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Theoretical Approaches to the Use of Information Systems in Building the Resilience of Economic Systems under Conditions of Instability

Abstract:
The study examines theoretical approaches to the role of information systems in building the resilience of economic systems under conditions of instability. The relevance of the topic is driven by the fact that instability for Ukraine's economic systems is structural and long-term in nature, caused by military, financial, and institutional challenges, which necessitates a revision of traditional management approaches and resilience-support instruments. The subject of the study is the theoretical and conceptual approaches to the use of information systems in the management of economic systems under conditions of instability, with particular emphasis on their role in ensuring economic system resilience. The object of the study is the processes of managing economic systems in an unstable external environment. The study aims to generalize and systematize theoretical approaches to the use of information systems as a tool for supporting managerial decision-making in ensuring the resilience of economic systems. The methodological framework of the research is based on methods of analysis and synthesis, systemic and comparative approaches, as well as the method of generalization of scientific propositions. The theoretical foundation of the study is formed by the works of domestic and foreign scholars, as well as publications in international academic journals. The results substantiate the expediency of considering information systems not only as a technological means of digitalization, but as a managerial instrument for enhancing adaptability, controllability, and coherence of management processes. A systematization of theoretical approaches to the use of information systems in the context of ensuring the resilience of economic systems under conditions of environmental uncertainty is proposed.

Keywords: resilience of economic systems, instability, information systems, managerial decision-making, digitalization, adaptability.

Abbreviations:

BI is Business Intelligence,

ERP is Enterprise Resource Planning,

IS are Information Systems,

OECD is Organisation for Economic Co-operation and Development.

Introduction

The current stage of development of economic systems is characterized by a growing level of instability caused by military conflicts, financial crises, disruptions of logistics chains, and

structural imbalances. For Ukraine's economic systems, instability has acquired a systemic nature and cannot be regarded as a temporary or cyclical phenomenon. Under such conditions, the issue of ensuring the resilience of economic systems and the search for effective managerial instruments for its formation becomes particularly relevant.

Traditional management approaches oriented toward a stable external environment prove insufficient for responding to prolonged uncertainty. This necessitates a rethinking of the role of information systems in the management of economic systems. Information systems are increasingly viewed not merely as technical tools for automating accounting processes, but as a key element of managerial infrastructure that provides analytical support for decision-making and enhances the adaptability of economic systems.

The relevance of the topic is driven by the fact that instability for Ukraine's economic systems is structural and long-term in nature, caused by military, financial, and institutional challenges, which necessitates a revision of traditional management approaches and resilience-support instruments.

The subject of the study is the theoretical and conceptual approaches to the use of information systems in the management of economic systems under conditions of instability, with particular emphasis on their role in ensuring economic system resilience. The study focuses on scholarly interpretations of the functions, managerial significance, and decision-support potential of information systems as instruments for enhancing adaptability, coordination, and the effectiveness of managerial processes in economic systems operating in a context of prolonged structural instability.

The object of the study is the processes of managing economic systems in an unstable external environment.

The study aims to generalize and systematize theoretical approaches to the use of information systems as a tool for supporting managerial decision-making in ensuring the resilience of economic systems.

To achieve this purpose, the following objectives are set:

- analyze scholarly approaches to the interpretation of economic system resilience;
- examine the evolution of the role of information systems in management processes;
- synthesize domestic and international experience in the use of digital management platforms.

The results of the research may be used by scholars, managers, and public authorities.

Methods

The methodological framework of this study is grounded in a combination of general scientific and specialized research methods aimed at ensuring a comprehensive theoretical analysis of the role of information systems in building the resilience of economic systems under conditions of instability. The selected methods make it possible to consistently examine the conceptual foundations of economic resilience, to identify the managerial functions of information systems, and to systematize existing scholarly approaches within a unified analytical perspective.

The method of analysis is employed as a fundamental general scientific tool for decomposing the complex phenomenon of economic system resilience into its key conceptual and functional components. Within the context of this research, analysis is used to examine existing theoretical interpretations of economic resilience, the evolution of management paradigms under conditions of instability, and the differentiated roles attributed to information systems in contemporary economic literature. By analytically separating technological, managerial, institutional, and informational dimensions, the study identifies the specific contribution of information systems to adaptive management processes and decision-making mechanisms.

The method of synthesis complements analytical procedures by enabling the integration of fragmented theoretical insights into a coherent conceptual framework. In this study, synthesis is applied to combine diverse scholarly viewpoints on resilience, digitalization, and management information systems into a unified theoretical construct. Through synthesis, the research articulates a comprehensive understanding of information systems not merely as technical instruments, but as integral components of managerial infrastructure that support coordination, adaptability, and continuity of economic system functioning under prolonged instability.

The systemic approach serves as a key methodological principle for examining economic systems as complex, multi-level, and dynamically interacting structures. Within this research, the systemic approach is used to conceptualize information systems as embedded elements of the broader management system rather than as isolated technological solutions. This approach allows the study to assess how information systems interact with strategic planning, operational control, resource allocation, and institutional governance, thereby influencing the overall resilience of economic systems. By adopting a systemic perspective, the research emphasizes the interdependence between information flows, managerial decisions, and adaptive capacity.

The logical and structural method is applied to ensure internal consistency and coherence in the presentation of theoretical material. This method is used to organize scholarly concepts, definitions, and classifications related to economic resilience and information systems into a logically ordered structure. Through logical-structural analysis, the study constructs a clear sequence of arguments that traces the transformation of information systems from auxiliary accounting tools to system-forming managerial instruments, thereby strengthening the conceptual integrity of the research.

The method of abstraction is employed to identify the essential characteristics of economic resilience and information system functionality while deliberately setting aside secondary or context-specific details. In this study, abstraction allows for the formulation of generalized theoretical propositions that are not limited to specific sectors or institutional settings. This method supports the development of a conceptual model applicable to economic systems operating under various forms of instability, including military, financial, and institutional challenges.

The comparative analysis method is used as a specialized tool to contrast domestic and international approaches to the digitalization of management processes and the application of information systems in ensuring economic resilience. In the course of the study, comparative analysis enables the identification of similarities and differences between national models of information system integration, particularly with respect to their role in managerial decision-

making, strategic coordination, and crisis response. This method allows the research to assess how varying levels of digital maturity influence the effectiveness of information systems as resilience-support instruments.

The method of theoretical generalization plays a central role in systematizing existing scholarly approaches to the use of information systems in adaptive management. In this study, generalization is applied to synthesize a wide range of academic sources into a structured typology of approaches, ranging from purely technological interpretations to managerial and institutional perspectives. Through this method, the research identifies dominant trends and conceptual gaps in the literature, thereby justifying the need for a more integrated theoretical understanding of information systems as tools for building economic system resilience.

The conceptual modeling method is employed to construct an abstract representation of the relationship between information systems and economic resilience. Based on the analyzed theoretical material, this method allows the study to outline key functional links between information support, managerial decision-making, adaptability, and system stability. Conceptual modeling does not aim at empirical verification within this research but serves as a theoretical instrument for clarifying causal and functional relationships relevant to adaptive management under instability.

The institutional-analytical method is used to examine information systems within the context of formal and informal management institutions that shape economic system behavior. In this study, this method enables the analysis of how institutional arrangements, governance structures, and regulatory environments influence the integration of information systems into management processes. By applying an institutional lens, the research highlights the role of information systems in enhancing coordination between different levels of economic governance and in supporting evidence-based policy and managerial decisions.

The structural and functional method is applied to identify the key functions performed by information systems in the management of economic systems under conditions of uncertainty. This method allows the study to classify information system functions—such as data collection, processing, integration, forecasting, and decision support—and to assess their contribution to system resilience. Through structural-functional analysis, the research demonstrates how these functions collectively enhance adaptability, reduce uncertainty, and improve the coherence of managerial actions.

Finally, the interpretative method is employed to critically assess scholarly narratives and conceptual frameworks related to economic resilience and digital management. In this study, interpretative analysis is used to evaluate the underlying assumptions, methodological orientations, and conceptual limitations of existing research. This method supports a reflective understanding of how information systems are positioned within contemporary management theory and allows for the articulation of a revised theoretical perspective that emphasizes their managerial and system-forming role.

Literature Review

In the scholarly literature, the issue of economic system resilience is examined from an interdisciplinary perspective that combines economic, managerial, institutional, and informational aspects. Domestic researchers emphasize that contemporary instability is a

persistent characteristic of the economic environment rather than a temporary deviation, which necessitates the adaptation of management tools (*Ivashchenko et al., 2025*; *Ostroverkhov & Kachmarskyi, 2025*; *Storchak, 2025*).

A significant portion of research focuses on the role of digital technologies and information systems in enhancing management efficiency. In studies (*Dzhulii & Hrebinska, 2024*; *Ivaniuk & Mykyta, 2024*; *Sedikov, 2025*), information systems are viewed as tools for automating management processes and providing analytical support for decision-making. At the same time, the emphasis is mostly on the technological aspects of digitalization, without a deep connection to the mechanisms of building economic system resilience.

International research confirms that the integration of information systems into strategic management functions contributes to increased adaptability and the capacity of economic systems to respond to crisis impacts (*Abidi et al., 2025*; *Ji & Huang, 2024*; *OECD, 2024*). In particular, OECD studies highlight the importance of integrated analytical platforms for supporting decision-making in the public sector.

At the same time, most scholarly publications lack a comprehensive theoretical approach to considering information systems specifically as managerial instruments for building economic system resilience, which creates the need for further theoretical generalizations.

A review of the literature allows for the identification of two dominant approaches to studying the role of information systems in modern economic systems. The first approach focuses on the technological dimension of digitalization and considers information systems as tools for automating managerial functions, accelerating information processing, and reducing transaction costs (*Dzhulii & Hrebinska, 2024*; *Ivaniuk & Mykyta, 2024*; *Sedikov, 2025*). Within this approach, the emphasis is on the implementation of ERP systems, business analytics, and digital platforms, without sufficient theoretical reflection on their role in fostering economic system resilience.

The second approach emphasizes the managerial and institutional dimensions of information system use. In these studies, information systems are regarded as elements of managerial infrastructure that influence the coordination of managerial decisions, the adaptability of organizational structures, and the alignment of strategic and operational objectives (*Pashentsev & Kolotaev, 2025*; *Storchak, 2025*; *Vitkovskyi, 2022*). Even within this approach, however, the issue of systematically integrating information systems with mechanisms for ensuring economic system resilience remains insufficiently developed.

Thus, the existing scholarly approaches form a fragmented understanding of the role of information systems in contemporary management, highlighting the need for further theoretical systematization and rethinking of their functions specifically in the context of building the resilience of economic systems under conditions of instability.

Results

The issue of economic system resilience is the subject of interdisciplinary research and is examined in the context of the ability of economic systems to maintain functional integrity, ensure recovery, and adapt under destabilizing influences. In the scholarly literature, resilience is understood as a complex characteristic that combines economic, managerial, institutional, and informational components (*Kozlovskyi et al., 2012*).

For Ukraine's economic systems, instability has a structural character. It is a systemic feature of the economy, driven by military and financial risks, rather than cyclical fluctuations. This necessitates a reconsideration of traditional approaches to ensuring resilience. In such conditions, IS perform not only the function of supporting management in crisis situations but also ensure the operation of management mechanisms under conditions of constant uncertainty and limited resources.

An analysis of contemporary approaches shows that in the context of increasing instability in Ukraine—due to military actions, disruptions of logistics chains, financial risks, and structural imbalances—traditional notions of resilience as a static equilibrium lose relevance. Instead, a dynamic approach comes to the forefront, within which resilience is considered the ability of an economic system to adapt to changes in the external environment and ensure continuity of functioning (*Kozlovskyi et al., 2012*; *Vitkovskyi, 2022*).

Several studies by Ukrainian scholars emphasize that instability is not a temporary deviation but a persistent characteristic of the contemporary economic environment, which requires a revision of management tools (*Ivashchenko et al., 2025*; *Ostroverkhov & Kachmarskyi, 2025*; *Storchak, 2025*). In such conditions, managerial instruments play a key role, as they form the mechanisms for responding to risks, coordinating managerial decisions, and allocating resources.

A special place among managerial instruments is occupied by information support, which determines the quality of managerial decisions and the speed of an economic system's response to changes in the external environment. Digital platforms have traditionally been viewed as auxiliary management tools, primarily focused on accounting and recording economic operations. Classical approaches to their use were limited to automating individual management functions without deep integration into the decision-making process. However, the development of digital technologies has significantly transformed the role of information systems in the management of economic systems (*Dzhulii & Hrebinska, 2024*; *Sedikov, 2025*).

Contemporary theoretical approaches emphasize the transformation of IS into comprehensive managerial and analytical platforms that enable the processing of large volumes of data, modeling of management scenarios, and support for strategic decision-making. Such platforms include ERP systems, business intelligence systems, and interactive analytical dashboards that provide data integration, timely access to key information, scenario forecasting, and decision support at both strategic and operational levels. In this context, information systems are considered not merely as technical tools but as elements of the managerial infrastructure of economic systems (*Pashentsev & Kolotaev, 2025*; *Sedikov, 2025*).

The main functions of modern information systems can be summarized as follows:

- Data collection—automation of information gathering from various functional subsystems of the economic system.
- Data processing and integration—providing a holistic view of the state of the economic system.
- Scenario forecasting—assessing risks and developing possible models of system behavior.
- Decision support—providing an information-analytical basis for strategic and operational management.

Research highlights that in conditions of uncertainty, the importance of information systems as tools for reducing uncertainty and ensuring transparency in managerial processes increases. The use of integrated information systems enhances the alignment of decisions across different management levels (*Pashentsev & Kolotaev, 2025*; *Storchak, 2025*; *Vitkovskyi, 2022*). The resilience of economic systems largely depends on the quality of information support for management processes. The timeliness, completeness, and analytical processing of information directly affect the soundness of managerial decisions, particularly during crises and military challenges. Digital platforms enable the collection, processing, and integration of data from various functional subsystems of the economic system, providing a comprehensive understanding of its current state. They form the basis for operational monitoring, forecasting, and adjustment of managerial decisions under complex operating conditions (*Chernyshenko, 2024*; *Ivaniuk & Mykyta, 2024*; *Sedikov, 2025*). This contributes to improving the quality of managerial decisions, reducing information asymmetry, and enhancing the controllability of economic processes. Ukrainian researchers emphasize that digital tools allow for prompt responses to changes in the external environment and mitigate the negative impact of destabilizing factors (*Ivashchenko et al., 2025*; *Storchak, 2025*).

One of the key functions of management systems is supporting their adaptability. Adaptability manifests as the ability of an economic system to adjust its operational parameters in response to external and internal challenges. Information systems provide the information-analytical foundation for forecasting potential development scenarios, assessing risks, and selecting optimal management decisions. In this context, they are considered instruments for ensuring the continuity of economic system functioning even under significant resource constraints (*Pashentsev & Kolotaev, 2025*; *Sedikov, 2025*).

Information systems serve as a link between the strategic development goals and the operational activities of economic systems. They facilitate the implementation of strategic decisions through a system of indicators, monitoring their achievement, and adjusting managerial actions in case of deviations from planned parameters (*Brechko & Hutsuliak, 2022*; *Vitkovskyi, 2022*).

According to the OECD Digital Government Index 2023, countries with high levels of digital maturity (South Korea, Estonia, Denmark) successfully integrate information systems into strategic management functions, enhancing adaptability and decision coherence during crises. This experience demonstrates that digitalization supports strategic management and process transparency and is relevant for Ukraine (*OECD, 2024*).

It is important to emphasize that international experience in the digitalization of management processes demonstrates not only the technological advantages of implementing information systems but also a shift in the managerial logic of economic system functioning. In countries with high digital maturity, information systems serve as instruments of strategic management, ensuring data integration, coordination among governance bodies, and the creation of an evidence-based foundation for managerial decision-making.

Thus, domestic theoretical approaches to the use of information systems in managing economic systems are evolving toward their integration into the decision-making process. Digital platforms act as key factors in building the resilience of economic systems by improving the quality of managerial decisions and ensuring coordination and adaptability of processes.

International experience demonstrates that such integration contributes to the creation of effective institutional prerequisites for management under conditions of instability.

For Ukraine's economic systems, this experience is particularly relevant given the prolonged nature of instability, limited resources, and the need for rapid responses to external challenges. Integrating information systems into management mechanisms allows not only for improving the efficiency of individual managerial functions but also for establishing the foundations of a comprehensive adaptive management model aimed at ensuring the resilience of economic systems in the medium- and long-term perspectives.

A demonstrative example of the relationship between digitalization and economic resilience is provided by Sorokina (*2025*), who analyzes the impact of digital technologies on the resilience of the public sector. The author demonstrates that digitalization acts as a factor in improving the quality of managerial decisions, process transparency, and the adaptability of public institutions, which positively correlates with the ability of economic systems to adapt to external challenges. The author also notes that integrated information systems form the basis for establishing crisis management mechanisms at the national level.

At the level of academic research, the link between digital transformation and economic system resilience is also confirmed in the business sector. For instance, a study published by Ji & Huang (*2024*) analyzes how digital technologies, including business intelligence systems and big data, enhance the adaptability of enterprises in response to external economic shocks. The authors indicate that the use of such information systems helps reduce information asymmetry, enables rapid forecasting of market changes, and improves the accuracy of managerial decisions.

A comparative analysis of publications in the field of management information confirms that contemporary approaches to the use of IS encompass not only technological but also organizational and strategic dimensions. Analysis of publications in the *Journal of Global Information Management* (*Abidi et al., 2025*) highlights the importance of integrated information systems for synchronizing strategic and operational decisions in crisis situations, enabling organizations to adapt to rapidly changing external environments.

Overall, international experience demonstrates that integrating information systems into national management mechanisms allows for the development of digital resilience strategies, which include:

- Integrated analytical support for decision-making;
- Coordination of actions across management levels;
- Transparency and adaptability of public services;
- Risk forecasting and scenario planning.

Taking international experience into account makes it possible to identify ways to integrate best practices into Ukraine's management processes to create effective information-management mechanisms for ensuring the resilience of economic systems. Combining domestic and international approaches enables the formation of a comprehensive management model that considers both technological and organizational-analytical aspects of economic system functioning under conditions of prolonged uncertainty.

A synthesis of approaches to studying economic systems and the use of information systems in management processes indicates the fragmented nature of existing theoretical understandings.

In most studies, information systems are considered either as elements of digitalization of specific management functions or as a technological component of transformational processes, without a clear systemic integration with mechanisms for building economic system resilience (*Dzhulii & Hrebinska, 2024*; *Kozlovskyi et al., 2012*; *Storchak, 2025*).

At the same time, existing theoretical approaches do not sufficiently address the role of information systems specifically as managerial instruments for building the resilience of economic systems. The majority of studies focus on the technological aspects of digitalization or analyze information systems without adequately considering their managerial and organizational dimensions. This results in the absence of a comprehensive theoretical framework for integrating information systems into mechanisms for ensuring the resilience of economic systems during crisis impacts.

The body of approaches that has been developed provides a basis for systematizing theoretical understandings of the use of information systems in the management of economic systems along the following directions:

- Information systems as tools for accounting and information support of management;
- Information systems as tools for analytical support of managerial decision-making;
- Information systems as integrative platforms for coordinating management processes;
- Information systems as elements of adaptive management under conditions of instability.

Unlike existing approaches, the proposed systematization emphasizes the managerial role of information systems in building the resilience of economic systems, rather than focusing solely on their technological or functional characteristics. This allows for an expansion of theoretical understanding by incorporating the informational-analytical and coordination components of management.

Studies on digital transformation and crisis management emphasize that it is the integration of analytical and managerial functions within information systems that creates the conditions for enhancing the resilience of economic systems in unstable environments (*Pashentsev & Kolotaev, 2025*; *Sedikov, 2025*; *Vitkovskyi, 2022*). At the same time, the digitalization of management processes alone does not guarantee increased resilience. The key factor is not the level of technological sophistication of information systems, but the degree to which they are integrated into managerial decision-making processes. Without such integration, information systems primarily serve as data repositories and have little impact on the adaptability and controllability of economic systems.

Within this theoretical generalization, the role of information systems in building economic system resilience is justified not only as technical or auxiliary but as a system-forming component of management. This approach allows information systems to be seen as tools for supporting managerial decisions, reducing uncertainty, enhancing the soundness of management actions, and coordinating activities across different levels of economic system governance.

The proposed approach expands the possibilities for theoretical analysis of mechanisms for ensuring economic system resilience, as it allows the integration of economic and information-technological aspects of management. This is particularly important for Ukraine's economic systems in the context of military challenges and post-war recovery, where the effectiveness of managerial decisions largely depends on the quality of information support and the ability of

management systems to rapidly adapt to changes in the external environment (*Chernyshenko, 2024*; *Ivashchenko et al., 2025*; *Ostroverkhov & Kachmarskyi, 2025*).

The generalizations obtained provide a scientific basis for further research in developing information-oriented management models for economic resilience, assessing the effectiveness of information system use, and forecasting their impact on the long-term stability of economic systems.

Discussion

Contemporary economic systems in Ukraine operate under conditions of constant instability, encompassing military, financial, and logistical risks. The results of the theoretical analysis confirm that IS serve as key instruments for enhancing the adaptability and coordination of managerial processes. At the same time, the integration of IS into management mechanisms remains fragmented, and their role in building the resilience of economic systems is insufficiently studied.

Thus, an urgent scientific problem arises: how to optimally combine the technological and managerial potential of information systems to enhance the long-term resilience of economic systems. A critical issue is determining the level of IS integration into strategic and operational processes that ensures maximum adaptability without overloading the managerial infrastructure.

Moreover, the analysis of domestic and international experience highlights differences in approaches to management digitalization (*Yakubiv et al., 2025*). In countries with high digital maturity, IS form part of strategic management and serve as tools for risk forecasting. In Ukraine, IS implementation is mostly limited to the automation of individual processes, reducing the effectiveness of decision-making in crisis situations. This raises an important question for further research: which models of IS integration will be most effective under the conditions of the Ukrainian economy and limited resources.

Additionally, it is necessary to study the impact of different types of IS (ERP systems, business intelligence, integrated platforms) on the resilience of economic systems at both sectoral and governmental levels. This will enable the development of practical recommendations for building an information-management infrastructure that supports forecasting, decision alignment, and enhanced adaptability.

Accordingly, the main issues for further discussion and research include:

- Optimal levels of IS integration into strategic and operational processes;
- Comparison of the effectiveness of different types of IS in enhancing resilience;
- Adaptation of international experience to Ukrainian realities;
- Assessment of IS impact on the speed of response and coordination of managerial decisions in crisis situations.

Conclusion

Information systems are critically important tools for supporting economic resilience under conditions of prolonged uncertainty. They enable the integration of strategic and operational management functions, enhance system adaptability, coordinate actions across management levels, and ensure continuity of operation even under limited resources and significant instability.

The systematic use of information systems improves the quality of managerial decisions through process transparency, analytical justification, and scenario forecasting for the development of economic systems. This minimizes risks and creates the foundation for strategic planning and effective response to crisis situations.

Experience from countries with high digital maturity (South Korea, Estonia, Denmark) demonstrates that integrating information systems into public and corporate management mechanisms enhances adaptability and decision coherence. Adapting these practices to the Ukrainian context is crucial for developing a national model of information-oriented management for economic system resilience.

A systematization of the roles of information systems in building economic system resilience is proposed, combining technological, analytical, and managerial dimensions. This study provides a conceptual foundation for future applied and empirical research. It emphasizes that it is not the level of technological development but the degree of IS integration into the decision-making process that determines the effectiveness of adaptive management. The findings provide a basis for the further development of information-oriented management models and for forecasting the impact of information systems on the long-term stability of economic systems.

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