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THEORETICAL AND METHODOLOGICAL FOUNDATIONS OF CRISIS MANAGEMENT FOR ENTERPRISES IN THE GAS SECTOR UNDER A WARTIME ECONOMY

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Abstract. The article examines the theoretical and methodological foundations of anti-crisis management of gas sector enterprises under the conditions of a wartime economy and identifies the main directions for strengthening the resilience of Ukraine's energy infrastructure. The study applies systemic, risk-oriented, structural-functional, and scenario analysis methods, which made it possible to comprehensively assess current crisis challenges affecting gas sector enterprises. The impact of military actions, infrastructure destruction, financial instability, personnel shortages, and cybersecurity threats on the efficiency of energy enterprises was analyzed. The necessity of implementing digital technologies, strategic resilience systems, and innovative anti-crisis management models was substantiated. It was determined that effective anti-crisis management should be based on the integration of strategic planning, state support, digitalization, and international cooperation. Prospects for further research are related to the development of artificial intelligence technologies and mechanisms for the post-war recovery of the energy sector.

Key words: anti-crisis management, gas sector, wartime economy, energy security, crisis management, digitalization, resilience, gas sector enterprises.

Introduction. The current stage of Ukraine's economic development is characterised by a high level of instability caused by large-scale military operations, the transformation of energy markets, increased geopolitical risks, and the need to ensure the country's energy security. In such conditions, the functioning of enterprises in the gas sector takes on particular significance, as they are strategically important elements of the state's critical infrastructure and ensure the stability of the energy system, industrial production, and the housing and utilities sector. Ukraine's gas sector plays a key role in shaping the country's energy independence and maintaining economic stability under a war economy.

The military aggression against Ukraine has significantly impacted the operations of gas sector enterprises. The destruction of energy infrastructure facilities, disruptions in logistics chains, a shortage of financial resources, rising energy costs, staff losses and the constant threat of cyberattacks constitute a complex set of systemic crisis challenges for the industry. Under such conditions, traditional management mechanisms lose their effectiveness, necessitating the development of new approaches to crisis management capable of ensuring the adaptability, resilience and continuity of operations for enterprises in the gas sector.

The issue of crisis management has long been a focus of attention for both domestic and international scholars. Significant contributions to the development of crisis management theory have been made by researchers such as I. Ansoff (1975), M. Porter (1985), P. Drucker (2008), V. Vasylenko (2005), A. Didyk et al. (2019). Their works address issues of strategic crisis management, mechanisms for ensuring the economic security of enterprises, methods of risk forecasting, and approaches to managing organisational resilience. However, most existing scientific approaches were developed in the context of peaceful economic development and do not take into account the specific nature of enterprise operations under a war economy.

Research into crisis management is of particular relevance in the gas sector, as this industry is extremely sensitive to external and internal threats. Military operations create not only physical risks

of infrastructure destruction but also give rise to new types of crisis phenomena: energy shortages, information and cyber threats, disruptions to state regulatory systems, increased financial instability and complications in the international energy sector. In this regard, there is a need to develop a comprehensive methodology for crisis management that takes into account the multi-level nature of modern crisis processes.

In contemporary academic literature, increasing attention is being paid to issues relating to ensuring business resilience, the digitalisation of management processes, and the use of innovative technologies in crisis management systems. In particular, research is being conducted into the potential applications of artificial intelligence, digital risk monitoring platforms, automated energy network management systems, and mechanisms for scenario-based forecasting of crisis situations (Shevchenko & Melnyk, 2023). However, the issue of integrating these tools into the management system of gas sector enterprises under a wartime economy remains insufficiently developed.

Furthermore, the relevance of the research is heightened by Ukraine's European integration processes and the need to harmonise the national energy management system with European Union standards. The implementation of modern crisis management mechanisms is a key prerequisite for enhancing the competitiveness of gas sector enterprises, ensuring the country's energy security, and establishing a sustainable model for post-war economic recovery.

The need to study the theoretical and methodological foundations of crisis management in the gas sector is driven by a combination of economic, energy, security and managerial factors that arise in a wartime economy. The insufficient adaptation of existing crisis management models to contemporary challenges necessitates the development of new scientific approaches to ensure the effective functioning of enterprises in Ukraine's gas sector.

Main text. The current economic climate in Ukraine is characterised by a high degree of turbulence, driven by the impact of military operations, the destruction of critical infrastructure, instability in energy markets, and the need to ensure the uninterrupted operation of strategically important sectors. In such conditions, enterprises in the gas sector become key elements of the national energy security system, upon whose operational efficiency the stability of the state economy, the social sphere and the defence sector depends. It is for this reason that the issue of establishing an effective crisis management system for gas sector enterprises in a wartime economy is of particular relevance.

The aim of this article is to examine the theoretical and methodological foundations of crisis management for gas sector enterprises under a wartime economy, as well as to justify contemporary approaches to establishing an effective crisis management system aimed at ensuring the resilience, adaptability and continuity of operations within the energy sector.

To achieve the stated objective, the following research tasks are set out in this article:

- to analyse theoretical approaches to defining the essence of crisis management;
- to examine the specific features of how enterprises in the gas sector operate under a war economy;
- to identify the main crisis risks and threats to the operations of enterprises in the gas sector;
- to characterise contemporary methodological approaches to crisis management;
- to investigate mechanisms for ensuring the economic and energy stability of enterprises;
- to analyse the role of digitalisation and innovative technologies in the crisis management system;
- to formulate practical recommendations for improving the crisis management system of enterprises in Ukraine's gas sector.

The subject of the study is the processes of crisis management in gas sector enterprises under a war economy.

The subject of this study is the theoretical, methodological and applied aspects of developing a crisis management system for enterprises in the gas sector amidst the crisis-driven transformations of the economic environment.

The methodological basis of the study consists of a range of general scientific and specialised methods of scientific inquiry. The study utilised methods of systems analysis, generalisation, comparison, scientific abstraction, structural-functional analysis and scenario forecasting. The application of a systems approach enabled the examination of crisis management as a multi-level system of interrelated management mechanisms aimed at ensuring the sustainability of enterprises in the gas sector. The method of structural-functional analysis was used to study the organisational mechanisms of crisis response, and the method of scenario forecasting was used to assess the potential risks to the long-term functioning of enterprises.

The theoretical framework of this study is based on the works of Ukrainian and international scholars in the fields of crisis management, strategic management, energy security and the economic resilience of enterprises. Considerable attention is paid to the study of modern concepts of risk management, organisational resilience and the digital transformation of management systems. Furthermore, the study takes into account current trends in the development of Ukraine's energy sector and international experience in the operation of critical energy infrastructure during crisis situations.

The practical significance of the study lies in the possibility of using the results obtained to improve the crisis management system of enterprises in the gas sector, develop effective crisis response mechanisms, enhance economic security, and ensure the stable operation of enterprises during a period of a wartime economy. The proposed approaches can be utilised by government bodies, managers of enterprises in the fuel and energy sector, and specialists in the field of strategic management.

The scientific novelty of this study lies in the comprehensive justification of the theoretical and methodological foundations of crisis management for enterprises in the gas sector under a wartime economy, as well as in the identification of modern mechanisms for ensuring the resilience and adaptability of enterprises based on the integration of strategic management, digital technologies and risk-oriented approaches to crisis management.

In the current context of global economic development, the issue of ensuring the effective functioning of enterprises in conditions of instability is of particular importance. The increasing frequency of crises, the intensification of global risks, energy transitions and military conflicts are creating new challenges for the management systems of enterprises in strategic sectors of the economy. This applies particularly to enterprises in the gas sector, whose activities are directly linked to ensuring the country's energy security, the stable functioning of the industrial complex and the maintenance of the country's socio-economic balance.

The theoretical foundations of crisis management have evolved over a long period of time, influenced by developments in economic science, management theory and the practical operation of enterprises in crisis conditions. In the academic literature, crisis management is regarded as a system of managerial measures aimed at preventing, identifying, containing and overcoming crisis phenomena whilst minimising the negative consequences for the enterprise (Lihonenko, 2016, p. 161). At the same time, contemporary researchers emphasise that crisis management is not limited to merely reacting to a crisis, but involves the formation of a long-term system of strategic resilience for the enterprise.

One of the key aspects of crisis management is its comprehensive nature. The crisis management system encompasses the financial, organisational, human resources, production, information and security components of an enterprise's operations. For enterprises in the gas sector, this is of particular importance, as the functioning of the industry depends on the continuity of technological processes, the stability of logistics systems and the effectiveness of critical infrastructure management.

In academic theory, there are several approaches to defining the nature of crisis management. The classical approach is based on the concept of reactive management, according to which the primary function of management is to overcome an existing crisis and restore stability to the enterprise's operations. However, current economic conditions necessitate a shift towards a preventive model

of crisis management, which involves the early diagnosis of crisis phenomena, risk forecasting, and the development of mechanisms for the enterprise to adapt to changes in the external environment (Manzhos, 2013).

Enterprises in the gas sector operate in a high-risk environment, driven by economic, political, technological and military factors. In this context, a systematic approach to crisis management is of particular importance. According to the systems concept, an enterprise is viewed as a complex, multi-level system in which all elements are interrelated. A disruption in the functioning of a single element of the system can lead to a large-scale crisis affecting the enterprise's production, financial and management spheres (Drucker, 2008).

An important element of the theoretical foundations of crisis management is the classification of crisis phenomena. Financial, operational, logistical, managerial, human resources, information and energy crises are characteristic of enterprises in the gas sector. In a wartime economy, these risks are compounded by threats of physical destruction of infrastructure, cyberattacks, shortages of material resources, disruptions to international energy links and instability in state regulation (Morozova et al., 2024). This is precisely why crisis management in the gas sector must be based on the principles of adaptability, flexibility and continuous risk monitoring.

Among the key principles of crisis management in contemporary academic literature, the following are highlighted: the principle of systematicity, strategic orientation, prompt response, information availability, economic feasibility and innovation. The principle of systematicity involves a comprehensive approach to crisis management and takes into account the interrelationships between all structural elements of the enterprise. The principle of strategic orientation is aimed at ensuring the long-term sustainability of the enterprise and developing mechanisms for its adaptation to external changes (Gudz, 2022).

The principle of information security is of particular importance to companies in the gas sector, as the effectiveness of crisis management depends to a large extent on the quality of a company's information and analytical system. In today's environment, digital technologies, automated monitoring systems, risk forecasting and artificial intelligence tools play a vital role, enabling the rapid identification of crisis trends and the formulation of management decisions (Farat et al., 2025).

Crisis management in the gas sector is also closely linked to the enterprise's economic security system. Ensuring economic security involves creating conditions for the stable operation of the enterprise, protecting its resource potential, maintaining financial stability, and minimising external and internal threats. In a wartime economy, the economic security system of gas sector enterprises transforms into a comprehensive system of strategic resilience, combining economic, technological, information and security management mechanisms.

The theoretical foundations of crisis management for enterprises in the gas sector are based on a comprehensive combination of strategic, systemic, risk-oriented, and adaptive management approaches. The current conditions of a wartime economy require a rethinking of classical models of crisis management and the development of new mechanisms to ensure the resilience of enterprises capable of functioning effectively amid multi-level crisis threats.

The wartime economy creates fundamentally new operating conditions for enterprises in the gas sector, characterized by a high level of uncertainty, instability in resource supply, the destruction of production infrastructure, a shortage of financial resources, and a constant threat to the security of critical energy system facilities. Under such conditions, traditional enterprise management methods lose their effectiveness, necessitating the development of new methodological approaches to crisis management capable of ensuring the resilience, adaptability, and continuity of operations for enterprises in the gas sector.

The concept of a war economy in contemporary academic literature is viewed as a specific type of economic system that operates under conditions of military conflict, resource mobilization,

and heightened levels of state regulation. The main feature of a war economy is the concentration of economic resources on ensuring the state's defense capability and maintaining critical infrastructure (Danylyshyn, 2025). For enterprises in the gas sector, this means the necessity of operating under conditions of constant crisis risks, which requires a transition from a traditional management model to an adaptive crisis management system.

One of the key methodological approaches to crisis management is the systems approach, which involves viewing the enterprise as a holistic, multi-level system whose elements are interconnected. Within the framework of the systems approach, a gas sector enterprise is viewed not merely as a production entity, but as a component of the state's energy security, whose activities influence the stability of the country's economic and social systems. The application of the systems approach allows for identifying the key elements of an enterprise's crisis resilience, assessing the interrelationship between risks, and developing a comprehensive crisis management system.

The risk-oriented approach plays a significant role in crisis management methodology. Its essence lies in the constant monitoring of internal and external threats, assessing the likelihood of crisis situations, and developing mechanisms to prevent them. For enterprises in the gas sector, the risk-oriented approach is particularly important, as the industry's operations are associated with a high level of technological, financial, environmental, and security risks. In a wartime economy, these risks are compounded by threats of infrastructure destruction, cyberattacks, disruptions in energy supply, and instability in government regulation.

Modern crisis management methodology also involves the use of a scenario-based approach, which is based on forecasting possible outcomes of crisis situations and developing alternative models for management decisions. Scenario-based forecasting allows gas sector enterprises to assess the potential consequences of crisis phenomena, model response options, and ensure preparedness for emergencies. War economy conditions are characterized by a high level of unpredictability, so the use of a scenario-based approach becomes an essential component of the strategic crisis management system.

The concept of enterprise resilience is of particular importance in today's conditions. In the scientific literature, resilience is defined as an organization's ability to adapt to crisis conditions, quickly restore operations after negative impacts, and ensure operational stability amid constant change (Farat et al., 2025). For enterprises in the gas sector, building resilience involves creating flexible organizational structures, diversifying resource provision, developing crisis monitoring systems, and implementing modern digital management technologies.

Strategic planning is a key methodological element of crisis management. In today's environment, strategic crisis planning is aimed not only at ensuring the company's financial stability but also at establishing mechanisms for long-term adaptation to crisis-induced changes. For enterprises in the gas sector, strategic planning must include an assessment of the risks of infrastructure destruction, scenarios for ensuring energy security, mechanisms for backup resource supply, and measures for the digital transformation of management systems (Morozova et al., 2024).

One of the most important areas of development in modern crisis management methodology is the digitalization of management processes. The use of digital monitoring platforms, automated risk analysis systems, artificial intelligence technologies, and big data enables more effective management decision-making and ensures a rapid response to crisis situations (Shevchenko & Melnyk, 2023). For companies in the gas sector, digital technologies are of particular importance, as they enable remote monitoring of critical infrastructure operations and enhance energy security.

In addition, an institutional approach plays a key role in crisis management methodology, which involves accounting for the impact of government policy, regulatory frameworks, and international cooperation on the operations of gas sector enterprises. Under a wartime economy, state regulation of the energy sector intensifies, and gas sector enterprises become vital components of the national security system (Danylyshyn, 2025). This is precisely why the effectiveness of crisis management

depends to a large extent on the level of interaction between enterprises and government agencies, international energy organizations, and financial institutions.

Modern methodological approaches to crisis management for gas sector enterprises in a wartime economy are based on a combination of systemic, risk-oriented, scenario-based, strategic, and institutional management approaches. Their comprehensive application allows for the development of effective crisis response mechanisms, ensures the stability of enterprise operations, and enhances the country's energy security in the face of multi-level crisis threats.

The current phase of operations for enterprises in Ukraine's gas sector is marked by an unprecedented level of crisis-related challenges caused by military hostilities, global energy instability, the transformation of international energy markets, and the intensification of domestic economic risks. Gas sector enterprises are key elements of the state's critical infrastructure; therefore, any disruptions to their operations directly impact the country's energy security, the stability of industrial production, and the state's socioeconomic development.

One of the most significant crisis challenges for gas sector enterprises has been the destruction of energy infrastructure as a result of military operations. Gas transmission system facilities, underground gas storage facilities, compressor stations, and energy hubs have become targets of systematic attacks, leading to disruptions in the stability of energy supply and an increased risk of emergencies (Morozova et al., 2024). The destruction of critical infrastructure places an additional burden on enterprise management systems and requires the rapid implementation of crisis response mechanisms.

Disruptions to logistics and production processes remain a significant challenge. A wartime economy is characterized by restricted transport routes, shortages of material and technical resources, difficulties in supplying equipment, and rising costs associated with maintaining production processes. For gas sector enterprises, this means an increased risk of disruptions in natural gas transportation, delays in repair work, and complications in infrastructure modernization processes. Additionally, the instability of logistics chains negatively impacts the financial stability of enterprises and reduces the efficiency of their operations.

One of the key challenges at the current stage of the gas sector's development is the threat to cybersecurity and the information infrastructure of enterprises. The active implementation of digital technologies and automated control systems significantly increases the efficiency of enterprises' operations, but at the same time creates new risks associated with cyberattacks and information threats. Disruptions to digital management systems for gas transmission infrastructure can lead to large-scale man-made accidents, interruptions in energy supply, and destabilization of the country's energy system (Farat et al., 2025). In this regard, gas sector enterprises are compelled to develop new information security mechanisms and strengthen the protection of critical digital systems.

A significant crisis factor is the financial instability of gas sector enterprises. Military operations have led to a decline in investment activity, increased costs for infrastructure restoration, reduced consumer purchasing power, and more difficult access to international financial resources. Companies are forced to operate under conditions of working capital shortages, high inflation, and currency market instability, which significantly complicates the implementation of strategic development programs (Shevchenko & Melnyk, 2023). Furthermore, financial instability limits companies' ability to modernize production facilities and adopt innovative technologies.

The issue of the labor shortage in the gas sector is becoming particularly acute. A significant portion of skilled workers has been mobilized or forced to leave their homes due to military operations. This leads to a shortage of professional staff, complicates human resources management processes, and reduces the efficiency of enterprise operations. At the same time, gas sector enterprises require highly qualified specialists to maintain complex technical infrastructure and ensure the continuity of technological processes. In this regard, an important focus of crisis management is the development of a system for workforce stability and the adaptation of personnel to the conditions of a wartime economy.

Regulatory and legal challenges facing gas sector enterprises constitute a separate category of crisis-related challenges. Under a wartime economy, the state is tightening its control over the energy sector, which is accompanied by changes in regulatory frameworks, the introduction of new restrictions, and the transformation of mechanisms for state management of the energy market. Frequent changes in legislation, instability in tariff policy, and an increased administrative burden create additional risks for the operations of gas sector enterprises. This necessitates the adaptation of management mechanisms to the new operating conditions of the energy industry.

Global energy instability is a significant factor affecting the operations of gas sector enterprises. The global energy market is undergoing a profound transformation, accompanied by changes in energy consumption patterns, increased competition for energy resources, and heightened geopolitical risks. For Ukraine, this means the need to diversify energy supply sources, adapt to European energy standards, and develop new models of international energy cooperation (Danylyshyn, 2025). Gas sector enterprises must take these trends into account in the process of strategic planning and the development of a crisis management system.

In addition, ensuring the country's energy security remains a significant challenge. The gas sector is critical to the functioning of the defense industry, the utilities sector, and systems that support the population's livelihood. Any disruptions in the operations of gas sector enterprises can have far-reaching socioeconomic consequences and create additional risks to the country's national security (Morozova et al., 2024). This is precisely why the issue of establishing an effective crisis management system extends beyond the scope of individual enterprises and becomes an integral part of state policy in the field of energy security.

The current crisis challenges facing enterprises in Ukraine's gas sector are complex and multifaceted. Military operations, infrastructure destruction, financial instability, staffing issues, cyber threats, and global energy transformations are shaping new operating conditions for enterprises, which require the development of effective crisis management mechanisms. Under these conditions, the creation of an adaptive management system capable of ensuring the resilience of enterprises and maintaining the country's energy security takes on particular importance.

The effectiveness of crisis management for gas sector enterprises under a wartime economy depends largely on the management system's ability to respond promptly to crisis threats, adapt to an unstable external environment, and ensure the continuity of critical infrastructure operations. The current operating conditions of the energy sector require the development of a comprehensive crisis management system that integrates organizational, economic, digital, security, and strategic management mechanisms (Farat et al., 2025).

One of the fundamental elements of crisis management is the organizational mechanism for crisis response. Its primary task is to ensure the rapid adoption of management decisions in emergency situations and to coordinate the activities of all the enterprise's structural units. In gas sector enterprises, organizational mechanisms must include the establishment of crisis headquarters, systems for real-time monitoring of infrastructure status, backup control centers, and emergency response mechanisms (Gudz, 2022). In a wartime economy, the ability of the management system to function even in the event of partial destruction of production or information infrastructure becomes particularly important.

A crisis monitoring system is an important tool for crisis management. Its primary function is to continuously monitor internal and external risk factors, assess threat levels, and forecast potential crisis situations. For companies in the gas sector, the monitoring system must cover the technical condition of infrastructure, financial performance indicators, the level of energy security, the state of information systems, and external geopolitical risks. Continuous analysis of crisis factors allows for the timely identification of threats and minimization of the negative consequences of their impact.

The digitalization of crisis management systems is of particular importance in today's environment. The use of digital technologies ensures faster information processing, the automation of man-

agement processes, and the development of effective mechanisms for forecasting crisis situations. Gas sector enterprises are actively implementing automated process control systems, digital infrastructure monitoring platforms, cloud-based data storage technologies, and remote monitoring systems for critical facilities. Digitalization enhances enterprises' adaptability to crisis-induced changes and ensures rapid response to emergencies.

One of the most promising areas of development in crisis management is the use of artificial intelligence technologies. Artificial intelligence systems enable the analysis of large amounts of data, the forecasting of risks, the modeling of crisis scenarios, and the formulation of optimal management decisions. For enterprises in the gas sector, the application of artificial intelligence is of particular importance in the areas of forecasting emergency situations, assessing the technical condition of infrastructure, and ensuring energy security (Shevchenko & Melnyk, 2023). In addition, artificial intelligence technologies can be used to automate resource management processes, optimize logistics routes, and improve the efficiency of production processes.

An important element of crisis management is the mechanisms for ensuring the energy security of gas sector enterprises. Energy security involves creating conditions for the stable operation of natural gas supply systems, protecting critical infrastructure, and minimizing the risks of disruptions in energy supply. In today's environment, ensuring energy security involves diversifying gas supply sources, creating reserve capacities, modernizing the gas transmission system, and strengthening the protection of energy facilities against physical and cyber threats (Morozova et al., 2024).

Government support for gas sector enterprises plays a significant role in ensuring effective crisis management. In a wartime economy, the state coordinates the activities of the energy sector, provides financial support to strategically important enterprises, establishes the regulatory framework for crisis management, and organizes international cooperation in the field of energy security. State support also includes implementing programs to restore energy infrastructure, stimulating investment in the modernization of the gas sector, and promoting the adoption of innovative technologies.

One of the key areas of modern crisis management is the development of a system of strategic resilience for enterprises. An enterprise's resilience is defined as its ability to adapt to crisis conditions, maintain operational stability, and quickly resume operations after negative impacts. For enterprises in the gas sector, a strategic resilience system must include contingency management mechanisms, resource diversification, the development of cybersecurity systems, the creation of a talent pool, and the implementation of modern strategic planning models.

In addition, international cooperation in the field of energy security is an important mechanism for crisis management. Ukraine's integration into the European energy space creates opportunities to attract international technical assistance, investments in infrastructure modernization, and the exchange of experience in crisis management. Cooperation with international energy organizations allows for increasing the resilience of gas sector enterprises and adapting the national crisis management system to modern European standards (Danylyshyn, 2025).

Ensuring effective crisis management for enterprises in the gas sector under a wartime economy requires the comprehensive use of organizational, digital, strategic, and security management mechanisms. Modern tools for crisis response, digitalization, artificial intelligence, and strategic resilience form the basis of an adaptive management system capable of ensuring the stable operation of enterprises and maintaining the country's energy security amid multi-level crisis threats.

Current transformational processes in the global energy system, military challenges, and Ukraine's integration into the European economic space are shaping new conditions for the development of enterprises in the gas sector. In these conditions, improving the crisis management system takes on particular importance; it must ensure not only a rapid response to crises but also the development of long-term resilience of enterprises to external and internal threats. The prospects for the development of crisis management in gas sector enterprises are directly linked to the processes of

digitalization, modernization of energy infrastructure, the introduction of innovative technologies, and the harmonization of the national management system with European standards.

One of the key areas for the development of crisis management is the European integration of Ukraine's energy sector. Ukraine's participation in the European energy space requires adapting the management system of gas sector enterprises to European Union requirements in the areas of energy security, environmental policy, digital transformation, and crisis management. Harmonizing national legislation with EU standards creates conditions for improving the efficiency of enterprises, attracting foreign investment, and modernizing gas transmission infrastructure.

An important area of future development is the creation of innovative management models for gas sector enterprises. Current crisis conditions require a shift from traditional administrative management models to adaptive management systems based on the principles of flexibility, risk-oriented planning, and strategic resilience. In the scientific literature, increasing attention is being paid to the concept of adaptive management, which involves the continuous updating of management decisions in line with changes in the external environment and a rapid response to crisis challenges (Gudz, 2022).

The digitalization of management systems is of particular importance for the future development of crisis management. The use of digital technologies allows enterprises in the gas sector to increase the efficiency of management processes, ensure automated monitoring of infrastructure operations, and improve the quality of crisis forecasting. In today's environment, the implementation of digital risk monitoring platforms, big data technologies, automated information analysis systems, and intelligent management decision support systems holds great promise (Farat et al., 2025).

One of the most promising areas for the development of crisis management is the use of artificial intelligence and machine learning technologies. Artificial intelligence systems are capable of analyzing large amounts of data, predicting technical failures, assessing the level of crisis risks, and developing optimal response models for emergencies. This is of particular importance for enterprises in the gas sector, as it allows for improving the operational safety of critical infrastructure, optimizing production processes, and reducing the influence of the human factor on management decision-making (Shevchenko & Melnyk, 2023).

A promising direction for the development of crisis management is the creation of adaptive organizational structures within enterprises. The conditions of a wartime economy require gas sector enterprises to be able to rapidly change their management structure, reallocate resources, and ensure the functioning of crisis response systems even in the event of partial infrastructure destruction. Adaptive organizational structures must be based on the principles of decentralized management, rapid decision-making, and flexible coordination of activities among structural units.

An important factor in the future development of crisis management is the modernization of the energy infrastructure of gas sector enterprises. The destruction of energy system facilities as a result of military operations necessitates the creation of new models of energy resilience, which involve the diversification of energy supply sources, the development of backup gas supply systems, and the implementation of modern technologies for protecting critical infrastructure. In the post-war period, the modernization of the gas sector will become one of the key areas of the country's economic recovery.

The development of a system of strategic resilience for enterprises is of particular importance. The formation of a resilient management model involves creating mechanisms for the long-term adaptation of enterprises to crisis-induced changes, ensuring workforce stability, building up reserve financial resources, and strengthening information security systems. In today's environment, resilience is viewed as one of the key criteria for the effectiveness of a crisis management system.

Another promising area is the development of international cooperation in the field of energy security and crisis management. Ukraine is actively integrating into international energy programs and cooperating with European partners in the modernization of energy infrastructure, the development of digital technologies, and the enhancement of energy sector security. International cooperation creates

opportunities to attract investment, acquire modern technologies, and implement European standards for crisis management.

Furthermore, the prospects for the development of crisis management in gas sector enterprises are linked to the formation of a new state policy in the field of energy security. The state must ensure the creation of an effective regulatory framework for crisis management, stimulate innovative development in the energy sector, and support the digital transformation of enterprises. The conditions of a wartime economy require enhanced coordination between government agencies, gas sector enterprises, and international partners to ensure the stable operation of the country's energy system.

The prospects for the development of crisis management in the gas sector are linked to a comprehensive transformation of the management system, the digitalisation of management processes, the implementation of artificial intelligence technologies, the development of strategic resilience, and integration into the European energy area. Implementing these measures will enhance the resilience of gas sector enterprises, ensure the country's energy security and establish an effective crisis management system in the face of contemporary global challenges.

Conclusion. The study found that crisis management in gas sector enterprises under a wartime economy is one of the key elements in ensuring the country's energy security and the stable functioning of the national economy. Current crisis processes caused by military actions, the destruction of critical infrastructure, global energy instability, and economic transformations significantly complicate the operations of gas sector enterprises and require the development of new approaches to crisis management systems.

The study summarized the theoretical foundations of crisis management and determined that a modern crisis management system must be based on a comprehensive combination of strategic, systemic, risk-oriented, and adaptive approaches to enterprise management. It was established that traditional models of crisis management, developed under conditions of stable economic development, do not fully meet the modern challenges of a wartime economy and require significant transformation.

The study identified the main characteristics of how gas sector enterprises operate under a wartime economy. Key crisis factors include the destruction of energy infrastructure, instability of logistics systems, financial risks, personnel shortages, cyber threats, and a high level of uncertainty in the external environment. It has been established that these factors are complex in nature and directly affect the level of economic resilience of enterprises in the gas sector.

The study showed that one of the most effective directions for the development of crisis management is the implementation of a system of strategic resilience for enterprises. Resilience enables enterprises to adapt to crisis-induced changes, maintain the continuity of critical infrastructure operations, and establish mechanisms for rapid response to emergencies. It has been established that a strategic resilience system must include backup management mechanisms, diversification of resource provision, the development of information security systems, and the creation of adaptive organizational structures.

The paper substantiates the importance of using modern digital technologies in the crisis management system of gas sector enterprises. It has been determined that the digitalization of management processes, the use of automated monitoring systems, big data technologies, and artificial intelligence allow for improved forecasting of crisis situations, enhanced quality of management decisions, and ensure rapid response to crisis threats. Particular attention is paid to the role of artificial intelligence technologies in risk analysis, emergency situation forecasting, and the optimization of gas transmission infrastructure operations.

The study demonstrates that effective crisis management for gas sector enterprises is impossible without active state support and the development of a modern energy security system. The state must ensure regulatory and legal oversight of crisis management, support the modernization of energy infrastructure, encourage the adoption of innovative technologies, and coordinate the activities of energy sector enterprises during crisis situations.

Furthermore, the study establishes that the prospects for the development of crisis management in the gas sector are directly linked to Ukraine's European integration processes and the harmonization of the national energy management system with European standards. Integration into the European energy space creates opportunities for infrastructure modernization, attracting international investment, developing digital technologies, and implementing modern crisis management mechanisms.

The study's findings confirm that effective crisis management for gas sector enterprises under a wartime economy must be based on a comprehensive combination of strategic management, digitalization, risk management systems, government support, and mechanisms for strategic resilience. Implementing these approaches will ensure the stable operation of gas sector enterprises, enhance the country's energy security, and lay the groundwork for the post-war restoration of Ukraine's energy system.

Based on the conducted research, it has been established that the effective operation of gas sector enterprises under a wartime economy requires a comprehensive improvement of the crisis management system, focused on ensuring the adaptability, resilience, and continuity of critical energy infrastructure operations. Current crisis challenges necessitate a transition from traditional management mechanisms to innovative crisis response models based on the use of digital technologies, a risk-oriented approach, and strategic planning.

One of the key practical recommendations is the establishment of a multi-level crisis management system at gas sector enterprises, which should include mechanisms for continuous risk monitoring, crisis forecasting, contingency management, and rapid response to emergencies. Particular attention should be paid to the creation of crisis management centers capable of coordinating the company's activities in the face of military threats and infrastructure destruction.

An important area for improving the crisis management system is the development of digital transformation in gas sector enterprises. It is recommended to actively implement automated production process management systems, digital risk monitoring platforms, remote infrastructure control systems, and big data technologies. The use of modern digital tools will improve the effectiveness of management decision-making, reduce response times to crisis situations, and ensure the continuity of the energy system's operation.

A promising direction for the development of crisis management is the implementation of artificial intelligence and machine learning technologies in the management processes of gas sector enterprises. The use of intelligent forecasting systems will enable the timely identification of crisis trends, analysis of the technical condition of infrastructure, modeling of emergency risks, and optimization of enterprise resource utilization. In today's environment, the digitalization and automation of management systems are becoming critical components of ensuring the nation's energy security.

Of particular importance is the need to strengthen workforce stability at gas sector enterprises. It is recommended to establish a talent pool system, develop staff training programs, implement remote management mechanisms, and create conditions for employees to adapt to operating in crisis situations. Workforce stability is one of the key elements in ensuring the continuity of critical infrastructure operations under a wartime economy.

An important area for the practical implementation of crisis management is the modernization of the energy infrastructure of gas sector enterprises. It is advisable to implement modern technologies for protecting critical infrastructure facilities, develop backup energy supply systems, diversify energy sources, and enhance the cybersecurity of energy systems. The implementation of these measures will reduce enterprises' dependence on external crisis factors and increase their strategic resilience.

The study found that the state must play a key role in ensuring effective crisis management. It is recommended to improve the regulatory framework for crisis management, develop state programs to support gas sector enterprises, stimulate investment in the modernization of energy infrastructure, and foster international cooperation in the field of energy security. State policy should be aimed at forming a comprehensive system for protecting critical energy infrastructure and ensuring the stable functioning of the state's energy sector.

Prospects for further research include the development of innovative models for crisis management in gas sector enterprises, the study of mechanisms for the digital transformation of management systems, the evaluation of the effectiveness of artificial intelligence technologies in management processes, and the development of strategic resilience systems for enterprises. Particular attention should be paid to studying the postwar restoration of Ukraine's energy infrastructure, the adaptation of enterprises to European energy security standards, and the development of international energy cooperation.

The study confirms the need for a comprehensive transformation of the crisis management system of gas sector enterprises under a wartime economy. Implementing the proposed practical recommendations will help increase the resilience of enterprises, ensure the country's energy security, and establish an effective crisis management system in the face of contemporary global challenges.

References:

1. Ansoff, H. I. (1975). Managing strategic surprise by response to weak signals. *California Management Review*, 18(2), 21–33. URL: https://www.creaciondeestrategia.com/wp-content/uploads/2022/02/Ansoff_1975.pdf
2. Danylyshyn, B. (2025). Osoblivosti formuvannia voiennoi ekonomiky ta povoyennoi vidbudovy Ukrainy [Features of the formation of the wartime economy and post-war reconstruction of Ukraine]. In *Europe and the War in Ukraine* (pp. 119–146). *Academic Studies Press*. DOI: <https://doi.org/10.1515/9798897830237-010> [in Ukrainian]
3. Didyk, A. M. (Ed.). (2019). Ekonomichna bezpeka pidpriemstva [Economic security of the enterprise]. NU “Lvivska politehnika”; TzOV “Vydavnycha hrupa “Bukhhaltery Ukrainy”. URL: https://fpk.in.ua/images/biblioteka/3fmb_finan/Ekonomichna-bezpeka-pidpryyemstva_pidruchnyk.pdf [in Ukrainian]
4. Drucker, P. F. (2008). Management: Tasks, responsibilities, practices (Rev. ed.). *HarperBusiness*. URL: <https://cssplatformbytha.com/wp-content/uploads/2024/10/Management-Peter-F.-Drucker.pdf>
5. Farat, O., Danko, T., & Farat, D. (2025). Stalyi rozvytok i vyrobnycha bezpeka pidpriemstv naftohazovoho kompleksu Ukrainy [Sustainable development and production safety of oil and gas complex enterprises of Ukraine]. *Ekonomika ta Suspilstvo*, (81). DOI: <https://doi.org/10.32782/2524-0072/2025-81-7> [in Ukrainian]
6. Gudz, O. Y. (2022). Principles of anti-crisis management of the enterprises. *Economy. Management. Business*, 40(3-4). DOI: <https://doi.org/10.31673/2415-8089.2022.031216>
7. Lihonenko, L. O. (2016). Antykryzove upravlinnia pidpriemstvom v umovakh ekonomiky znan ta intelektualizatsii menedzhmentu [Anti-crisis enterprise management in the conditions of knowledge economy and intellectualization of management]. *Ekonomichniy Forum*, (1), 161–170. URL: http://nbuv.gov.ua/UJRN/ecfor_2016_1_25 [in Ukrainian]
8. Manzhos, S. (2013). Kontseptualni pidkhody do traktuvannia sutnosti antykryzovoho menedzhmentu [Conceptual approaches to interpreting the essence of anti-crisis management]. *Halytskyi Ekonomichnyi Visnyk*, 3(42), 23–32. [in Ukrainian]
9. Morozova, O. S., Zemliakov, I. S., Lozinska, L. D., Kulyk, T. P., & Harazdiuk, V. V. (2024). Ekonomika hazovoi promyslovosti Ukrainy v umovakh voiennoho stanu [Economics of the gas industry of Ukraine under martial law]. *Aktualni Pytannia Ekonomichnykh Nauk*, 6, Article 14909772. DOI: <https://doi.org/10.5281/zenodo.14909772> [in Ukrainian]
10. Porter, M. E. (1985). Competitive advantage: Creating and sustaining superior performance. *The Free Press*. URL: <https://library.uniq.edu.iq/storage/books/file/competitive%20Advantage/166677556024.pdf>
11. Shevchenko, N. V., & Melnyk, S. I. (2023). Finansovy menedzhment [Financial management] [Training manual]. *State Biotechnology University*. URL: https://www.researchgate.net/publication/367023192_Finansovij_menedzhment_navchalnij_posibnik_-_Sevcenko_NV_Melnik_SI_VIDANIJ [in Ukrainian]
12. Vasylenko, V. O. (2005). Antykryzove upravlinnia pidpriemstvom: Navchalnyi posibnyk [Crisis management of the enterprise: A tutorial]. *Tsentr navchalnoi literatury*. URL: <https://studfile.net/preview/7825360/> [in Ukrainian]