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# FINANCIALLY-ORIENTED COMPLEX OF ECONOMIC AND MANAGEMENT TOOLS IN THE DEVELOPMENT OF THE DIGITAL ECOSYSTEM OF ENTREPRENEURIAL STRUCTURES

## ABSTRACT

The article investigates a financially-oriented complex of economic and management tools in the development of the digital ecosystem of entrepreneurial structures, which represents a key factor in forming resilient, adaptive, and innovation-oriented business models in the context of the modern digital economy. The purpose of the study is to scientifically substantiate and structure an integrated model of financial and management tools capable of ensuring systemic reproduction, scaling, and self-development of the digital ecosystem. The authors conduct an analysis of theoretical and methodological approaches to the formation of digital ecosystems of entrepreneurial structures, including technological, institutional-economic, organizational-management, network, and behavioral-value approaches. Key financial determinants of each approach are identified, allowing the main driving mechanisms of ecosystem development to be determined, including investments in digital platforms, transactional and regulatory costs, financing of managerial innovations, partnership mechanisms, and analytical support for decision-making. A structural-functional model of the financially-oriented complex of tools is developed, comprising five levels: strategic-financial, managerial coordination and process integration, digital-platform infrastructure, analytical data and digital intelligence, and ecosystem interaction and creation of digital value. It is established that the greatest efficiency is achieved through the integration of all levels, creating conditions for cyclical and adaptive interaction of financial flows, managerial decisions, and digital infrastructure, which promotes scalability, self-development, and innovative dynamics of the ecosystem. Conceptual principles for the application of financial-management tools are proposed: strategic prioritization of investments, process integration, flexibility and adaptability, scalability, and analytical support. The implementation of these principles involves the use of modern digital platforms, big data analytics, risk forecasting modules, partnership financial models, and performance monitoring systems, ensuring efficient resource allocation, enhancing competitiveness, and the sustainability of the digital ecosystem. The proposed model and conceptual approaches can serve as a methodological foundation for planning and implementing digital transformations in entrepreneurial structures, ensuring synergy between financial resources, managerial decisions, and digital infrastructure.

**Keywords:** digital ecosystem, financially-oriented tools, management mechanisms, digital transformation, structural-functional model, innovative development, strategic budgeting

**JEL Classification:** G30, L26

## INTRODUCTION

The relevance of this study is driven by profound transformations that have encompassed the contemporary economic environment under the influence of digitalization, which is gradually becoming a key determinant of the development of entrepreneurial structures. Digital ecosystems are increasingly emerging as a new form of business organization, where value is created through the interaction of data, technologies, financial flows, and managerial decisions. Under these conditions, traditional financial and managerial instruments prove to be insufficient, as they fail to account for the

networked nature of the digital environment, its high dynamics, scalability, and growing dependence on integrated platform-based solutions.

An equally important aspect is that the digital transformation of entrepreneurial structures is accompanied by the emergence of new financial risks, changes in the format of competitive rivalry, transformations of value creation models, and the need for rapid decision-making based on big data. This necessitates the formation of a fundamentally new set of economic and managerial instruments focused on financial sustainability, transparency, adaptability, and strategic coherence of digital business processes. The absence of a holistic scientific approach to structuring such a set creates methodological gaps in the formation of effective digital ecosystems and complicates the achievement of stable enterprise development.

Moreover, the global economy demonstrates a pronounced trend toward a platform-based model of operation, within which the integration of financial instruments with digital technologies determines the ability of businesses to scale, achieve innovative growth, and maintain competitive viability. Therefore, the study of a financially oriented complex of economic and managerial instruments emerges as a scientifically and practically significant issue that requires in-depth theoretical reconsideration and structural generalization.

Thus, the relevance of the research topic is обусловлена the urgent need to develop a modern scientific model capable of harmonizing financial, managerial, and digital mechanisms for the development of entrepreneurial structures, ensuring their resilience, innovativeness, and capacity to function effectively in the conditions of the digital economy.

## LITERATURE REVIEW

One of the significant scientific contributions that provides a conceptual foundation for understanding the digital transformation of the entrepreneurial sector is the work of Burdyak, M. I. (Burdyak et al., 2023). The researchers convincingly demonstrate that traditional models of business process organization in the agricultural sector are gradually losing their effectiveness due to the rapid transition of the economy toward a digital paradigm. In their view, the formation of an integrated digital architecture of the enterprise — an interconnected space of data, technologies, managerial procedures, and economic analysis tools — becomes a key prerequisite for increasing productivity and ensuring the strategic resilience of agricultural entities. As emphasized by Burdyak, M. I. (Burdyak et al., 2023), digitalization cannot be limited to the implementation of isolated technical solutions; rather, it requires the development of comprehensive economic and managerial instruments capable of providing financial support for digital innovations and ensuring their integration into the operational models of enterprises.

Within a broader technological context, the work of Maddikunta P. K. R. (Maddikunta et al., 2021), devoted to the concept of Industry 5.0 and the technological foundations of its implementation, holds substantial theoretical significance. The authors systematize a range of key digital solutions, from artificial intelligence and cyber-physical systems to digital twins, cloud services, and the industrial Internet of Things, and demonstrate that their integration forms a new quality of enterprise digital ecosystems. According to the authors, modern business structures require a transition to human-centered digital models capable of ensuring adaptability, enhanced productivity, and the intellectualization of managerial decision-making. Consequently, the approaches proposed in this study create a methodological basis for the development of financially oriented managerial instruments that support digital transformation processes.

A methodological expansion of the understanding of digital transformation is proposed by Hus, A. V. (Hus, 2020), who provides a detailed analysis of the relationship between the concepts of the “digital economy,” the “network economy,” and related categories. The author (Hus, 2020) argues that the digital economy represents a systemic process of rethinking value creation, resource management, and the organization of market interactions. This approach allows the digital ecosystem of entrepreneurial structures to be considered as a multi-level space in which technological solutions are inseparable from economic, managerial, and financial mechanisms.

In summary, it can be argued that the modern digital ecosystem of entrepreneurial structures is formed at the intersection of technological innovations, managerial approaches, and financial mechanisms. This intersection creates the conceptual foundation for the development of a financially oriented complex of economic and managerial instruments that ensures the sustainability, innovativeness, and strategic adaptability of businesses under conditions of digitalization.

One of the important contemporary research directions shaping the methodological basis for understanding the digital transformation of entrepreneurial structures is the work of Dats, A. Ya., & Zahoretskyi, L. Yu. (Dats et al., 2024). The authors thoroughly demonstrate that the implementation of digital tools in the management of construction enterprises is no longer an optional innovation but a key condition for maintaining competitiveness and enhancing economic resilience.

The researchers show that traditional organizational and managerial mechanisms are no longer capable of ensuring sufficient transparency, resource optimization, and operational control, whereas digital solutions create a fundamentally new model for managing production and financial flows. In this way, the authors emphasize the necessity of modernizing managerial approaches and highlight the need to form a system of instruments that combine technological innovations with economically sound management methods.

A notable contribution to the expansion of scientific discourse is also made by the study of Dudnieva, Yu. E., & Kuzenko, O. A. (Dudnieva et al., 2024), which focuses on the transformation of human capital in the context of the digital economy. The authors convincingly demonstrate that the modernization of economic and managerial mechanisms is impossible without changes in the cognitive and professional characteristics of personnel, and that enterprises' ability to adapt to digital technologies directly depends on the level of employees' digital competencies. In their work, human capital is viewed not merely as a resource but as a strategic investment that determines the pace, scale, and economic effectiveness of digital transformations. In this context, the researchers emphasize the critical role of human potential development as an integral economic and managerial instrument that ensures the sustainable functioning of the digital ecosystem of entrepreneurial structures.

A significant conceptual emphasis in the scientific domain is provided by the work of Zahorodnia, A. S., & Shchekhovska, L. M. (Zahorodnia et al., 2024), in which digital technologies are considered a powerful catalyst for business transformation in the international dimension. The authors convincingly show that digitalization changes not only the structure of production and logistics processes but also models of strategic development, competitive market configurations, and forms of economic interaction between enterprises. Through extensive comparative analysis, the researchers demonstrate that successful digital ecosystems are formed where technological innovations are combined with effective managerial and financial instruments capable of supporting long-term business development. This creates an important theoretical foundation for rethinking economic and managerial approaches and proves that digital technologies perform a structural-forming role in modern entrepreneurial ecosystems.

One of the comprehensive studies forming the theoretical framework for contemporary understanding of digital transformations in the entrepreneurial environment is the work of Kozlov, V. V., & Tomashevskaya, T. V. (Kozlov et al., 2021). The authors conduct a holistic analysis of the prerequisites, risks, and prospects of digital economy development, emphasizing that digitalization creates a new architecture of economic processes in which data, the speed of information flows, and enterprises' ability to integrate digital technologies into their business models play a key role. The scholars stress that the digital economy environment generates new requirements for financing, management, and strategic development, as entrepreneurial structures must adapt their economic and managerial mechanisms to conditions of increased technological turbulence. The work of Kozlov, V. V., & Tomashevskaya, T. V. (Kozlov et al., 2021) thus provides an important theoretical basis for understanding how a financially oriented complex of instruments should support the sustainability of enterprises' digital ecosystems.

A substantial contribution to the scientific discourse is also made by the study of Koliadenko, S. V. (Koliadenko, 2021), in which the author examines the evolution of supply chains under conditions of economic digitalization. The study convincingly shows that digital technologies do not merely modernize logistics processes but fundamentally transform their structure by increasing transparency, controllability, and economic efficiency. The work emphasizes that digital supply chains become a distinct element of the entrepreneurial ecosystem, capable of enabling new financial and economic models, including cost optimization, increased capital turnover, and the integration of analytical tools into managerial decision-making processes. Thus, Koliadenko, S. V. (Koliadenko, 2021) demonstrates that digital logistics acts as one of the key instruments in forming an economic and managerial complex oriented toward ensuring the financial sustainability of enterprises within the digital ecosystem.

Of particular importance for the study of the digital transformation of entrepreneurial structures is the work of Lebid O. V. (Lebid, 2022), which focuses on the transformation of Ukraine's economic sectors during wartime. The author emphasizes that digitalization acquires the characteristics not only of an innovative but also of an anti-crisis strategy, as it enables business continuity, adaptability of business processes, and prompt responses to external shocks. In the researcher's study, digital technologies are considered as instruments for ensuring financial stability, improving resource management efficiency, and rethinking enterprise development strategies under conditions of high uncertainty. Thus, this work creates an important conceptual bridge between digital modernization and the economic security of entrepreneurial structures, which directly correlates with our research focus on the formation of a financially oriented complex of economic and managerial instruments.

One of the illustrative studies forming an important foundation for understanding the digital transformation of entrepreneurial structures is the work of Solona O. V. (Solona, 2022). The author convincingly demonstrates that the implementation of digital technologies in production processes, particularly automated systems, analytical platforms, and intelligent resource management tools, is not merely an element of technological modernization but a key factor in enhancing the efficiency and adaptability of modern enterprises. At the same time, it is emphasized that such transformation requires substantial investments in technical infrastructure and the development of personnel competencies, which highlights the importance of forming comprehensive financial mechanisms to support digitalization.

The contribution of Strutinska, I. V. (Strutinska, 2019) is also significant for our study, as it reveals the role of small and medium-sized enterprises in the development of the digital economy. The researcher demonstrates that SMEs are the most sensitive environment to innovative changes, where digital tools facilitate the optimization of operational processes, increase the flexibility of business models, and expand market opportunities. However, as noted by the author, the transition to a digital format is impossible without adequate financial support, once again actualizing the need to create a system of financially oriented economic and managerial instruments to support the digital ecosystem of enterprises.

In a broader theoretical context, the work of Tertychny, Y. S. (Tertychny, 2016) is also important, as it considers digital business as one of the key drivers of global economic development. The author outlines a range of determinants shaping the impact of digital entrepreneurship on the structure of global markets, value creation mechanisms, and management systems. The study emphasizes that digitalization leads to profound structural changes, which require a reconsideration of approaches to strategizing, financing, and organizational support for the development of entrepreneurial structures.

All the reviewed studies demonstrate a common trend: digitalization is perceived not only as a technological upgrade but as a complex process of forming a new management system based on data, automation, and integrated digital tools. Therefore, contemporary scientific discourse increasingly emphasizes the need to develop a holistic, financially oriented complex of economic and managerial instruments capable of ensuring not only technological modernization but also the sustainable development of the digital ecosystem of entrepreneurial structures.

One of the studies forming the theoretical basis for understanding the digital transformation of entrepreneurial structures is the work of Prokhorova, V. V., & Chobitok, I. O. (Prokhorova et al., 2023). The authors examine in detail the foresight and innovation-based management mechanism of enterprises under digitalization, emphasizing that modern management models must integrate forecasting, innovative technologies, and adaptive development strategies. The researchers convincingly show that only a comprehensive management approach combining technological, organizational, and strategic components is capable of ensuring effective digital transformation of enterprises. At the same time, the necessity of financial support for such innovative initiatives is emphasized, highlighting the significance of forming financially oriented management instruments.

An important contribution to understanding the digital economy as a systemic phenomenon is made by Rudnichenko, Ye. M. (Rudnichenko et al., 2020). In their work, the authors analyze the impact of the digital economy on organizational development, indicating that digital technologies not only transform operational processes but also fundamentally reshape the economic and managerial structure of enterprises, creating the need for new financial and managerial instruments. The authors emphasize that digitalization acts as a catalyst for the integration of managerial, technological, and economic processes into a unified, effective system.

A significant aspect of enterprise digital transformation is revealed in the study by Tkachenko V. V. and Klymchuk M. M. (Tkachenko et al., 2019), which analyzes the imperatives of the digital economy in the development of enterprise management methodology. The authors emphasize that modern management methodology should take into account not only technological innovations but also the economic feasibility of their implementation. In particular, digital tools make it possible to optimize resources, improve the effectiveness of managerial decisions, and ensure the financial stability of enterprises under complex market conditions.

All the mentioned studies demonstrate that the digitalization of entrepreneurial structures is a systemic phenomenon that requires an integrated management approach, where economic, managerial, and financial instruments form a unified complex capable of supporting the sustainable development of the digital ecosystem.

One of the fundamental studies forming the theoretical basis for understanding enterprise digital transformation is the work of Tupkalo V. M. (Tupkalo, 2021). The researcher convincingly proves that the digital economy radically changes the paradigm of enterprise management by transforming traditional approaches to resource management, business processes, and finance. It is emphasized that the successful implementation of digital innovations requires not only technological modernization but also the adaptation of economic and managerial instruments capable of accumulating capital and ensuring the financial sustainability of entrepreneurial structures.

An important contribution to understanding global digitalization trends is made by Khanin I. H., Bilozubenko V. S., and Sopin Ye. O. (Khanin et al., 2021). In their work, the authors systematize the essence of the digital economy, its features, and global development trends. They note that digitalization forms a new economic reality in which the integration of technologies and managerial processes becomes critical for ensuring enterprise competitiveness. At the same time, they emphasize the need for financial mechanisms that support the adaptation of business models to the digital environment.

The study by Haustova V. Ye., Reshetnyak O. I., Haustov M. M., and Zinchenko V. A. (Haustova et al., 2022) focuses on analyzing the development of the ICT sector in Ukraine based on international indices and rankings. The authors demonstrate that effective integration of digital technologies into entrepreneurial structures directly correlates with investment attractiveness and financial sustainability, emphasizing the role of economic, managerial, and financial instruments in forming a resilient digital ecosystem.

The work of Chykov I. A. (Chykov, 2022) reveals the essence of digital transformation of the economy and the problems of its implementation. The author emphasizes the need for a comprehensive approach to the introduction of digital technologies, where economic and managerial decisions are integrated with financial instruments to ensure the stability and efficiency of entrepreneurial structures.

One of the important contributions to understanding the role of digital instruments in ensuring enterprise security is the work of Kryshanovych M. (Kryshanovych et al., 2021). The authors model the process of forming the security potential of engineering enterprises and demonstrate that the integration of digital technologies into security management systems allows not only the optimization of risk-related processes but also the more efficient use of financial resources to maintain enterprise stability. They emphasize that the creation of digital security potential has a direct impact on strategic planning and capitalization decisions, which is critically important for the development of the digital ecosystem of entrepreneurial structures.

The study by Nikonenko U. (Nikonenko et al., 2022) draws attention to investment attraction policy in key sectors of the economy in the context of implementing Industry 4.0 aspects. The authors substantiate that effective capital attraction is impossible without the integration of modern digital technologies and mechanisms for managing investment flows. This work is relevant to our study, as it demonstrates that financially oriented economic and managerial instruments must be adapted to the digital environment, ensuring both effective capital accumulation and strategic use of investments for the development of entrepreneurial structures.

In the work of Bondarenko S. (Bondarenko et al., 2022), legal mechanisms for ensuring information security under conditions of digitalization are examined. The researchers emphasize that without appropriate legal and regulatory support, digital instruments for risk management and investment processes may prove ineffective. In the context of our study, this highlights the importance of integrating economic and managerial instruments with financial, digital, and regulatory infrastructure to create resilient and secure digital ecosystems of enterprises.

The study by Lelyk L. (Lelyk et al., 2022) provides a comprehensive analysis of enterprise economic security using integrated digital approaches. The authors demonstrate that assessing and managing economic security through digital methods makes it possible to optimize capital flows, enhance financial stability, and ensure flexibility in strategic managerial decision-making. This research directly emphasizes the role of financially oriented instruments as a key element in the development of digital ecosystems of entrepreneurial structures, ensuring the integration of managerial, economic, and technological solutions.

Equally important is the study by Yurchuk N. P. and Kiporenko S. S. (Yurchuk et al., 2022), which examines the specifics of using digital technologies in agribusiness. The authors emphasize that the successful digitalization of agricultural enterprises depends on the synchronous development of technologies, managerial practices, and financial instruments capable of ensuring investment and supporting the adaptation of business processes to the digital environment.

All the reviewed works confirm the systemic nature of digital transformation, in which economic, managerial, and financial instruments form an integrated complex capable of supporting the effective development of the digital ecosystem of entrepreneurial structures.

## AIMS AND OBJECTIVES

The purpose of the article is to provide scientific substantiation and structuralization of a financially oriented complex of economic and managerial instruments capable of ensuring the formation, functional coherence, and sustainable development of the digital ecosystem of entrepreneurial structures.

The main objectives of the study are as follows:

1. To analyze theoretical and methodological approaches to the formation of digital ecosystems of entrepreneurial structures and to identify their key financial determinants.
2. To reveal the content and logic of the functioning of a financially oriented complex of economic and managerial instruments and to determine its place within the contemporary model of business digital transformation.
3. To outline the structural and functional interconnections between financial flows, managerial decisions, and the digital infrastructure of entrepreneurial systems, identifying the regularities of their interaction.
4. To develop conceptual foundations for the application of financial and managerial instruments in the process of formation and evolution of the digital ecosystem, as well as to formulate recommendations aimed at enhancing its efficiency and competitive development.

## METHODS

The methodological framework of the study is based on a systems approach, which makes it possible to consider the digital ecosystem as a dynamic set of interrelated financial, managerial, and technological components. Within this framework, structural and functional analysis is applied, enabling the identification of the internal logic and interdependence between financial flows, managerial decisions, and the digital infrastructure of business systems.

To reconstruct the theoretical and methodological foundations of digital ecosystem formation and to clarify the essence of the financially oriented complex of instruments, the methods of scientific abstraction, generalization, formalization, and conceptual modeling are employed. These methods facilitate the identification of key financial determinants, the development of a coherent definitional framework, and the determination of the structural parameters of the model under study.

In order to identify the regularities of interaction between financial flows and the digital infrastructure of entrepreneurial structures, comparative and analytical methods, causal analysis, and logical-structural grouping are applied, allowing the establishment of cause-and-effect relationships among individual elements of the digital business architecture.

In the process of developing conceptual foundations for the practical application of financial and managerial instruments, forecasting methods, elements of the scenario approach, and expert evaluation are used, making it possible to formulate scientifically grounded recommendations aimed at improving the efficiency of the digital ecosystem of entrepreneurial structures.

Overall, this methodological toolkit ensures the comprehensive nature of the research, allows the integration of in-depth theoretical analysis with practical orientation, and guarantees the scientific reliability of the obtained results.

## RESULTS

### *Analysis of Theoretical and Methodological Approaches to the Formation of Digital Ecosystems of Entrepreneurial Structures*

In contemporary economic discourse, the category of the digital ecosystem of entrepreneurial structures is gradually moving beyond a purely technocratic interpretation and is increasingly perceived as a complex, organized space in which financial resources, managerial practices, and digital platforms form a unified self-developing framework. The diversity of scientific approaches to interpreting the nature of ecosystems, from technologically oriented to institutional and economic, necessitates their systematic reconsideration.

Particular attention should be paid to financial determinants, as they largely define the ability of a digital ecosystem to scale, maintain resilience, ensure flexible reproduction, and adapt to external challenges. The generalization of key conceptual approaches makes it possible to identify the regularities of digital ecosystem formation and to understand which financial parameters act as their fundamental driving forces (Table 1).

**Table 1. Theoretical and methodological approaches to the formation of digital ecosystems of entrepreneurial structures and their key financial determinants.** (Source: Burdyak et al., 2023; Tupkalo, 2021)

| Theoretical and Methodological Approach | Brief Description                                                                                                                             | Key Financial Determinants                                                                                                                   |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| Technological (Platform-Based)          | The ecosystem is viewed as a network of digital platforms that integrate products, services, and data into a unified operational environment. | Investments in digital infrastructure, costs of platform development and maintenance, cybersecurity financing, and data monetization models. |
| Institutional and Economic              | Emphasis is placed on the interaction of rules, norms, contracts, and incentives that support the functioning of the ecosystem.               | Cost of institutional coordination, transaction costs, fiscal incentives, and expenditures related to regulatory compliance.                 |
| Organizational and Managerial           | The ecosystem is interpreted as a set of interconnected business processes and management models that ensure sustainability and growth.       | Financing of managerial innovations; budgeting for digital transformation; allocation of financial flows among ecosystem components.         |
| Network (Cooperative)                   | Highlights the role of partnerships, integrated interactions, and horizontal cooperation among market participants.                           | Investments in partnership projects; financial mechanisms for co-creation of value; risk pooling; co-financing mechanisms.                   |
| Behavioral and Value-Oriented           | Focuses on user behavior, digital habits, and value creation through data and analytics.                                                      | Costs of data collection and analysis; budget for UX improvements; financing of personalization tools; ROI of digital marketing.             |

The synthesis of the above theoretical approaches demonstrates that a digital ecosystem is a multidimensional construct within which financial instruments act not only as a resource base but also as a system-forming factor. Each approach highlights its own set of financial determinants, ranging from investments in platform-based solutions to mechanisms of joint financing that ensure cooperative development. It is precisely the integrated consideration of these parameters that enables the formation of a holistic understanding of the logic underlying the functioning of digital ecosystems and the identification of strategic priorities for their sustainable development.

### ***Logic of Functioning of the Financially Oriented Complex of Economic and Managerial Instruments and Its Role in the Contemporary Model of Business Digital Transformation***

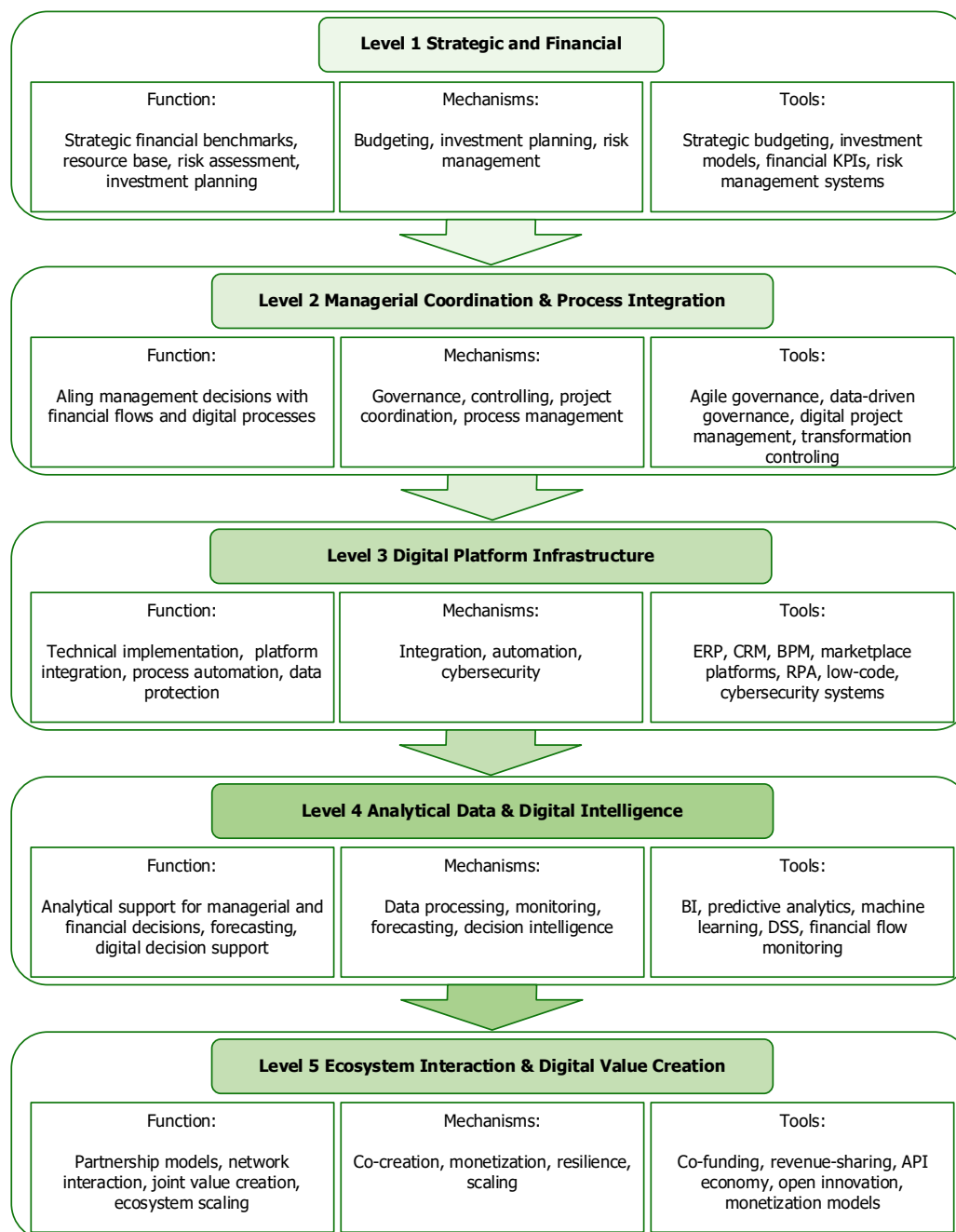
The logic of functioning of the financially oriented complex of economic and managerial instruments in the contemporary model of business digital transformation is based on the principle of multi-level integration of financial resources, managerial mechanisms, and digital infrastructure into a unified dynamic system. In the digital environment, financial flows cease to serve merely as channels for supporting operational activities; instead, they are transformed into an active regulator of the pace, direction, and depth of transformational processes. Through the integration of investment strategies, managerial coordination tools, data analytics, and digital platforms, a coherent framework for ecosystem-based development is formed.

Within this logic, the financial component serves as the primary impulse that determines the capacity to renew the technological base, develop digital services, scale business processes, and ensure the resilience of digital infrastructure. In parallel, managerial instruments provide organizational alignment of these changes by establishing rules, methodologies, decision-making procedures, and internal control mechanisms that enable the transformation of resources into measurable digital value. Digital platforms and analytical tools, in turn, ensure the transparency of financial flows, enhance forecasting accuracy, facilitate automated management mechanisms, and create conditions for system self-learning based on large-scale data sets.

In the contemporary model of business digital transformation, this complex assumes the role of a system-forming core — an element that not only coordinates the interaction of financial and economic decisions but also determines the ability of an entrepreneurial structure to adapt, innovate, and achieve long-term growth. Digital transformation thus ceases to be a localized project and acquires the characteristics of a continuous strategic process in which financially oriented instruments perform the function of balancing risks, innovativeness, and efficiency. Consequently, their role in the modern business model is not auxiliary but decisive, as they create a platform for the emergence of new forms of value, digital products, network interactions, and integrated ecosystem solutions.

Thus, the logic of functioning of this complex lies in the combination of strategic financial rationality with the capabilities of digital technologies, which ensures not only the efficiency of the operational environment but also the formation of new business organization models based on the principles of flexibility, data openness, and innovative interaction among participants in the digital ecosystem.

The structural and functional model reflects the logic of construction and the dynamics of interaction among the key elements of financially oriented instruments under conditions of business digital transformation (Figure 1). It is based on the principle of a multi-level integration of financial, managerial, and digital mechanisms that jointly form a sustainable development environment for entrepreneurial structures.



**Figure 1. Structural and functional model of the financially oriented complex of economic and managerial instruments in the development of the digital ecosystem of entrepreneurial structures.**

Table 2 presents a description of the components of the financially oriented complex of economic and managerial instruments in the development of the digital ecosystem of entrepreneurial structures. The table illustrates a multi-level structure of the model, integrating strategic, managerial, technological, and analytical components, as well as the corresponding mechanisms and tools that ensure effective digital transformation and the creation of digital value.

**Table 2. Description of the components of the financially oriented complex of economic and managerial instruments in the development of the digital ecosystem of entrepreneurial structures.**

| Model Level                                                  | Content and Functional Characteristics                                                                                                                                                  | Key Instruments and Mechanisms                                                                                                               |
|--------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Strategic and financial level                             | Ensures the definition of strategic financial benchmarks, the formation of the resource base for digital transformation, risk assessment, and investment planning in digital solutions. | Strategic budgeting; investment models for financing digital projects; financial KPIs; digitalization risk management systems.               |
| 2. Level of managerial coordination and process integration  | Aimed at aligning managerial decisions with financial flows and digital processes, it establishes internal regulations, procedures, and control mechanisms for transformation.          | Agile governance; data-driven governance; digital project management; transformation controlling; process management.                        |
| 3. Level of digital platform infrastructure                  | Provides the technical implementation of digital transformation, integration of platform solutions and digital services, business process automation, and data protection.              | ERP, CRM, and BPM systems; marketplace platforms; RPA technologies; low-code tools; cybersecurity systems.                                   |
| 4. Level of analytical data and digital intelligence         | Forms the information and analytical basis for managerial and financial decision-making; it ensures data processing, forecasting, and digital support for management.                   | BI systems; predictive analytics; machine learning; financial flow monitoring; decision support systems.                                     |
| 5. Level of ecosystem interaction and digital value creation | Ensures the development of partnership models, the formation of network interactions, and joint value creation; supports ecosystem scaling.                                             | Co-funding and revenue-sharing models; API economy; open innovation; monetization models; mechanisms for resilience and scalability support. |

The presented structural and functional model demonstrates the logic of multilevel interaction between financial, managerial, and digital instruments that form the foundation for the development of modern entrepreneurial ecosystems. Each level performs its own specific functions; however, the greatest value emerges precisely from their integration, which ensures resilience, scalability, and the innovative dynamics of the digital ecosystem. The model may be applied as an analytical framework for assessing the maturity of business digital transformation or for developing comprehensive digital development strategies.

### ***Structural and Functional Relationships between Financial Flows, Managerial Decisions, and Digital Infrastructure of Entrepreneurial Systems***

The interaction between financial flows, managerial decisions, and the digital infrastructure of entrepreneurial systems constitutes the basis of the functional integrity of a digital ecosystem. Financial resources act as the primary driver of digital transformations, enabling investment in platform solutions, process automation, and the development of innovative services. Managerial decisions, in turn, determine the rules for allocation and prioritization of these financial flows, as well as coordination among different elements of the digital ecosystem, thereby increasing resource efficiency and minimizing risks.

Digital infrastructure provides the technical and informational environment for the implementation of financial and managerial decisions. It transforms financial flows into concrete projects and services, ensures automated analytics and monitoring, and creates a platform for integrating ecosystem participants. The interaction among these three components is cyclical in nature: financial resources are directed toward infrastructure development; managerial decisions optimize its utilization; and infrastructure generates data for new strategic decisions and the effective redistribution of financial resources.

The regularities of this interaction can be outlined as follows:

1. **Cyclicity and feedback:** financial flows guide infrastructure development, digital infrastructure generates data for managerial decision-making, and managerial decisions adjust financing priorities.
2. **Integrativity:** System effectiveness depends on the extent to which financial, managerial, and digital components operate within a unified information and resource framework.
3. **Investment prioritization:** financial resources are concentrated in segments where managerial decisions indicate the highest strategic and operational value.
4. **Adaptability and scalability:** digital infrastructure enables rapid responses to changes in financial flows and managerial priorities, thereby enhancing ecosystem flexibility and resilience.

Structural and functional relationships between financial flows, managerial decisions, and digital infrastructure are presented in Table 3.

**Table 3. Structural and functional relationships between financial flows, managerial decisions, and digital infrastructure.**

| Component of the System | Functional Role                                                                            | Interconnections with Other Components                                                                                               | Patterns of Interaction                                                                                       |
|-------------------------|--------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| Financial flows         | Source of resources for digital projects, investments in platforms, and innovation         | Managerial decisions define priorities and allocation mechanisms; digital infrastructure translates financing into specific projects | Cyclicity: finance → infrastructure → data for management; concentration of resources on priority segments    |
| Managerial decisions    | Coordination of processes, definition of strategic priorities, and risk management         | Direction of financial flows; optimization of digital infrastructure performance                                                     | Integrativity: managerial decisions shape a unified system framework; adaptability: rapid response to changes |
| Digital infrastructure  | Technical and informational platform for project implementation, analytics, and monitoring | Utilizes financial resources; provides data for managerial decision-making                                                           | Scalability and self-development: generate feedback and supports resource optimization                        |

The table demonstrates that the effective functioning of entrepreneurial digital ecosystems relies on the close integration of financial flows, managerial decisions, and digital infrastructure. The interaction among these components is cyclical and adaptive: financial resources drive the development of infrastructure, digital platforms generate data for managerial decisions, and managerial decisions optimize the allocation of funds and transformation priorities. Such interdependence creates conditions for sustainable development, scalability, and self-evolution of the digital ecosystem.

### ***Conceptual Foundations for the Application of Financial-Managerial Instruments in the Formation and Evolution of Digital Ecosystems***

The contemporary development of entrepreneurial digital ecosystems requires a comprehensive approach to managing financial resources and organizational processes. Financial-managerial instruments function not only as mechanisms for fund allocation but also as systemic elements that determine the efficiency of transformation and the ecosystem's capacity for self-development.

Conceptually, the application of these instruments is based on several key principles. The first principle is strategic prioritization of investments, which allows directing resources to projects with the greatest potential for synergy among platform solutions, managerial processes, and analytical tools. This ensures maximum transformation efficiency while minimizing the risk of resource dispersion.

The second principle is cyclicity and process integration. Financial resources, managerial decisions, and digital infrastructure must operate as a unified system with feedback loops: finances support infrastructure development, digital platforms generate data for managerial decisions, and managerial decisions optimize the allocation of financial flows and transformation priorities.

The third principle is flexibility and adaptability, which enables the entrepreneurial system to respond rapidly to changes in the technological environment, user behavior, and strategic priorities. This enhances resilience and creates conditions for continuous ecosystem self-development.

The fourth principle is scalability and efficient resource utilization, whereby financial-managerial instruments allow the rapid redistribution of funds among platform solutions, services, and business processes in response to the ecosystem's evolving needs.

The fifth principle is analytical support and digital control, which involves leveraging advanced analytical and digital systems to assess the effectiveness of financial decisions, forecast transformation outcomes, and promptly adjust development strategies.

Based on these principles, it is recommended to:

- integrate financial and digital platforms to unify managerial, analytical, and financial functions into a single system;
- implement AI- and big data-based forecasting and risk assessment modules;
- develop partnership-based financial models that attract additional resources through co-funding, revenue-sharing, or open innovation;
- establish digital platform performance monitoring systems to evaluate profitability and optimize resource allocation;
- implement internal flexible financial management policies to enable rapid reallocation of funds among priority projects;

- ensure process resilience and continuity through the reservation of financial flows, risk insurance, and integration of system self-learning mechanisms.

The application of these principles creates conditions for sustainable development, scalability, and enhanced competitiveness of the digital ecosystem, ensuring synergy between financial resources, managerial decisions, and digital infrastructure. This approach transforms financial-managerial instruments into a key mechanism for value creation and innovative development within entrepreneurial structures.

## DISCUSSION

Unlike the studies of Zahorodnia and Shchekhovska (2024) and Kozlov and Tomashevskaya (2021), which focus on the transformative role of digital technologies and the prerequisites for digital ecosystem development, this research proposes a systematically integrated model of a financially oriented complex of economic and managerial instruments. The model not only facilitates the optimization of individual processes but also enables the formation of a holistic, self-developing digital ecosystem. In this approach, financial flows, managerial decisions, and digital infrastructure are treated as an interconnected system, where each component influences the functioning of the others. The resulting integration effect enhances the overall efficiency, sustainability, and resilience of the ecosystem, providing a comprehensive framework for supporting long-term enterprise development in conditions of technological turbulence.

The scientific novelty of this study lies in the identification of structural-functional levels of interaction and the determination of patterns that ensure cyclicity, adaptability, and scalability of the digital ecosystem. Unlike existing approaches, which often view digital transformation as a linear process with localized analytics, we propose a model in which financial-managerial instruments serve as a mechanism of strategic governance, enabling flexible resource reallocation, integration of analytics into managerial decisions, and effective coordination among ecosystem participants.

The developed conceptual foundations also allow for concrete recommendations to enhance the efficiency and competitiveness of the digital ecosystem. These include the integration of platform solutions to unify managerial, financial, and analytical functions; the development of partnership-based financial models; the implementation of predictive analytical tools; and mechanisms for adaptive resource management. Such an approach ensures not only operational efficiency but also a long-term development strategy, which is critically important under the current conditions of dynamic market changes and technological evolution.

## CONCLUSIONS

The conducted research confirmed that the development of entrepreneurial digital ecosystems is impossible without the comprehensive integration of financial, managerial, and digital components. The analysis of theoretical and methodological approaches demonstrated the multidimensional nature of digital ecosystems, in which financial resources not only ensure operational functionality but also play a systemic role, determining possibilities for scalability, adaptability, and resilience. Each approach, technological, institutional-economic, organizational-managerial, network-based, and behavioral-value, highlights its own financial determinants, ranging from investments in digital platforms to co-financing mechanisms that support cooperative ecosystem development.

The structural-functional model of the financial-oriented set of economic and managerial instruments showed that the key factor for effective digital transformation is multi-level integration: the strategic-financial level determines priorities and resources, the managerial level ensures process coordination and transformation control, the digital-platform infrastructure implements technical solutions, the analytical level supports data-driven decision-making, and the ecosystem level facilitates partnership interactions and value co-creation. The greatest value arises from the integration of these levels, which ensures resilience, flexibility, and innovative dynamics of the ecosystem.

The identified patterns of interaction between financial flows, managerial decisions, and digital infrastructure confirm the system's cyclical, integrative, and adaptive nature. Financial resources drive the development of infrastructure and platforms, digital solutions generate data for managerial decisions, and managerial mechanisms optimize the allocation of funds and transformation priorities. Such interdependence creates conditions for self-development, scalability, and enhanced competitiveness of the digital ecosystem.

The developed conceptual foundations for the application of financial-managerial instruments ensure the practical implementation of these principles. Strategic investment prioritization, process integration, flexibility and adaptability, scalability, and analytical support allow financial resources to be transformed into tangible digital products, services, and innovative

business models. The proposed instruments, from predictive and risk assessment modules to co-financing schemes and performance monitoring systems, create conditions for continuous development and resource optimization.

Thus, the research confirms that the financial-oriented set of economic and managerial instruments constitutes the systemic core of entrepreneurial digital ecosystems. Its application ensures synergy among finances, managerial decisions, and digital platforms, which is a critical condition for sustainable development, innovation, and long-term strategic growth. The proposed model and conceptual foundations can serve as a methodological basis for planning digital transformations and enhancing the effectiveness of entrepreneurial ecosystems in the contemporary digital economy.

Future research prospects include exploring the dynamic adaptation of financial-managerial instruments under rapidly evolving technological and market conditions, assessing the impact of emerging digital technologies such as artificial intelligence and blockchain on ecosystem resilience and value creation, and developing quantitative models to measure the efficiency and scalability of integrated digital ecosystems. Further studies could also examine sector-specific applications, comparative international practices, and the integration of behavioral and social factors in digital ecosystem management to provide more nuanced recommendations for policymakers and enterprise managers.

## ADDITIONAL INFORMATION

### AUTHOR CONTRIBUTIONS

*All authors have contributed equally.*

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## ФІНАНСОВО ОРІЄНТОВАНИЙ КОМПЛЕКС ЕКОНОМІКО-УПРАВЛІНСЬКИХ ІНСТРУМЕНТІВ У РОЗВИТКУ ЦИФРОВОЇ ЕКОСИСТЕМИ ПІДПРИЄМНИЦЬКИХ СТРУКТУР

У дослідженні вивчено фінансово орієнтований комплекс економіко-управлінських інструментів у розвитку цифрової екосистеми підприємницьких структур, що є ключовим чинником формування стійких, адаптивних та інноваційно орієнтованих бізнес-моделей у сучасних умовах цифрової економіки. Мета роботи полягає в науковому обґрунтуванні та структуризації інтегрованої моделі фінансово-управлінських інструментів, здатної забезпечити системне відтворення, масштабування та саморозвиток цифрової екосистеми. Автори провели аналіз теоретико-методологічних підходів до формування цифрових екосистем підприємницьких структур, зокрема технологічного, інституційно-економічного, організаційно-управлінського, мережевого та поведінково-ціннісного. Виокремлено ключові фінансові детермінанти кожного підходу, що дозволяє визначити основні рушійні механізми розвитку екосистеми, включаючи інвестиції в цифрові платформи, трансакційні та регуляторні витрати, фінансування управлінських інновацій, партнерські механізми та аналітичне забезпечення ухвалення рішень. Розроблено структурно-функціональну модель фінансово орієнтованого комплексу інструментів, що включає п'ять рівнів: стратегічно-фінансовий, управлінської координації та процесної інтеграції, цифрово-платформної інфраструктури, аналітичних даних і цифрової інтелектуалізації, а також екосистемної взаємодії та створення цифрової цінності. Установлено, що найбільшу ефективність забезпечує інтеграція всіх рівнів, яка створює умови для циклічної та адаптивної взаємодії фінансових потоків, управлінських рішень і цифрової інфраструктури; сприяє масштабованості, саморозвиткові та інноваційній динаміці екосистеми. Запропоновано концептуальні засади застосування фінансово-управлінських інструментів: стратегічна пріоритизація інвестицій, інтеграція процесів, гнучкість і адаптивність, масштабованість та аналітичне

забезпечення. Реалізація цих засад передбачає використання сучасних цифрових платформ, аналітики великих даних, модулів прогнозування ризиків, партнерських фінансових моделей і систем моніторингу ефективності, що забезпечує ефективний розподіл ресурсів, підвищення конкурентоспроможності й стійкості цифрової екосистеми. Пропонована модель і концептуальні підходи можуть слугувати методологічною основою для планування та реалізації цифрових трансформацій підприємницьких структур, забезпечуючи синергію між фінансовими ресурсами, управлінськими рішеннями та цифровою інфраструктурою.

**Ключові слова:** цифрова екосистема, фінансово орієнтовані інструменти, управлінські механізми, цифрова трансформація, структурно-функціональна модель, інноваційний розвиток, стратегічне бюджетування

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