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MANAGING THE RESILIENCE OF SMALL AND MEDIUM-SIZED ENTERPRISES BASED ON DIGITAL TECHNOLOGIES AND ARTIFICIAL INTELLIGENCE UNDER CONDITIONS OF WARTIME UNCERTAINTY

Abstract

The paper presents a comprehensive theoretical study of the problem of managing the resilience of small and medium-sized enterprises (SMEs) under conditions of wartime uncertainty. The relevance of the research lies in the need to expand the conceptual foundations for the formation of enterprise resilience in a highly turbulent external environment characterized by multidimensional risks, their interdependence, and continuous dynamics. Based on the analysis of theoretical approaches to the interpretation of SME resilience and the assessment of current conditions of their functioning, the limitations of traditional approaches focused on adaptation or recovery from isolated shocks are substantiated. It is demonstrated that under conditions of wartime uncertainty, resilience should be interpreted as a dynamic systemic property formed through the continuous reconfiguration of the business system. The methodological framework of the study includes methods of theoretical generalization, comparative analysis, and structural-logical modeling, which enabled the development of the conceptual basis of the research. The empirical foundation is represented by analytical and statistical data from international organizations reflecting the specific features of SME functioning in wartime conditions. The main result of the study is the development of an integrated model of SME resilience management based on the formation of an integrated resilience core as a result of the dynamic interaction of resource potential, digital technologies, and artificial intelligence tools. The proposed approach makes it possible to move from managing individual factors to managing systemic interconnections that determine the ability of enterprises to function under conditions of high uncertainty.The results of the study can be applied in the development of resilience management strategies for SMEs, focused on the integration of digital technologies and artificial intelligence tools into a unified management system.

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and medium-sized enterprises, wartime uncertainty, digital transformation.

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УПРАВЛІННЯ СТІЙКІСТЮ МАЛОГО ТА СЕРЕДНЬОГО БІЗНЕСУ НА ОСНОВІ ЦИФРОВИХ ТЕХНОЛОГІЙ ТА ШТУЧНОГО ІНТЕЛЕКТУ В УМОВАХ ВОЄННОЇ НЕВИЗНАЧЕНОСТІ

Анотація

У статті проведено комплексне теоретичне дослідження проблеми управління стійкістю малого і середнього бізнесу в умовах воєнної невизначеності. Актуальність дослідження полягає у необхідності розширення концептуальних засад формування стійкості підприємств в умовах високої турбулентності зовнішнього середовища, що характеризується багатовимірністю ризиків, їх взаємопов'язаністю та постійною динамікою. У результаті дослідження теоретичних підходів до трактування сутності стійкості малого і середнього бізнесу та аналізу сучасних умов його функціонування обґрунтовано обмеженість традиційних підходів, орієнтованих на адаптацію або відновлення після впливу окремих шоків. Доведено, що в умовах воєнної невизначеності стійкість доцільно розглядати як динамічну системну властивість, що формується у процесі безперервної перебудови бізнес-системи. Методичний інструментарій дослідження охоплює методи теоретичного узагальнення, порівняльного аналізу, а також структурно-логічного моделювання, що дозволило сформувати концептуальну основу дослідження. Емпіричною базою виступили аналітичні та статистичні дані міжнародних організацій, що відображають особливості функціонування малого і середнього бізнесу в умовах воєнного часу. Результатом дослідження є розробка інтегрованої моделі управління стійкістю малого і середнього бізнесу, в основі якої лежить формування інтегрованого ядра стійкості як результату динамічної взаємодії ресурсного потенціалу, цифрових технологій та інструментів штучного інтелекту. Запропонований підхід дозволяє перейти від управління окремими факторами до управління системними зв'язками, що визначають здатність підприємства функціонувати в умовах високої невизначеності. Результати проведеного дослідження можуть бути використані

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при формуванні стратегій управління стійкістю малого і середнього бізнесу, орієнтованих на інтеграцію цифрових технологій та інструментів штучного інтелекту в єдину систему управління.

Ключові слова: стійкість підприємства; управління стійкістю; малі і середні підприємства; воєнна невизначеність; цифрова трансформація

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Introduction

The current stage of economic development in Ukraine is characterized by the functioning of businesses under conditions of systemic wartime uncertainty, which is not episodic but prolonged and multidimensional in nature. For small and medium-sized enterprises (SMEs), this implies not only an intensification of risks, but also a transformation of the very logic of economic activity, which must adapt to an environment marked by high turbulence, unpredictability, and the interdependence of shock effects.

Within traditional approaches, enterprise resilience is predominantly interpreted as the ability to adapt to or recover from external disturbances. However, such approaches were developed under relatively stable or cyclically evolving economic conditions and therefore do not fully capture the specifics of an environment in which shocks are continuous, overlapping, and capable of altering the parameters of business functioning in real time. Under such conditions, resilience ceases to be the result of reactions to isolated influences and instead acquires the characteristics of a continuous process of business system reconfiguration.

In this context, digital transformation acquires particular importance, extending beyond the instrumental support of enterprise activities and assuming the role of a system-forming factor. The use of digital technologies not only ensures the continuity of operational processes, but also creates opportunities for flexible responses to environmental changes, the maintenance of business process continuity, and the reorientation of development strategies. The further evolution of digital solutions is closely linked to the implementation of artificial intelligence tools, which enable data analysis, forecasting, and managerial decision-making under conditions of uncertainty.

At the same time, existing scientific approaches to the study of SME resilience tend to consider resources, digital technologies, and artificial intelligence tools as relatively autonomous elements influencing enterprise performance. Such fragmentation limits the ability to explain the mechanisms of resilience formation in conditions of wartime uncertainty, where the key role is played not by individual elements, but by the nature of their interaction.

This necessitates a shift from the analysis of individual factors to the study of their integrated interaction, allowing resilience to be interpreted as a systemic property of the enterprise. In this context, particular relevance is given to the development of an approach in which resilience is conceptualized as the result of the functioning of an integrated core formed through the dynamic interaction of resource potential, digital technologies, and artificial intelligence tools.

Literature review

The disclosure of the research problem is based on the analysis of theoretical approaches to understanding the essence of resilience in small and medium-sized enterprises (SMEs), as well as the role of digital technologies and artificial intelligence in ensuring the adaptability of enterprises under extreme operating conditions. In this context, the level of organizational resilience of SMEs is considered as the key outcome indicator, while the determining factors include the degree of digital transformation, the saturation

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of business processes with digital solutions, the intensity of the use of artificial intelligence tools, and the nature of enterprise interaction with the institutional and digital environment. Given that contemporary wartime risks amplify the impact of both economic and non-economic factors on SME performance, the systematization of scientific approaches to the interpretation of enterprise resilience and its digital dimension becomes particularly relevant.

The analysis of scientific sources suggests that research by foreign scholars is dominated by organizational, dynamic-resource, ecosystem, and digital (digital resilience) approaches to understanding SME resilience. The organizational approach emphasizes the internal capabilities of enterprises to withstand shocks, maintain critical functions, and recover from crises, which presupposes the presence of appropriate managerial practices, flexible structures, and an adaptive organizational culture. The dynamic-resource approach is based on the concept of dynamic capabilities, according to which resilience is the result of the coordinated implementation of capabilities to identify opportunities and threats, respond to them in a timely manner, and transform the business model to enhance enterprise viability (Khurana et al., 2022). The ecosystem approach considers SME resilience as a derivative of the quality of interaction with the broader entrepreneurial, financial, and digital ecosystem, within which enterprises gain access to markets, infrastructure, knowledge, and stakeholder support. The digital approach, in turn, shifts the focus toward the enterprise's ability to ensure the continuity and recoverability of digital processes, communication channels, and information systems, which become fundamental for SME operations under conditions of high uncertainty.

The analysis of literature on SME digital transformation indicates that researchers consistently emphasize the evolving role of digital technologies—from a supporting tool to a system-forming factor ensuring business resilience in crisis conditions. A number of studies demonstrate that the implementation of e-commerce, cloud services, remote work management systems, and digital platforms enables enterprises to maintain market access, sustain communication with customers and partners, and reduce operational risks (Khurana et al., 2022). Studies on the digital transformation of Ukrainian SMEs during wartime reveal the phased nature of digitalization, which is often initiated by forced measures (transition to online operations, remote interaction with customers, use of digital payment services) and subsequently evolves into a comprehensive transformation of business processes and management structures. At the same time, the success of digital transformation largely depends on enterprises' access to high-quality digital infrastructure, financial resources, and opportunities for developing digital competencies among personnel.

A separate group of studies is devoted to the concept of digital resilience. Research by international organizations emphasizes that digital resilience encompasses not only the technical aspect of ensuring the continuity of information systems, but also organizational, regulatory, and behavioral components associated with enterprises' readiness to invest in cybersecurity, backup systems, hybrid cloud solutions, and digital interaction services with public institutions (OECD, 2024). Particular importance is attributed to public digital platforms that provide SMEs with access to administrative services, financial instruments, and support programs, thereby reducing transaction costs and accelerating the recovery of business activity. Thus, digital transformation and digital resilience are viewed as interrelated categories forming a new dimension of enterprise resilience management.

Growing attention is also paid to studies that explore the role of artificial intelligence in enhancing SME resilience. A synthesis of international research allows the identification of key areas of AI application, including strategic management, operational process optimization, and support for managerial decision-making. In particular, the use of data analytics algorithms improves the identification of risks and opportunities, the evaluation of alternative scenarios, and the development of adaptive development strategies. At the operational level, the implementation of predictive analytics systems, inventory management tools, automated customer service, and fraud detection solutions helps reduce the vulnerability of business processes to demand fluctuations, supply chain disruptions, and financial risks. At the same time, SMEs typically face constraints related to access to high-quality data, financial resources,

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and specialized competencies, which limits the full utilization of AI potential (Brüggemann et al., 2025).

Particular attention should be given to studies focusing on the functioning of Ukrainian SMEs under conditions of wartime uncertainty. These works emphasize that the combination of physical destruction, workforce displacement, energy supply disruptions, and cyber threats creates a fundamentally new risk environment that requires a rethinking of approaches to enterprise resilience (Kantaruk Pierre et al., 2025). Empirical studies show that entrepreneurs actively apply digital adaptation strategies, including the implementation of remote work formats, integration into international digital platforms, and the use of cloud services to ensure data security. At the same time, it has been established that prior experience in digitalization, particularly during the COVID-19 pandemic, significantly enhances the ability of enterprises to rapidly adapt and transform business models in crisis conditions, indicating the cumulative nature of digital resilience formation.

In studies devoted to export-oriented Ukrainian SMEs, attention is focused on the combination of digitalization and relational capital as key factors of resilience. Intensive use of digital communication channels with foreign partners, participation in international online platforms and professional networks enable enterprises not only to mitigate the negative effects of wartime risks, but also to expand their presence in foreign markets. At the same time, international analytical reports emphasize the decisive role of state policy in the field of digitalization, particularly support programs for digital transformation, development of digital skills, and access to public digital services as a basis for creating a favorable environment for sustainable SME development (Ingram et al., 2025).

At the same time, the analysis of scientific sources indicates an insufficient development of a comprehensive approach to integrating digital technologies and artificial intelligence tools into a unified system of SME resilience management. Most studies focus on individual aspects of digital transformation or AI application, without revealing the mechanisms of their interaction in the formation of enterprise resilience under conditions of extreme uncertainty.

Thus, the contemporary scientific discourse demonstrates a shift from a narrow interpretation of SME resilience as the ability to withstand isolated shocks toward its understanding as a multidimensional category formed under the influence of digital maturity, the intensity of artificial intelligence use, and the level of enterprise integration into the digital and institutional ecosystem. This necessitates further development of theoretical and methodological foundations for SME resilience management based on the integration of digital technologies and artificial intelligence tools.

Aims and Objectives

The aim of the paper is to provide a theoretical substantiation and to develop an integrated model for managing the resilience of small and medium-sized enterprises under conditions of wartime uncertainty, based on the formation of an integrated resilience core as a result of the dynamic interaction of resources, digital technologies, and artificial intelligence tools.

Methods

The study is based on a combination of theoretical and empirical approaches to the analysis of SME resilience under conditions of wartime uncertainty.

The theoretical stage of the research involved the systematization of scientific approaches to the interpretation of SME resilience, digital transformation, and the role of artificial intelligence, based on the analysis of recent academic publications and analytical reports of international organizations.

The empirical stage was based on the generalization of statistical and analytical data on the functioning of Ukrainian SMEs during wartime, in particular data from UNDP, OECD, and EBRD, which made it possible to identify key trends, losses, and adaptive mechanisms of business activity.

To synthesize the obtained results and to develop the conceptual framework of the study, the method of structural-logical modeling was applied. This enabled the development of an integrated model of SME

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resilience management, reflecting the interconnections between the external environment, resource potential, digital technologies, artificial intelligence tools, and resilience outcomes.
Such an approach made it possible to move from the description of individual influencing factors to a systemic representation of the mechanisms of resilience formation under conditions of wartime uncertainty.

Results

The presentation of the research findings is based on two interrelated components: the analysis of publicly available statistical data on the state and resilience of small and medium-sized enterprises (SMEs) in Ukraine under wartime conditions, and the development of an author's integrative model of SME resilience management based on digital technologies and artificial intelligence tools. On the one hand, statistical indicators make it possible to outline the scale of the impact of wartime events on the SME sector; on the other hand, they highlight the role of digital transformation as a key mechanism for adaptation and recovery of business activity. The synthesis of empirical findings from international organizations serves as the empirical foundation for substantiating the logic of the proposed model, which reflects the interconnections between resources, digital solutions, the application of artificial intelligence, managerial processes, and resilience outcomes (UNDP, 2024).
According to the consolidated assessment of the United Nations Development Programme, micro, small, and medium-sized enterprises constitute the backbone of Ukraine's national economy: they account for 99.98% of all business entities, 74% of employment, and 64% of value added. Such a structure of the business sector determines a high sensitivity of macroeconomic dynamics to the level of SME resilience, as any significant decline in their activity is immediately reflected in reductions in employment, household income, and tax revenues. The UNDP assessment of the impact of the war indicates that since the beginning of the full-scale invasion, 64% of SMEs temporarily suspended or completely ceased their operations; however, the majority subsequently managed to resume activities, and as of the end of 2023, only about 9.6% of the enterprises that had ceased operations remained at risk of permanent closure. This indicates a significant adaptive potential of the sector, while also highlighting the scale of the shock that necessitates a systemic approach to resilience management (UNDP, 2024).
A more detailed analysis of the structure of losses allows for a more precise characterization of the challenges faced by Ukrainian SMEs. According to UNDP data, the vast majority of enterprises incurred financial losses, with a significant share reporting losses of up to USD 100,000, while the average loss is estimated at approximately USD 227,000 per enterprise, which represents a critical level for small businesses. At the same time, a substantial decline in capacity utilization is observed: on average, it dropped to 45.7% in 2023 compared to the pre-war level of 72.4%, with only partial recovery expected in the following years. These indicators demonstrate that even despite the resumption of operations, a considerable proportion of SMEs continue to operate under conditions of underutilized resources, which limits their investment activity and capacity for modernization without targeted resilience management (UNDP, 2024).
In this context, particular importance is attached to the analysis of the role of digital technologies in mitigating the negative impact of the war on enterprise performance. An OECD analytical report on digital business transformation in Ukraine emphasizes that digital technologies simultaneously act as a driver of productivity and a tool for enhancing resilience under wartime risks. It is noted that the government has significantly accelerated the digitalization of public services, developing an ecosystem of electronic services (in particular, through the "Diia" platform); however, SMEs have not yet fully realized the potential of digital solutions for strengthening their resilience. Among the key barriers are limited awareness of available digital tools, a shortage of digital skills, sectoral specificities, and financial constraints related to investments in IT infrastructure and cybersecurity (OECD, 2024).
The findings of OECD analytical reports and discussions with the Ukrainian business community indicate that SMEs most actively implement digital sales channels (online platforms, social media), cloud services for data storage and remote work organization, and electronic tools for interaction with public authorities

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(registration, reporting, participation in support programs). These components provide a basic level of digital resilience, enabling enterprises to maintain operational activities despite physical constraints, workforce displacement, and infrastructure disruptions. At the same time, more advanced elements of digital transformation (integrated management systems, data analytics, and artificial intelligence tools) remain less widespread among SMEs, creating a gap between potential and the actual level of use of digital technologies for resilience management (Kolodiziev et al., 2024).

In order to systematize the generalized empirical findings and provide a comprehensive understanding of the impact of wartime conditions on SME performance, it is advisable to structure key indicators according to the following logic: from the structural role of the SME sector and the initial shock impact to losses, constraints, and adaptation mechanisms, including digital transformation. Such an approach makes it possible not only to reflect the scale of destabilization, but also to systematize the indicators of the impact of wartime shock and digital transformation on the resilience of SMEs in Ukraine under conditions of uncertainty (Table 1).

Table 1 – System of indicators of the impact of wartime shock and digital transformation on the resilience of small and medium-sized enterprises in Ukraine

No.	Indicator	Value	Period	Analytical interpretation	Source
1. Structural and economic significance of the SME sector in the national economy					
1	Share of SMEs in the total number of enterprises in Ukraine	99.98%	pre-war / updated 2024	Confirms the system-forming role of SMEs and the critical importance of their resilience for the economy	UNDP, 2024
2	Share of employment provided by SMEs	74%	pre-war	Indicates the social significance of the sector and its link to labor market stability	UNDP, 2024
3	Share of value added generated by SMEs	64%	pre-war	Characterizes the contribution of SMEs to GDP and economic recovery	UNDP, 2024
2. Destabilizing effects of wartime shock on SME activity					
4	Share of SMEs that suspended operations after the outbreak of war	64%	2022–2023	Reflects the depth of the initial shock and disruption of business continuity	UNDP, 2024
5	Share of SMEs that resumed operations	~91%	end of 2023	Demonstrates a high adaptive capacity of the sector	UNDP, 2024
6	Share of enterprises at risk of closure	~9.6%	2023	Identifies the segment requiring targeted support instruments	UNDP, 2024
7	Average financial losses per enterprise	USD 227,000	2023	Reflects the scale of financial exhaustion of businesses	UNDP, 2024
8	Capacity utilization (pre-war level)	72.4%	before 2022	Baseline for assessing the impact of the war	UNDP, 2024
9	Capacity utilization	45.7%	2023	Indicates a decline in operational efficiency	UNDP, 2024
10	Expected capacity utilization	~56%	2024	Indicates gradual but incomplete recovery	UNDP, 2024
3. Economic losses and systemic constraints on SME functioning under wartime conditions					
11	SMEs maintaining operational activity	57%	2022	Reflects the core of resilient enterprises	EBRD
12	SMEs with reduced activity	37%	2022	Indicates latent decline in resilience	EBRD
13	SMEs with suspended activity	6%	2022	Reflects the most vulnerable segment of businesses	EBRD
14	Decline in revenues	43%	2022	Characterizes the contraction of market activity	EBRD
15	Reduction in employment	22%	2022	Indicates workforce losses	EBRD
16	Loss of demand	77%	2022	Identifies a key external shock	EBRD
17	Increase in costs	70%	2022	Highlights the need for efficient cost management	EBRD
18	Decline in productivity	68%	2022	Supports the need for process digitalization	EBRD

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19	Inability to plan	68%	2022	Indicates a high level of uncertainty	EBRD
20	Labor shortage	55%	2022	Reflects human capital constraints	EBRD
4. Adaptation mechanisms and digital transformation of SMEs under wartime uncertainty					
21	Level of SME digitalization	basic / medium	2023–2024	Indicates partial digital transformation and potential for further development	OECD; VoxUkraine
22	E-commerce volume	UAH 239 billion (+25%)	2024	Reflects rapid growth of online sales channels	VoxUkraine
23	SME relocation	significant share	2022–2024	Demonstrates adaptation through spatial transformation	UNDP
24	Remote work adoption	widespread	2020–2024	Confirms cross-crisis digital adaptation	CBS Research
25	Changes in business models	significant share	2022–2024	Reflects innovative transformation of SMEs	UNDP

Source: compiled based on UNDP, EBRD, OECD, VoxUkraine, CBS Research

The results of the analysis of the system of indicators (Table 1) confirm that the full-scale invasion of the russian federation into Ukraine in 2022 led to a profound destabilization of SME functioning, resulting in widespread suspension of activities, significant financial losses, reduced capacity utilization, and disruption of market equilibrium due to declining demand and rising costs. At the same time, a substantial adaptive potential of the sector has been identified, as evidenced by the high proportion of enterprises that resumed operations during 2023.

The analysis of the structure of losses and constraints indicates that the key drivers of declining resilience are not limited to direct economic losses, but also include systemic barriers, such as planning uncertainty, labor shortages, and restricted access to resources. Under these conditions, adaptation mechanisms become critically important, among which relocation, business model transformation, and the implementation of flexible organizational formats prevail.

It has been established that digital transformation acts as a key factor in enhancing SME resilience, enabling the maintenance of operational activities, the expansion of sales channels, and the improvement of managerial decision-making efficiency. The growing role of e-commerce, cloud services, and remote work indicates the emergence of a digitally oriented model of business adaptation to wartime uncertainty.

Thus, the generalization of statistical data provides grounds to assert that, despite significant losses, Ukrainian SMEs demonstrate a high level of adaptability and recovery capacity, while the use of digital tools often determines business survival under wartime conditions. However, the persistence of barriers to digitalization and the uneven adoption of more advanced digital solutions and AI-based systems necessitate the development of a comprehensive resilience management model capable of systematically aligning resources, technologies, and managerial practices.

The obtained results of the statistical analysis, together with the generalization of contemporary scientific approaches to organizational and digital resilience and the role of artificial intelligence, make it possible to move from the description of empirical manifestations to the conceptualization of the mechanisms of SME resilience formation. The identified patterns indicate that SME resilience is formed as a multi-level process that combines the influence of the external environment, internal enterprise resources, digital tools, and managerial practices. This determines the need to develop a generalized model that integrates these elements into a unified logical system and reflects the mechanisms of transforming resources into resilience outcomes under conditions of wartime uncertainty.

Taking the above into account, an integrated model of SME resilience management based on digital technologies and artificial intelligence tools under conditions of wartime uncertainty has been developed (Figure 1).

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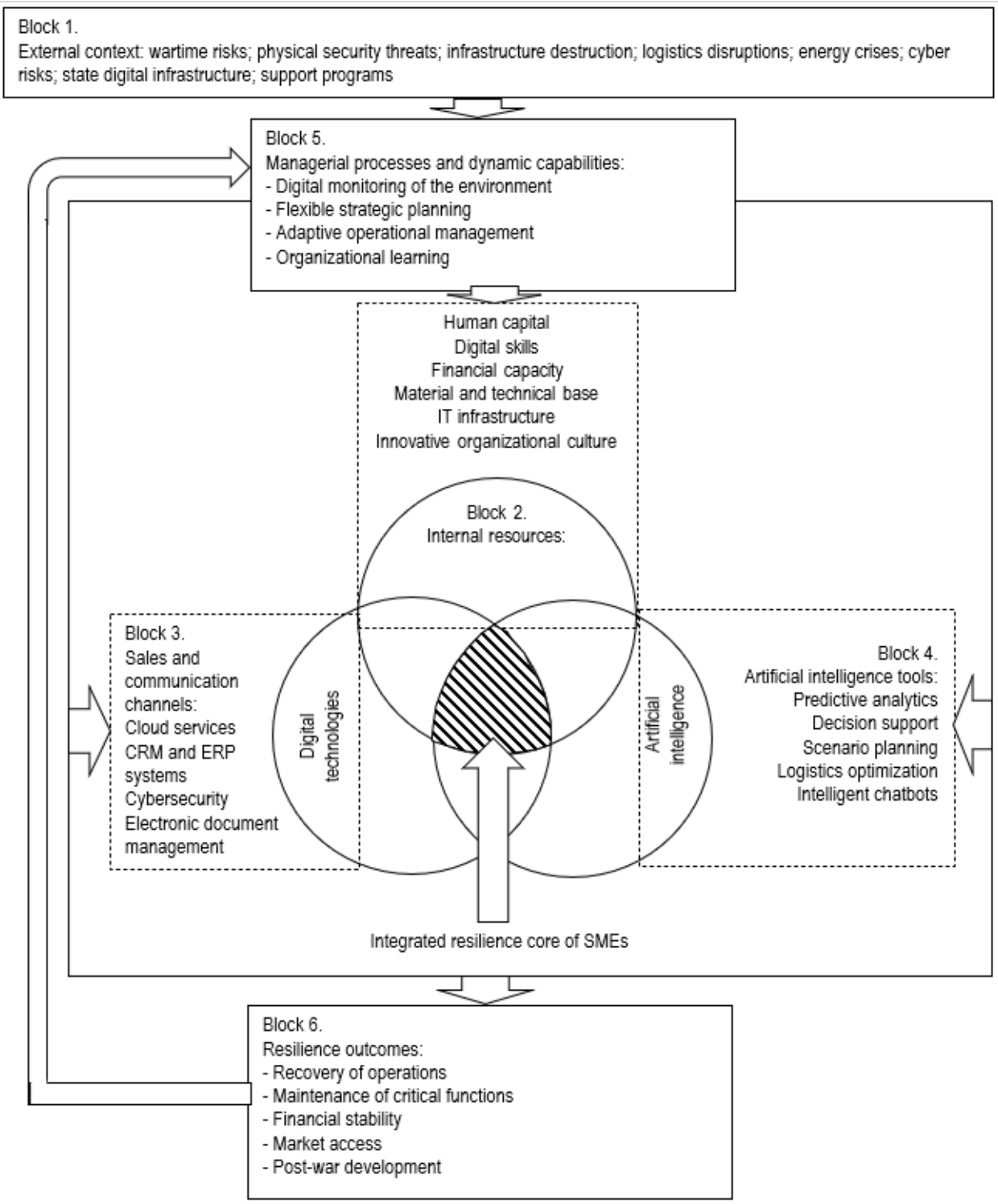

Figure 1. Integrated model of SME resilience management based on digital technologies and artificial intelligence under conditions of wartime uncertainty
Source: author's development

The first block of the proposed model represents the external context of SME functioning, which under conditions of the full-scale invasion of the russian federation into Ukraine is characterized by a high intensity, complexity, and interdependence of risks. These conditions affect not only physical security, infrastructure destruction, and disruptions of logistics chains, but also generate energy, cyber, and

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institutional challenges, significantly increasing the level of uncertainty in the business environment. At the same time, the institutional dimension, represented by the development of state digital infrastructure, business support programs, and regulatory conditions for the use of digital technologies and artificial intelligence, creates the framework conditions for SME adaptation. Thus, the external context not only generates threats, but also determines the available trajectories of resilience formation.

Within these constraints and opportunities, the second block of the model represents the internal potential of the enterprise, which serves as the foundation for the implementation of adaptive strategies. The main focus of management in this context is the system of interconnected resources—human capital, financial capacity, material and technical base, and IT infrastructure—the level of development of which determines the enterprise's ability to absorb and integrate digital solutions. An important component of this block is an organizational culture oriented toward innovation and learning, which ensures not only the implementation of technologies but also their meaningful use in managerial decision-making processes. In this context, resources acquire a dynamic rather than static character, transforming under the influence of external challenges.

The further logic of the model is associated with the transition from resource potential to its practical realization through digital technologies, which constitute the third block. These technologies ensure the operational level of resilience by creating an instrumental environment for maintaining the continuity of business processes. The use of digital sales and communication channels, cloud services, enterprise resource management systems, customer relationship management systems, as well as cybersecurity tools and electronic document management, enables enterprises to minimize the impact of spatial constraints, ensure organizational flexibility, and respond rapidly to changing operating conditions.

In contrast to the operational level, the fourth block of the model reflects the analytical dimension of resilience management, which is implemented through artificial intelligence tools. Their application enables the transition from a reactive to a proactive model of enterprise behavior, as it provides deeper data analysis, risk forecasting, and support for managerial decision-making. The integration of predictive analytics, scenario planning, optimization algorithms, and intelligent customer interaction services strengthens the dynamic capabilities of enterprises—their ability to detect changes in the external environment, formulate well-grounded managerial responses, and transform business models in accordance with new conditions.

The interaction of internal resources, digital technologies, and artificial intelligence tools forms the central element of the model—the integrated resilience core of SMEs. It is within this core that a synergistic combination of resource potential and digital capabilities of the enterprise takes place, ensuring a qualitatively new level of adaptability. The integrated resilience core reflects the transition from the fragmented use of individual tools to a systemic digital transformation, in which data, technologies, and managerial decisions function as a unified and coordinated system. In this context, resilience emerges not as a sum of individual measures, but as the result of the integrated interaction of its components.

The fifth block of the model represents managerial processes and dynamic capabilities through which the potential of the integrated core is transformed into tangible outcomes. In particular, the application of systematic environmental monitoring, flexible strategic planning, adaptive operational management, and organizational learning enables the alignment of resources, technologies, and managerial decisions, thereby determining the effectiveness of the entire system. At the same time, the quality of their implementation determines the enterprise's ability to transform digital tools from a set of isolated solutions into a comprehensive resilience management system.

The final, sixth block reflects the outcome manifestations of SME resilience, which are multidimensional in nature and include the ability to recover operations, maintain critical functions, ensure financial stability, and preserve market access. It should be emphasized that within the proposed model these outcomes do not represent an endpoint, but rather form a feedback loop that influences the further development of the enterprise's resource base, digital capabilities, and managerial practices. Thus, resilience is interpreted as a dynamic process that evolves through the accumulation of experience, organizational learning, and adaptation to environmental changes.

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Discussion

The results obtained in this study not only allow for the generalization of existing approaches to ensuring the resilience of small and medium-sized enterprises, but also provide grounds for rethinking the very logic of its formation under conditions of wartime uncertainty.

Within traditional scientific approaches, SME resilience is predominantly interpreted as the ability to adapt to or recover from external shocks. Such an interpretation is relevant in relatively stable or cyclically changing environments; however, it proves to be limited in situations where shocks become persistent, multidimensional, and interconnected, as is the case under wartime conditions.

In this context, resilience ceases to be a static characteristic and acquires the features of a process formed through the continuous reconfiguration of the business system. Accordingly, not only the availability of resources or individual digital solutions becomes crucial, but also the enterprise's ability to integrate, align, and adaptively utilize them under conditions of uncertainty.

The proposed integrated model makes it possible to interpret these processes through the concept of an integrated resilience core, which is formed not as a sum of individual elements, but as the result of their dynamic interaction. This approach shifts the focus from managing individual factors to managing the systemic interconnections between them.

In contrast to existing studies, where digital technologies are primarily considered as tools for improving operational efficiency, in this research they are treated as a system-forming element that determines the architecture of enterprise resilience. Similarly, artificial intelligence tools are viewed not only as instruments for data analysis, but also as mechanisms for reducing uncertainty and supporting managerial decision-making in real time.

Thus, the results obtained make it possible to move from interpreting resilience as a reactive characteristic to understanding it as a dynamic property of a complex socio-economic system operating under conditions of high turbulence.

At the same time, the proposed approach has certain limitations related to the conceptual nature of the model and the lack of its quantitative validation. This opens up prospects for further research aimed at the formalization of the parameters of the integrated resilience core and the empirical verification of the relationships between its components.

Conclusions

The study establishes that under conditions of wartime uncertainty, the resilience of small and medium-sized enterprises cannot be considered as a static characteristic or the result of isolated managerial actions, but rather as a dynamic process formed through the interaction of resources, digital technologies, and artificial intelligence tools.

It is demonstrated that traditional approaches to resilience, focused on adaptation to individual shocks, are insufficient under conditions of their continuous and intensive impact. This necessitates a transition to systemic resilience management based on the integration of key components of the business system.

The scientific novelty of the study lies in the development of an integrated model of SME resilience management based on the concept of an integrated resilience core, which is formed as a result of the dynamic interaction of resource potential, digital technologies, and artificial intelligence tools.

The practical significance of the results lies in the transformation of approaches to the development of enterprise resilience management strategies—from the fragmented implementation of digital solutions to the creation of a comprehensive system capable of functioning under conditions of high uncertainty.

Prospects for further research are associated with the quantitative interpretation of the parameters of the integrated resilience core, as well as the development of tools for assessing its impact on enterprise performance.

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