practice*, 23(1), 175–186. <https://doi.org/10.3846/btp.2022.15298>
 21. Vasylytsiv, T. G., Mulska, O. P., Levytska, O. O., Lupak, R. L., Semak, B. B., & Shtets, T. F. (2022). Factors of the Development of Ukraine's Digital Economy: Identification and Evaluation. *Science and Innovation*, 18(2), 44–58. <https://doi.org/10.15407/scine18.02.044>
 22. Tkachenko, T., Pohrebniak, A., Radchenko, H., Liubokhynets, L., & Budnik, M. (2022). Methodical Principles of the Competitiveness Assessment of Industrial Enterprises in the Conditions of the Circular Economy Formation. *Management Theory and Studies for Rural Business and Infrastructure Development*, 44(1), 95–102. <https://doi.org/10.15544/mts.2022.10>
 23. Kutsyk, P., Lupak, R., Kutsyk, V., & Protsykevych, A. (2022). State Policy of the Investment Processes Development on the Market of IT Services. *Economic Annals-XXI*, 182(3–4), 64–76. <https://doi.org/10.21003/ea.V182-08>
 24. Havlovska, N., Illiashenko, O., Konoplina, O., Shevchuk, I., Hlynska, A., & Prytys, V. (2020). Strategic Adaptation as a Way of Managing Organizational Changes. *TEM Journal*, 9(3), 1053-1061. <https://doi.org/10.18421/TEM93-35>
 25. Li, R., Rao, J., & Wan, L. (2022). The digital economy, enterprise digital transformation, and enterprise innovation. *Managerial and Decision Economics*, 43(7), 2875–2886. <https://doi.org/10.1002/mde.3569>
 26. Urbinati, A., Chiaroni, D., Chiesa, V., & Frattini, F. (2020). The role of digital technologies in open innovation processes. *R&D Management*, 50(1), 136–160. <https://doi.org/10.1111/radm.12313>
 27. Ghezzi, A., & Cavallo, A. (2020). Agile Business Model Innovation in Digital Entrepreneurship: Lean Startup Approaches. *Journal of Business Research*, 110, 519–537. <https://doi.org/10.1016/j.jbusres.2018.06.013>
 28. Carvalho, A., Alves, H., & Leitão, J. (2022). What research tells us about leadership styles, digital transformation and performance in state higher education? *International Journal of Educational Management*, 36(2), 218–232. <https://doi.org/10.1108/IJEM-11-2020-0514>
 29. Kutsyk, V., & Moiseenko, I. (2019). Regulation mechanism of business responsibility. *Social & Legal Studies*, 1(3), 116–122. <https://doi.org/10.32518/2617-4162-2019-1-116-122>
 30. Kutsyk, P., Bashnyanyn, G., & Shevchuk, B. (2016). Economic model of «national capitalism» as an ideational socio-cultural project. *Economic Annals-XXI*, 162(11–12), 4–8. <https://doi.org/10.21003/ea.V162-01>
 31. Ilyash, O., Lupak, R., Dzhadan, I., & Kolishenko, R. (2021). Assessing structural components of investment and innovation provision of economic security in the basic types of economic activity. *Journal of Economy Culture and Society*, 63, 17–37. <https://doi.org/10.26650/JECS2020-0038>
 32. Rudnichenko, Ye., Dzhhereliuk, I., Mykhalchyshyna, L., Savina, S., Pokotylova, V., & Havlovska, N. (2020). Safe Inter-action Management of State Institutions and Business Entities Based on the Concepts of Evolutionary Economics: Modeling and Scenario Forecasting of Processes. *TEM Journal*, 9(1), 233–241. <https://dx.doi.org/10.18421/TEM91-33>
 33. Gomes, S., Lopes João, M., & Ferreira, L. (2022). The impact of the digital economy on economic growth: The case of OECD countries. *RAM. Revista de Administração Mackenzie*, 23(6), 1–31. <https://doi.org/10.1590/1678-6971/eramd220029.en>
 34. Yang, J., Zhao, Y., Han, C., Liu, Y., & Yang, M. (2022). Big data, big challenges: Risk management of financial market in the digital economy. *Journal of Enterprise Information Management*, 35(4–5), 1288–1304. <https://doi.org/10.1108/JEIM-01-2021-0057>
 35. Rudnichenko, Y., Liubokhynets, L., Havlovska, N., Nazarchuk, T., Krymchak, L., & Harbusiuk, V. (2022). Innovative Approach for Assessing Management System Flexibility for Determining Mechanism Functioning Mode for Ensuring Economic Security of Organizations. *TEM Journal*, 11(4), 1569–1576. <https://doi.org/10.18421/TEM114-18>
 36. Lin, R., Xie, Z., Hao, Y., & Wang, J. (2020). Improving high-tech enterprise innovation in big data environment. *International Journal of Information Management*, 50, 575–585. <https://doi.org/10.1016/j.ijinfomat.2018.11.009>
 37. Kutsyk, V., Ostapenko, L., & Pudryk, D. (2019). Development of procedures for ensuring the repayment of tax debt as a guarantee of the formation of an investment climate. *Baltic Journal of Economic Studies*, 5(2), 86–89. <https://doi.org/10.30525/2256-0742/2019-5-2-86-89>
 38. Protsykevych, K. I. (2025). Organizational and economic mechanism for realizing the potential of high-tech startups in the field of information and communication technologies. *Qualification scientific work in the form of a manuscript*. 269 p. <https://dspace.lute.lviv.ua/items/62b5fe82-bb5b-4128-891d-2b8003497a03>

Куцик П., Лупак Р., Любохинець Л., Процикевич К., Процикевич А., Микитин О.

ЩОДО МОДЕЛЮВАННЯ ПРОЦЕСІВ ФОРМУВАННЯ ТА РЕАЛІЗАЦІЇ ПОТЕНЦІАЛУ ВИСОКОТЕХНОЛОГІЧНИХ СТАРТАПІВ У ГАЛУЗІ ІКТ: АПРОБАЦІЯ РЕСУРСНО-ФУНКЦІОНАЛЬНОГО ТА ЕКОНОМЕТРИЧНОГО ПІДХОДІВ

У статті здійснено науково-прикладне обґрунтування вдосконалення моделювання процесів формування та реалізації потенціалу високотехнологічних стартапів у галузі ІКТ шляхом апробації ресурсно-функціонального та економічного підходів. Методико-прикладний базис дослідження ґрунтується на використанні кореляційно-регресійного, дисперсійного та коваріаційного аналізу для обґрунтування впливу чинників ресурсного забезпечення на реалізацію потенціалу суб'єктів господарювання в галузі ІКТ України. До ключових характеристик формування та реалізації потенціалу високотехнологічних стартапів у галузі ІКТ віднесено процеси інтелектуально-кадрового, фінансово-інвестиційного, матеріально-технічного та інноваційно-технологічного забезпечення. Оновлення та осучаснення управлінських рішень щодо покращення реалізації потенціалу високотехнологічних стартапів у галузі ІКТ запропоновано здійснювати шляхом розширення традиційного аналізу стану й тенденції розвитку ІКТ-сектора методичними рекомендаціями, спрямованими на формування узагальнювальних висновків щодо якісних і кількісних характеристик розвитку галузевих високотехнологічних стартапів із застосуванням описового, компаративного та структурно-темпорального аналітичного інструментарію. Розроблено системну інформаційно-аналітичну модель реалізації потенціалу суб'єктів господарювання в галузі ІКТ, апробацію якої здійснено шляхом економічних розрахунків, де основна увага зосереджена на визначенні взаємозв'язків і залежностей між обраними компонентами аналізу, оцінюванні рівня впливу тенденцій ресурсного забезпечення на здатність досягати поставлених цілей, виявленні статистично значущих відмінностей між середніми інтегральними значеннями складових і ступеня однорідності вибірок; впливу якісних факторів на результати формування та реалізації досліджуваного потенціалу з урахуванням складових і їхніх елементів, які можуть спотворювати виконання поставлених завдань.

Ключові слова: інформаційно-комунікаційні технології, цифровізація, високотехнологічні стартапи, суб'єкт господарювання, менеджмент, інноваційно-технологічна діяльність, державна політика, ресурсне забезпечення, потенціал, розвиток

JEL Класифікація: O32, L26, C51