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Architecture of digital innovations as a determinant of strategic resilience of an enterprise

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Abstract. The relevance of the study is determined by the need to increase the strategic resilience of enterprises in the context of digital transformation, where the architecture of digital innovations is a key factor in adaptability and competitiveness. The aim of the study was to substantiate the role of the architecture of digital innovations as a determinant of the strategic resilience of enterprises. The research methodology was based on the use of systemic-structural and comparative analysis methods to identify the parameters of digital architecture, as well as economic-mathematical modelling to develop a matrix of its functional role in ensuring the adaptive potential of business. It is accepted that in conditions of growing turbulence of exogenous factors and digital transformation of the economy, the architecture of digital innovations is a key determinant of the strategic resilience of an enterprise. The conceptual parameters of digital architecture (technological basis, adaptability, predictability) and their impact on the transformation of traditional management models are considered. The dynamics of the integration of digital components into the operational activities of Ukrainian enterprises are analysed, which has made it possible to identify rs that negate the strategic potential of digital architecture. Based on the analysis, a phased approach to the formation of a holistic architecture and a matrix of its functional role in ensuring the resilience of economic entities are proposed. It has been proven that only a comprehensive approach to combining technological drivers with strategic development goals can ensure the long-term adaptive stability and competitiveness of an enterprise in the global digital space. The practical value of the study lies in the possibility of applying the proposed architectural approach and innovative tools by senior managers, crisis managers and digital development specialists to design flexible management strategies that ensure high resilience of enterprises in critical conditions

Keywords: cyber resilience; technological drivers; adaptive management; digitalisation; business model reconfiguration

Introduction

The formation of digital innovation architecture constitutes a key factor in the contemporary transformation of business entities, significantly modifying the paradigm of strategic management and the criteria for assessing long-term business sustainability. The integration of complex digital solutions, in particular artificial intelligence systems, big data architecture, cloud infrastructures and automated management platforms, is leading to profound reconfigurations of business models, organisational structures and predictive decision-making mechanisms. The relevance of

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this issue is due to the growing turbulence of the market environment, the acceleration of technological cycles, and the increasing demands on the adaptability of business systems in the global digital space. The transition to digitally oriented models of enterprise development is accompanied by a complex set of interrelated challenges.

On the one hand, the active implementation of digital innovations increases the vulnerability of enterprises to information and technological destabilisers and leads to an increase in cyber risks, which requires the formation of multi-level digital security mechanisms. On the other hand, increased competitive pressure from high-tech market players and dynamic consumer expectations are driving management to constantly reconfigure strategic business contours, which requires significant intellectual investment. Ensuring strategic resilience as the ability to quickly regenerate and maintain functionality in crisis conditions requires not only the implementation of individual technological solutions, but also the development of a comprehensive architecture of digital innovations, harmonised with long-term development goals. The successful functioning of an enterprise in an unstable environment requires the development of adaptive strategies based on the synergy of technological, organisational and managerial components, which will contribute to strengthening the systemic resilience of the business to exogenous shocks and ensure its sustainable development in a changing digital landscape.

A significant number of works are devoted to the study of the theoretical and practical aspects of the architecture of digital innovation and the strategic resilience of enterprises. M. Biluha (2025) considered the conceptual foundations of innovative development of enterprises in the context of digital transformation and crisis shifts. The author analysed in detail the potential of digital solutions to improve the efficiency of business processes and identified systemic barriers that hinder their implementation. The conclusions showed that the digitalisation of enterprises in Ukraine has great strategic potential, but requires a comprehensive approach to overcoming technological and organisational constraints, particularly in the context of cybersecurity and intellectual capital. N. Ivanova (2024) studied the impact of digitalisation on the national economy and the quality of life of the population in Ukraine. The author concluded that digital transformation contributes to the achievement of sustainable development goals by stimulating economic activity and improving the quality of public services, which is essential for ensuring systemic resilience at the meso and macro levels.

Researchers O. Kolodiziev *et al.* (2024) analysed the role of digital technologies and innovations in increasing the resilience and modernisation of the economy after periods of crisis. They applied a systematic approach, combining case studies and expert assessments, to identify the key factors of enterprise resilience. The study emphasised that digital tools and innovative solutions are crucial for the recovery and structural transformation of public and private organisations in the post-war period. Y. Parkhuts & O. Ohdanska (2025) explored the issue of increasing the competitiveness of enterprises through digitalisation. The authors applied business process analysis and assessment of digital integration indicators for enterprises in various industries. The conclusions of the study indicate that enterprises that actively implement digital technologies demonstrate a higher level of adaptability and ability to withstand market crises by optimising costs and expanding sales channels. A. Kuzior *et al.* (2022) focused on assessing Ukraine's national innovation ecosystems in the context of sustainable development. Using comparative analysis and rating methods, the authors identified the key strengths and weaknesses of the country's innovation structures. The results of the study showed that effective digitalisation of ecosystems significantly increases their ability to support innovative projects and integrate into global technology chains, which strengthens national resilience. The dependence of organisational resilience on the development of the innovative potential of enterprises was examined by J.A.R. Awad & R. Martin-Rojas (2024). The study applied an analytical model for assessing the impact of innovative resources on the sustainability of organisations. The authors concluded that enterprises with a high level of innovative potential demonstrate a greater ability to recover quickly from crisis situations because they have mechanisms for flexible resource reallocation. G. Fletcher & M. Griffiths (2020) analysed digital transformations in the context of lockdowns and crisis periods. They used case study and comparative analysis methods to identify effective business adaptation strategies. The findings showed that companies that plan digital transformation systematically are able to adapt more quickly to external shocks and minimise losses compared to companies that use fragmented IT solutions.

Despite significant scientific attention to individual aspects of digitalisation, the issue of forming a holistic architecture of digital innovations as a systemic determinant of strategic resilience remains controversial. Most existing works focus either on the technological component or on general issues of crisis management, leaving aside the mechanisms of their architectural integration. A number of important aspects of the organisational, financial and informational support of digital transformation processes at the level of economic entities have been partially studied. Methodological approaches to the integrated assessment of the effectiveness of digital adaptation of enterprises through the prism of their strategic sustainability are insufficiently developed. The lack of a systematic vision of mechanisms for overcoming barriers to technological integration, minimising cyber risks and eliminating the shortage of digital competencies creates a scientific gap in the development of adaptive architectural management models. This necessitates clarification of the conceptual parameters of digital innovation architecture and a reconsideration of the role of the technological factor as a fundamental determinant of business viability

under contemporary exogenous shocks. Thus, the aim of the study was to theoretically substantiate the concept of digital innovation architecture and develop practical recommendations for its formation as a fundamental tool for strengthening the strategic resilience of Ukrainian enterprises. The following hypotheses were formulated within the framework of scientific research:

H1: The development and implementation of integrated digital architecture significantly increases the adaptability and strategic resilience of enterprises to exogenous shocks.

H2: Systemic integration of innovative digital platforms (artificial intelligence, digital copies of enterprises) has a direct positive impact on operational efficiency and competitiveness.

H3: Institutional barriers to technological integration and a shortage of digital skills among staff are critical factors limiting the effectiveness of digital adaptation by economic entities.

Materials and Methods

The research methodology was based on a comprehensive combination of general scientific and specialised methods, which ensured a high degree of objectivity and representativeness of the scientific results obtained. To achieve the set aim, a systematic approach was used, which allowed to consider the architecture of digital innovations not as an isolated technological process, but as a complex multicomponent system integrated into the overall development strategy of the enterprise. The choice of methods was determined by the need for interdisciplinary analysis at the intersection of modern management, the digital economy and strategic planning.

Empirical methods, such as observation, comparison, and description, were used to study modern approaches to the digitalisation of enterprises in leading economic systems and to identify key global and national trends in the field of innovative development (Awad & Martin-Rojas, 2024; Ivanova, 2024; Biluha, 2025). In particular, the observation method allowed to evaluate practical models for implementing digital technologies in real business processes, comparison helped to identify critical differences and effective practices between different sectors of the economy, and description ensured the systematisation of existing approaches and their structured presentation for further analysis. The theoretical-cognitive method was used to conceptualise the architecture of digital innovations through the formalisation of basic ideas and testing of hypotheses regarding the impact of technological transformations on the strategic resilience of enterprises (Fletcher & Griffiths, 2020; Cui, 2025).

Logical methods were used to substantiate the conclusions: analysis, synthesis, induction, deduction, generalisation, and scientific abstraction. This made it possible to identify methodological problems and risks of digital transformation, as well as to determine the possibilities for its strategic optimisation in the national and international context (Kuzior *et al*., 2022; Akib *et al*., 2022; Parkhuts & Ohdanska, 2025). The information base of the study consisted of documentary and statistical sources. In particular, reports and publications of the National Bank of Ukraine (n.d.) were studied to assess the macroeconomic stability of the business environment. Analytical materials and global reviews by PwC Ukraine (n.d.) and KPMG Ukraine (2024) were necessary to identify strategic priorities and challenges of digitalisation. Official government statistics on the use of information and communication technologies (ICT) in the business sector (Ukrstat, n.d.) were analysed. Scientific works on trends in innovative progress and post-war reconstruction (Savras & Fedynets, 2023; Pizniak & Turchina, 2023) were also analysed.

Case studies and management scenario modelling were used to analyse the practical impact of digital innovations on business processes and the level of enterprise recovery in crisis conditions. This made it possible to verify the consistency of theoretical propositions with actual data on the functioning of economic entities in conditions of high turbulence (Kolodiziev *et al*., 2024; Tkachenko, 2024). This multi-method approach provided a comprehensive assessment of the architecture of digital innovations as a key determinant of strategic resilience.

Results and Discussion

The formation of the architecture of digital innovations of business entities within this study was based on the analysis of a number of empirical and statistical data. In particular, the use of analytical reviews by PwC Ukraine (n.d.) and KPMG Ukraine (2024) made it possible to identify the key strategic priorities for the digitalisation of Ukrainian business, among which the development of flexible IT infrastructures occupies a leading place. An analysis of documentary sources from the National Bank of Ukraine (n.d.) helped to assess the macroeconomic stability of the business environment, while official government statistics (Ukrstat, n.d.) made it possible to determine the dynamics of the use of information and communication technologies in the business sector. In addition, the scientific findings of I. Savras & N. Fedynets (2023) and D. Pizniak & S. Turchina (2023) were taken into account when considering post-war reconstruction trends. Based on a synthesis of these sources, a system of key parameters of digital architecture was formed (Table 1).

Table 1. Conceptual parameters of digital innovation architecture as determinants of resilience

Analysis parameter	Characteristic	Impact on strategic resilience
Technological basis	Convergence of artificial intelligence (AI), industrial Internet of Things (IIoT) and digital copies of the enterprise into a holistic architectural ecosystem.	Creates conditions for instant identification and adaptive response to dynamic market anomalies and technological failures.

Continued Table 1

Analysis parameter	Characteristic	Impact on strategic resilience
Structural adaptability	Modular configuration of business architecture (Microservices), which ensures high speed of process reengineering without stopping operations.	Neutralises the negative effects of structural transformations in the economy and increases the flexibility of the operating model under pressure from risks.
Analytical predictability	Use of big data analytics methods for multi-variant scenario modelling.	Ensures the transition from reactive to proactive management through the preventive identification of potential crisis phenomena.
Cognitive integration	Synergy of digital competencies of human capital and innovative culture within a single intellectual information space.	Increases the systemic stability of the organisation to destabilising factors through intellectual flexibility and the speed of staff training.
Ecosystem openness	The ability of digital architecture to integrate with external platforms and stakeholders through open interfaces (API).	Builds network resilience for the business through diversification of partnerships and rapid access to external innovation resources.
Resource mobility	The use of cloud technologies (Cloud Computing) for the dynamic redistribution of computing and operational capacities.	Ensures business continuity under any conditions and optimises costs during periods of low market activity.

Source: developed by the authors based on research by I.Z. Savras & N.I. Fedynets (2023), J.A.R. Awad & R. Martin-Rojas (2024), KPMG Ukraine (2024), I. Tkachenko (2024)

The architecture of digital innovation is not just an inert system, but a dynamic phenomenon that initiates a radical evolution of business models. It reorients organisational structures towards the principles of intellectual adaptability, innovation and predictive resilience using modern digital tools and end-to-end data analytics. In this context, architecture serves as the foundation on which an economic entity's ability to maintain functionality during exogenous shocks is based. The process of forming such architecture is iterative and multi-vector. The stages of developing the architecture of digital innovation as a determinant of an enterprise's strategic resilience are illustrated in Figure 1.

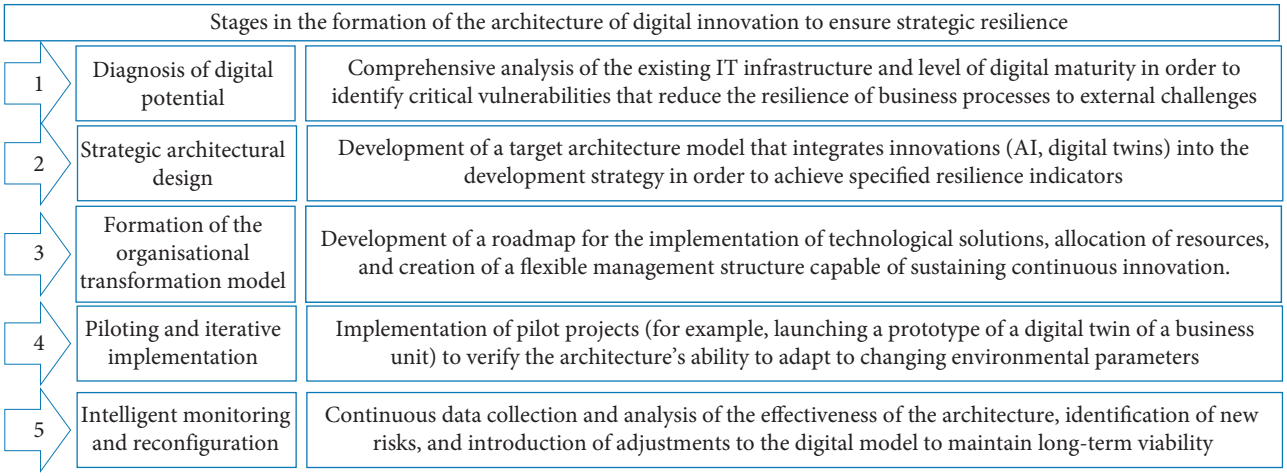


Figure 1. Stages in the formation of the architecture of digital innovation to ensure strategic resilience
Source: developed by the authors based on research by Y. Yan (2023), Strutynska *et al.* (2024), M. Biluha (2025), S. Masaev *et al.* (2025)

This sequence of stages reflects the logic of transition from diagnosing the initial state of the system to forming a predictive management model. At the same time, the development of digital innovation architecture allows a business entity to transform disparate technological tools into a coherent mechanism for counteracting crisis phenomena. The relationship between the strategic potential of digital architecture and the relevant risks of its implementation is systematised in Table 2.

Table 2. Determinants of the realisation of the strategic potential of digital architecture and systemic challenges to its implementation

Architecture components	Functional purpose	Example of implementation	Systemic risks and limitations
Intelligent algorithms (AI & ML)	Demand forecasting and automatic resource manoeuvring in real time.	Walmart: automatic replenishment of scarce goods based on analysis of weather anomalies.	High dependence on the accuracy of input data; inefficiency in situations without historical analogues.

Continued Table 2

Architecture components	Functional purpose	Example of implementation	Systemic risks and limitations
Digital copies (Digital Twins)	Stress testing of business processes and failure modelling without risk to assets.	Siemens: virtual testing of production lines during emergency power outages.	Significant development costs; risk of discrepancies between the digital model and reality.
Cloud ecosystem (Hybrid Cloud)	Ensuring operational continuity and territorial invariance of the business.	Capital One: complete relocation of banking operations to the cloud to continue working during local server failures.	Dependence on external providers; data confidentiality issues on third-party resources.
Cyber resilience (Zero Trust)	Forming a secure perimeter for safe access to strategic data.	Google (BeyondCorp): secure remote work for staff with critical data without using VPN.	Need for constant investment; risks of human error and social engineering.
Cognitive culture (Knowledge Mgmt)	Scaling adaptive experiences and rapid diffusion of anti-crisis solutions.	Toyota: global digital knowledge bases for instant replication of engineering solutions between factories.	Information overload for specialists; difficulty maintaining team spirit when working remotely.

Source: developed by the authors based on research by I. Trunina *et al.* (2023), I.Z. Savras & N.I. Fedynets (2023), D. Pizniak & S. Turchina (2023), O. Kolodiziev *et al.* (2024)

A summary of the above data allows to conclude that the architecture of digital innovations is not only a technological foundation but also a stabilising mechanism that minimises the impact of destabilising factors on the enterprise's activities. The key advantage of implementing such an architecture is the transition from static protection to dynamic adaptability, where digital copies and intelligent algorithms allow crises to be predicted even before they physically manifest themselves. At the same time, the identified systemic risks point to the need for a balanced approach: the technological complexity of the architecture must be accompanied by an appropriate level of cyber protection and the development of the cognitive abilities of personnel.

Thus, the strategic resilience of an enterprise in the digital age is determined not only by the availability of advanced technologies, but also by the ability to integrate them into a flexible and secure architectural model capable of continuous self-improvement. An analysis of the functional orientation of digital architecture (Table 2) confirmed that technological transformation is not only a requirement of the times, but also a key condition for ensuring the continuity of operational activities. To assess the real impact of these processes on the strategic stability of organisations, it is advisable to analyse the dynamics of the integration of key components of digital architecture into the operational activities of Ukrainian enterprises during 2022-2024 (Fig. 2).

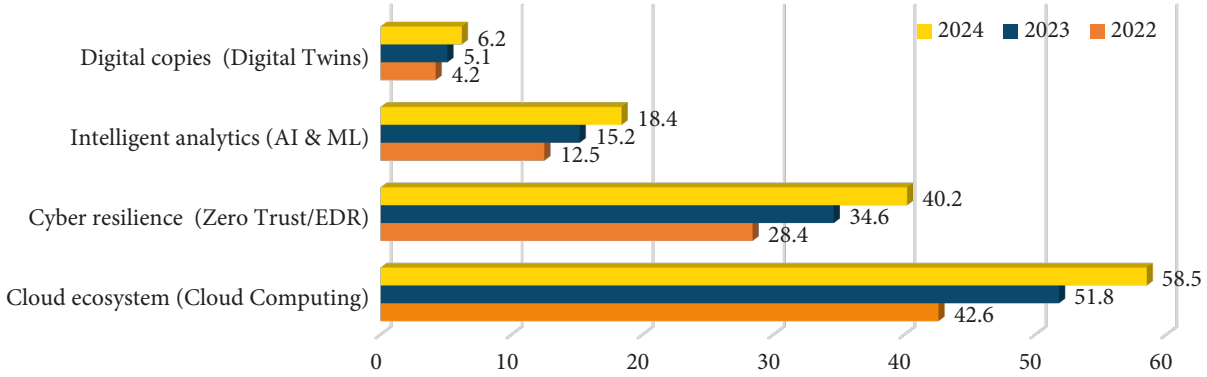


Figure 2. Dynamics of integration of digital architecture components into the operational activities of Ukrainian enterprises in 2022-2024, %

Source: developed by the authors based on research by Ukrstat (n.d.), KPMG Ukraine (2024), National Bank of Ukraine (n.d.), Y. Voloshchuk *et al.* (2025)

The data presented in Figure 2 clearly illustrate that, under conditions of high turbulence, Ukrainian businesses have chosen the path of consistent development of digital architecture. The most stable positive dynamics were demonstrated by the segments of intellectual analytics (+47.2%) and digital copies (+47.6%), which is explained by the gradual adoption of scenario modelling tools to minimise management risks. At the same time, the growth in the share of cloud technology use to 58.5% in 2024 indicates the systematic formation of territorial invariance of business. This has allowed organisations to ensure the preservation of operational memory and the continuity of processes regardless of physical threats to local infrastructure. Thus, the presented statistical indicators confirm the

role of digital architecture as a stabilising mechanism that transforms technological investments into strategic stability and adaptability of economic entities.

An analysis of the dynamics of indicators characterising the effectiveness of digital architecture implementation (Fig. 2) allows to assess both the positive effects and hidden challenges for enterprises in the period 2022-2024. Positive trends that directly affect the level of strategic resilience include: optimisation of operating costs: the integration of automated management systems and the transition to cloud services have enabled enterprises to reduce the costs of maintaining physical infrastructure, which has partially offset the negative impact of inflationary processes; faster recovery of business processes: the use of predictive analytics and digital twins has enabled rapid modelling of logistics chains and production cycles in the event of disruption; Strengthening digital immunity: systematic investments in cybersecurity architecture have minimised direct financial losses from the growing number of cyberattacks, ensuring the integrity of corporate data.

At the same time, the process of intensive digitalisation is accompanied by a number of destabilising factors that need to be taken into account in strategic management: Temporary decline in net profitability: significant capital investments in updating digital architecture (CapEx) in the early stages create additional pressure on profitability, requiring a review of investment policy; increased costs of retaining specialists: a shortage of personnel with a high level of digital competencies forces companies to increase their payroll, which affects the overall structure of operating expenses; risk of technological dependence: high concentration on solutions from global cloud providers creates potential threats in the event of technical failures on the part of the supplier or changes in licensing conditions.

Despite these challenges, the results of the analysis show that digital architecture in turbulent conditions is becoming a basic asset that determines not only current competitiveness, but also the ability of an enterprise to survive and adapt in the future. The data obtained confirm the hypothesis about the advisability of transforming IT infrastructure costs into strategic investments in security and resilience. In addition to internal economic factors, the period of intensive transformation of the architecture of digital innovation is driven by the need for Ukrainian businesses to adapt to new regulatory norms and global technological standards. In particular, institutional drivers such as integration into the European Union (EU) Single Digital Market, the introduction of open banking standards, and stricter personal data protection requirements have significantly changed the vector of digital solutions development (Table 3).

Table 3. Impact of strategic and regulatory drivers on the architecture of digital innovation in enterprises

Factor/category	Description	Impact on resilience	Implementation challenges
Harmonisation with the Digital Single Market (EU)	Implementation of General Data Protection Regulation (GDPR), electronic Identification, Authentication and Trust Services (eIDAS) and digital reporting standards.	Simplification of cross-border cooperation, entry into the EU market, increased investor confidence.	High costs of technical and legal compliance.
Special regime "Diia.City"	Preferential tax treatment and English law for IT assets.	Stimulation of in-house product development, capitalisation of intellectual assets.	The need for strict adherence to transparency and audit criteria.
National Cybersecurity Strategy	Critical infrastructure resilience requirements, Zero Trust model.	Formation of a systematic defence against hybrid threats, ensuring business continuity (BCP).	Shortage of qualified specialists, complex security audit procedures.

Source: developed by the authors based on research by A. Kuzior *et al.* (2022), N. Ivanova (2024), P. Zhang & Y. Wang (2024), National Bank of Ukraine (n.d.)

The systematisation of the factors presented in Table 3 provides grounds to assert that the regulatory environment in Ukraine serves as an external institutional basis for the formation of the architecture of digital innovation. On the one hand, the implementation of European standards has stimulated innovative activity and facilitated the integration of enterprises into the global digital space. On the other hand, adaptation to EU standards forces businesses to abandon fragmented software products in favour of unified integrated ecosystems, which minimises the risks of data fragmentation and strengthens the foundation for strategic resilience.

The introduction of the "Diia.City" regime has created more favourable financial and institutional conditions for the development of the technology sector, enabling enterprises to reallocate resources to scale complex architectural solutions. At the same time, the role of digital innovation architecture as a determinant of strategic resilience directly depends on the level of cognitive readiness of management to operate in the updated legal environment. In this context, it is important to develop the dynamic adaptability of management teams to converge the technological potential of architecture into the functional contours of strategic planning and preventive risk management. Thus, the formed architecture of digital innovations is not just a technical basis, but a holistic strategic system within which regulatory compliance is combined with technological flexibility. This creates the preconditions for the transition to an intellectually adaptive management model capable of self-learning in response to external challenges. For the practical implementation of this concept, it is necessary to define a

hierarchical structure of interaction between the components of the architecture, which allows transforming technological tools into an effective mechanism for ensuring strategic resilience (Fig. 3).

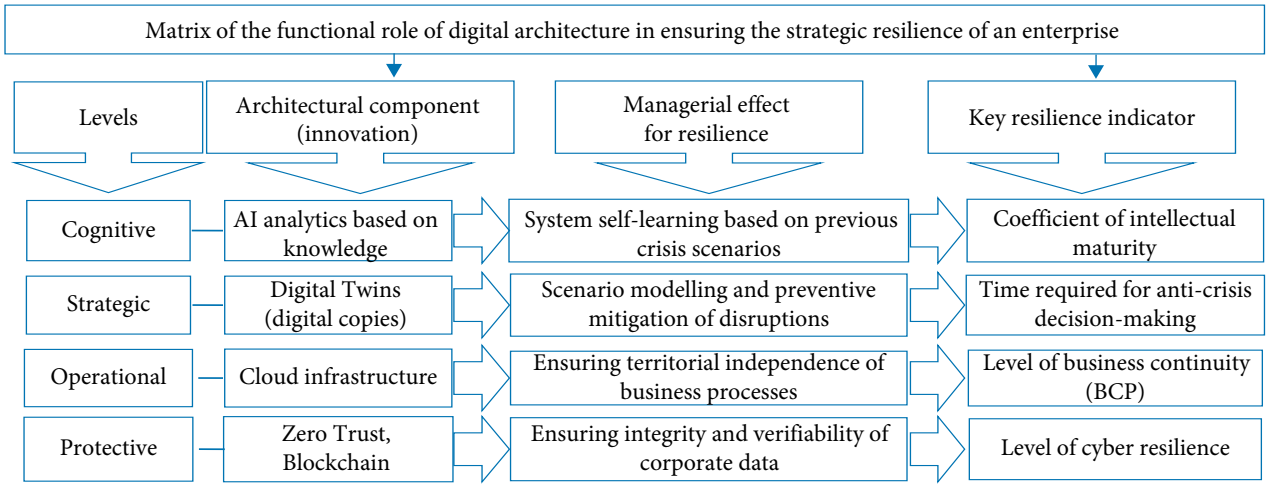


Figure 3. Matrix of the functional role of digital architecture in ensuring the strategic resilience of an enterprise
Source: developed by the authors based on research by H. Akib *et al.* (2022), R.G. Kula & C. Treude (2022), J.A.R. Awad & R. Martin-Rojas (2024), I. Tkachenko (2024)

The presented matrix clearly demonstrates the role of digital architecture as a key determinant defining an enterprise's capacity to withstand external shocks. Due to continuous feedback loops between the protective and cognitive levels, the system acquires self-organising properties. This means that the enterprise does not simply respond to changes in regulatory norms or security threats, but uses them as input data for automatic updating of management algorithms. Thus, the matrix presented in Figure 3 illustrates a hierarchical model of transforming digital innovations into strategic assets, where each level of architecture performs a specific function in ensuring the effective functioning and long-term resilience of the enterprise.

Despite the high strategic potential of the developed matrix (Fig. 3), its practical implementation is complicated by the influence of a number of destructive factors identified in the course of the study. Typologisation of these obstacles allows to specify the content of the problem field and determine the mechanisms for their elimination. The key obstacle is the fragmented implementation of digital solutions. The creation of "digital islands" (separate programmes without integration) leads to a break in information flows, which makes it impossible to form a single resilience contour. The solution to this problem lies in the transition to a microservice architecture that ensures the seamless integration of all business processes. Secondly, the development of architecture is accompanied by specific cyber risks, which, in conditions of global turbulence, transform from technical threats into strategic challenges. The implementation of the Zero Trust model, embedded in the protective layer of the author's matrix, allows for a change in the security paradigm: from perimeter protection to the protection of each individual operation. Thirdly, there is an acute shortage of digital competencies. Even the most sophisticated architecture remains inert without specialists capable of managing innovation cycles. This requires companies to transform their human resource management systems towards the formation of a "cognitive culture" (Table 4).

Table 4. Mechanisms for overcoming destabilising factors in the formation of digital architecture

Problem	Essence of destructive influence	Architectural solution (overcoming mechanism)	Effect on resilience
Fragmentation of solutions	Duplication of data and delays in managerial responses.	Implementation of unified ecosystems and integration through API interfaces.	System integrity and the speed of strategic manoeuvring.
Cyber risks	Risk of complete business disruption as a result of external attacks.	Transition to a multi-layered Zero Trust model and blockchain-based verification.	BCP and protection of assets.
Competence deficit	Inability to effectively operate intelligent systems.	Development of managerial "digital intelligence" and self-learning systems.	Increased adaptability to technological upgrades.
Misalignment with strategic objectives	A disconnect between IT expenditure and strategic outcomes.	Convergence of digital architecture into functional planning frameworks.	Transformation of digital innovation into a sustainable competitive advantage.

Source: developed by the authors based on research by G. Fletcher & M. Griffiths (2020), R.G. Kula & C. Treude (2022), D. Pizniak & S. Turchina (2023), J. Cui (2025)

The proposed comprehensive approach assumes that the architecture of digital innovation should be formed not as an isolated technological structure, but as a determining factor of systemic stability integrated into the organisational structure. This accelerates innovation cycles – from threat identification to adaptive response generation – which is important for maintaining stability in the dynamic global digital space. Thus, the strategic resilience of an enterprise is directly determined by the depth of integration of digital innovations into the management system. Only by overcoming these barriers can digital architecture become an effective tool for ensuring competitiveness, allowing an economic entity not only to maintain functional stability during shocks, but also to use digital transformation as a driver of exponential strategic development. It should be noted that even with intensive expansion of digital potential, financial and economic indicators of activity in the short term may show some volatility. This is due to the following factors: temporary depression of profitability: significant capital investments in digital infrastructure and support for cloud ecosystems create a burden on net profit, but such expenses are investments in strategic security; the cost of technological convergence: the process of combining disparate products into a single model requires significant resources to overcome data fragmentation; exogenous destruction: external shocks and energy instability lead to increased operational risks, which temporarily negate the expected economic effect. To transform architecture into an effective determinant of resilience, it is necessary to implement a strategic algorithm covering the following functional vectors:

1. Conceptual design: development of a target innovation model relevant to dynamic business goals.

2. Cognitive transformation: development of digital intelligence of personnel and innovative culture.

3. Optimisation of the operational contour: automation of routine processes to free up resources for strategic manoeuvring.

4. Cyber resilience: building a perimeter based on Zero Trust.

The implementation of these strategic vectors ensures a qualitative transformation of the enterprise management system into an intelligent adaptive model, where the use of API interfaces and blockchain technologies guarantees the necessary ecosystem openness. This allows for the optimisation of innovation cycles, enabling the organisation to not only adapt to market anomalies, but also to set new standards for industry leadership. The systematic integration of technological solutions positions the architecture of digital innovation as a fundamental determinant of strategic resilience, ensuring the long-term stability and competitiveness of a business entity in the global digital space (Beverungen *et al.*, 2022).

It has been established that the architecture of digital innovation acts as a multi-level framework that integrates the technological basis (artificial intelligence, big data, cloud infrastructures) with organisational and managerial contours. This allows digitalisation to be transformed from a budget expense into a strategic asset that generates added value even in periods of turbulence. Unlike the fragmented automation of individual functions, the architecture approach provides end-to-end visibility of business processes, which is critical for rapid decision-making. A central role in this process is played by digital twins of enterprises. Systematic digitalisation helps to strengthen the anti-crisis immunity of an enterprise. The integration of cloud computing ensures the mobility of work processes, and automated management systems allow the functionality of production chains to be maintained even with limited access to physical resources. Thus, digital architecture becomes the foundation for implementing a "dynamic capabilities" strategy.

The generalisation of the data obtained confirmed the key scientific hypotheses of the study: The results of the study fully confirmed hypothesis H1, as a direct relationship was established between the level of integrity of the digital architecture and the speed of regeneration of the enterprise's functions after critical exogenous shocks. The confirmation of hypothesis H2 is based on an analysis of operational efficiency: the implementation of systems based on predictive analytics and digital twins allows management to perform real-time simulation modelling of risks. The results also confirmed hypothesis H3: the architecture of digital innovations is identified as a key determinant of strategic resilience, ensuring the flexibility of business models in highly turbulent conditions.

Discussion of the obtained results within contemporary scientific discourse makes it possible to more fully reveal the theoretical and practical value of the study. It has been established that the need for deep reconfiguration of management systems under the influence of digitalisation fully corresponds to the position of M. Biluha (2025). The author rightly pointed out the systemic barriers faced by Ukrainian enterprises; however, this study expands that approach by proposing digital innovation architecture as a concrete methodological instrument for overcoming such obstacles. Supporting M. Biluha's (2025) thesis that technological inertia constitutes a major impediment to development, the present research demonstrates that overcoming it is possible only through a shift in the managerial paradigm towards adaptability. This requires not merely the replacement of software, but a reconsideration of organisational hierarchy, where digital flows become the foundation for decision-making at all management levels.

The analysis of the impact of digital innovations on corporate efficiency resonates with the empirical findings of J. Cui (2025), who identified a direct relationship between process digitalisation and productivity growth through the integration of artificial intelligence. This study aligns with the conclusion that the positive effects of technology emerge only under conditions of full systemic integration. It is demonstrated that the isolated use of, for example, artificial intelligence without coherent linkage to a comprehensive data architecture does not ensure the desired increase in resilience. Such synergy confirms the non-linear nature

of digital transformation effectiveness: maximum returns are achieved only after crossing a critical threshold of systemic integration. The vision of digital architecture as an ecosystem is also consistent with the work of I. Trunina *et al.* (2023). However, while those authors concentrated on the threats associated with Industry 5.0, the present study proposes solutions through the construction of strategic security contours, enabling risk neutralisation already at the stage of architectural design.

An important area of debate concerns the role of digital twins. The strategic approach of S.N. Masaev *et al.* (2025), who conceptualised digital twins as complex dynamic systems, is supported. Nevertheless, this study introduces a different emphasis: it argues that a digital twin is not merely a monitoring instrument, but a mechanism for ensuring strategic manoeuvrability of enterprises under wartime conditions, which corresponds with the conclusions of I. Tkachenko (2024) regarding the critical role of innovation during periods of military conflict. Complementing this perspective, the research substantiates that digital architecture performs the function of an intellectual "shell" that minimises the impact of physical destruction on the managerial stability of a business entity.

With regard to post-war recovery processes, the article shares the optimism of D. Pizniak & S. Turchina (2023) concerning the catalytic role of technology. However, unlike their macroeconomic approach, the focus of the present study is placed at the micro level – the individual enterprise. The results confirm the conclusions of I. Strutynska *et al.* (2024) that for small and medium-sized enterprises digitalisation constitutes a non-alternative means of survival. Given that such enterprises are the most vulnerable, the proposed architecture is characterised by modularity. This enables phased implementation, thereby addressing the problem of limited financial capacity discussed by I. Savras & N. Fedynets (2023). Such a stepwise approach makes digital transformation accessible even to entities with constrained investment resources, transforming financial limitations from an insurmountable barrier into a factor for prioritising change.

The issue of public investment, raised by Y. Voloshchuk *et al.* (2025), is particularly relevant in the current context. This study supports the thesis regarding the necessity of state stimulation of innovation. However, the analysis revealed a certain contradiction: external financing without an internal transformation of managerial architecture proves to be insufficiently effective. In this regard, the position of H. Akib *et al.* (2022) appears more convincing, emphasising the primacy of combining organisational and technological components. It has been demonstrated that adaptive management strategies integrated into a digital foundation create immunity to unpredictable market fluctuations, thereby increasing an enterprise's attractiveness for long-term investment.

In assessing the vulnerability of digital systems, it is appropriate to refer to the work of R. Kula & C. Treude (2022) on the impact of geopolitics on software ecosystems. The current findings confirm their concerns regarding the growth of cyber risks. Business stability now critically depends on the resilience of digital infrastructure, which substantiates the necessity of embedding cybersecurity directly into the architecture of innovation. This expands the traditional understanding of resilience by incorporating digital security as a mandatory determinant.

Summarising the results of the discussion, it is important to emphasise that the systemic analysis of opportunities and threats presented by Y. Yan (2023), along with the findings of P. Zhang & Y. Wang (2024), confirms that the academic community recognises digitalisation as a key factor in strategic management. The present research logically advances this argument by demonstrating that the architectural approach represents the highest form of realising innovation potential, as conceptualised by J.A.R. Awad & R. Martin-Rojas (2024). The proposed concept enables enterprises not merely to react to crises, but to build anticipatory resilience through continuous technological self-renewal. The conceptualisation of the results allows to conclude that the proposed digital innovation architecture forms a reliable foundation for the long-term survival of businesses under conditions of global instability. This confirms the expediency of transitioning from fragmented IT solutions to comprehensive digital ecosystems. Thus, an enterprise's strategic resilience is derived from the quality and integrity of its digital architecture.

Conclusions

The results of the study show that the formation of the architecture of digital innovations in the current turbulent conditions is a complex and multi-level process that combines technological, organisational and managerial components. The architecture of digital innovation is not just a set of individual technologies, but a holistic management system that ensures the adaptation of economic entities to global challenges, transforming traditional business models, optimising internal structures and creating conditions for dynamic resilience to exogenous shocks. The study confirmed that the systematic integration of digital copies of enterprises (Digital Twins), intellectual analytics and cloud computing allows a transition from passive response to crisis situations to predictive modelling of development scenarios. This ensures the continuity of business processes, increases the flexibility of management decisions and minimises the destructive impact of risks on the functioning of the organisation. An analysis of the dynamics of Ukrainian business digitalisation for 2022-2024 showed a positive correlation between the development of digital architecture and the level of strategic resilience of enterprises. Despite the temporary burden on financial indicators, investments in digital infrastructure form the basis for maintaining market positions and rapid recovery of potential in the post-war period.

It has been found that the process of digital architecture formation is determined not only by technological factors, but also by institutional drivers, such as

harmonisation with the EU Digital Single Market and the introduction of special legal regimes (Diia.City). Strategic resilience is ensured through the synergy of protective, operational, strategic and cognitive levels, with the key indicator of effectiveness being the system's ability to self-organise and make rapid anti-crisis decisions. The main vectors of architecture development in the context of Industry 5.0 are cyber resilience, openness of ecosystems through API solutions, and the development of digital intelligence of human capital. To realise their strategic potential, enterprises must apply a systematic approach that includes conceptual design, overcoming data fragmentation and cognitive transformation of management. Promising areas for further research include studying the impact of quantum computing on the cyber resilience of enterprises, developing methods for assessing the return on investment in digital resilience, and researching the role of artificial intelligence in the automatic re-engineering of business architectures in real time.

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Архітектоніка цифрових інновацій як детермінанта стратегічної резильєнтності підприємства

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Анотація. Актуальність дослідження обумовлена необхідністю підвищення стратегічної резильєнтності підприємств у контексті цифрової трансформації, де архітектоніка цифрових інновацій виступає ключовим фактором адаптивності та конкурентоспроможності. Метою дослідження було обґрунтувати роль архітектоніки цифрових інновацій як детермінанти стратегічної резильєнтності підприємств. Методологія дослідження ґрунтувалася на використанні методів системно-структурного та компаративного аналізу для ідентифікації параметрів цифрової архітектури, а також економіко-математичного моделювання для розробки матриці її функціональної ролі у забезпеченні адаптивного потенціалу бізнесу. Акцептовано, що в умовах зростаючої турбулентності екзогенних чинників та цифрової трансформації економіки архітектоніка цифрових інновацій виступає ключовою детермінантою стратегічної резильєнтності підприємства. Розглянуто концептуальні параметри цифрової архітектоніки (технологічний базис, адаптивність, предиктивність) та їхній вплив на трансформацію традиційних моделей управління. Проаналізовано динаміку інтеграції цифрових компонентів в операційну діяльність підприємств України, що дозволило виявити кореляцію між рівнем технологічного потенціалу та швидкістю відновлення бізнесу після кризових шоків. Встановлено, що фрагментарність впровадження рішень, кіберризики та дефіцит цифрових компетенцій є дестабілізуючими факторами, які нівелюють стратегічний потенціал цифрової архітектури. На основі проведеного аналізу запропоновано етапність формування цілісної архітектоніки та матрицю її функціональної ролі у забезпеченні резильєнтності суб'єктів господарювання. Доведено, що лише комплексний підхід до поєднання технологічних драйверів із стратегічними цілями розвитку дозволяє забезпечити довгострокову адаптивну стійкість та конкурентоспроможність підприємства в глобальному цифровому просторі. Практична цінність дослідження полягає у можливості застосування запропонованого архітектурного підходу та інноваційного інструментарію керівниками вищої ланки, антикризовими менеджерами та фахівцями з цифрового розвитку для проектування гнучких стратегій управління, що забезпечують високу резильєнтність підприємств у критичних умовах

Ключові слова: кіберстійкість; технологічні драйвери; адаптивне управління; цифровізація; реконфігурація бізнес-моделей