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STRATEGIC MANAGEMENT OF THE DEVELOPMENT OF A PUBLIC UTILITY COMPANY: KEY ASPECTS AND TOOLS FOR OVERCOMING THE CRISIS IN TIMES OF WAR

СТРАТЕГІЧНЕ УПРАВЛІННЯ РОЗВИТКОМ ПІДПРИЄМСТВА СФЕРИ КОМУНАЛЬНИХ ПОСЛУГ: КЛЮЧОВІ АСПЕКТИ ТА ІНСТРУМЕНТИ ПОДОЛАННЯ КРИЗИ В УМОВАХ ВІЙНИ

Summary. *Introduction. Under martial law, the strategic management of public utilities becomes critical to ensure the stable functioning of vital services. Military conflicts cause economic instability, destruction of infrastructure, lack of resources, and dependence on public funding and international assistance. This requires the development of a comprehensive strategy that includes financial sustainability, organizational change, digital transformation, and risk management.*

The purpose of the article is to analyze the key challenges faced by utilities during the war, assess their financial condition, and consider strategic management tools aimed at improving sustainability and efficiency. The role of digital technologies and international cooperation in strengthening utilities in times of crisis is also identified.

Materials and methods. The study is based on the analysis of financial indicators of utility companies, SWOT analysis, strategic planning and risk management methods. The information base is based on the reporting financial documents of PJSC "Kyivvodokanal", scientific publications and practical recommendations of international organizations on the management of utilities in crisis conditions.

Results. The article analyzes the dynamics of liquidity, solvency and financial stability of PJSC "AK 'Kyivvodokanal' for 2021–2023. The main problems of the enterprise are identified, in particular, a decrease in absolute and total liquidity, a drop in the solvency ratio and the need to optimize financial flows. The SWOT analysis revealed the strengths (key role in ensuring the livelihood of the population, the possibility of attracting international assistance) and threats (economic instability, destruction of infrastructure, outflow of qualified personnel). Three groups of tools to overcome the crisis are proposed: financial, organizational and risk management. Financial instruments include optimization of tariff policy, use of depreciation charges, attraction of international grants, and implementation of performance-based budgeting. Organizational measures include crisis management, digitalization, and Lean methodology, while risk management focuses on diversifying resource flows, insuring assets, and developing business continuity plans.

Discussion. The study confirms the importance of an integrated approach to the strategic management of utilities in crisis conditions. The use of modern financial, managerial, and digital tools helps to strengthen their sustainability and efficiency. Further research can be aimed at developing adaptive strategic models, integrating artificial intelligence into management processes, and expanding international cooperation to attract funding and exchange of experience in the field of crisis management of municipal infrastructure.

Key words: *strategic management, utilities, crisis conditions, financial sustainability, innovative approaches, risk management, strategic planning, digitalization, Lean methodology, international assistance.*

Анотація. *Вступ. В умовах воєнного стану стратегічне управління підприємствами комунальної сфери набуває критичного значення для забезпечення стабільного функціонування життєво важливих послуг. Військові конфлікти спричиняють економічну нестабільність, руйнування інфраструктури, нестачу ресурсів та залежність від державного фінансування й міжнародної допомоги. Це вимагає розробки комплексної стратегії, що охоплює фінансову стійкість, організаційні зміни, цифрову трансформацію та управління ризиками.*

Мета статті – проаналізувати ключові виклики, з якими стикаються підприємства комунальної сфери під час війни, оцінити їхній фінансовий стан та розглянути інструменти стратегічного управління, спрямовані на підвищення стійкості та ефективності роботи. Також визначено роль цифрових технологій та міжнародної співпраці у зміцненні комунальних підприємств в умовах кризи.

Матеріали і методи. Дослідження ґрунтується на аналізі фінансових показників підприємств комунальної сфери, застосуванні SWOT-аналізу, методів стратегічного планування та управління ризиками. Інформаційну базу склали звітні фінансові документи ПрАТ «АК «Київводоканал»», наукові публікації та практичні рекомендації міжнародних організацій щодо управління комунальними підприємствами у кризових умовах.

Результати. У статті проаналізовано динаміку ліквідності, платоспроможності та фінансової стабільності ПрАТ «АК «Київводоканал»» за 2021–2023 роки. Визначено основні проблеми підприємства, зокрема зниження абсолютної та загальної ліквідності, падіння коефіцієнта платоспроможності та необхідність оптимізації фінансових потоків. Проведений SWOT-аналіз виявив сильні сторони (ключова роль у забезпеченні життєдіяльності населення, можливість залучення міжнародної допомоги) та загрози (економічна нестабільність, руйнування інфраструктури, відтік кваліфікованих кадрів). Запропоновано три групи інструментів для подолання кризи: фінансові, організаційні та ризик-менеджмент. Фінансові інструменти включають оптимізацію тарифної політики, використання амортизаційних відрахувань, залучення міжнародних грантів та впровадження бюджетування, орієнтованого на ефективність. Організаційні заходи передбачають кризовий менеджмент, цифровізацію та Lean-методологію, а ризик-менеджмент зосереджується на диверсифікації ресурсних потоків, страхуванні активів та розробці планів неперервності бізнесу.

Перспективи. Дослідження підтверджує важливість комплексного підходу до стратегічного управління комунальними підприємствами у кризових умовах. Використання сучасних фінансових, управлінських та цифрових інструментів сприяє зміцненню їхньої стійкості та ефективності. Подальші дослідження можуть бути спрямовані на розробку адаптивних стратегічних моделей, інтеграцію штучного інтелекту у процеси управління та розширення міжнародної співпраці для залучення фінансування та обміну досвідом у сфері кризового управління комунальною інфраструктурою.

Ключові слова: *стратегічне управління, комунальні підприємства, кризові умови, фінансова стійкість, інноваційні підходи, управління ризиками, стратегічне планування, діджиталізація, методологія Lean, міжнародна допомога.*

Problem statement. Military actions and economic instability pose significant challenges for utilities, forcing them to adapt management strategies in conditions of high uncertainty. The deepening crisis in the national economy, destruction of critical infrastructure, lack of resources and dependence on state and international financing significantly affect the financial stability and operational efficiency of enterprises.

The current environment is characterized by:

1. Increased instability and unpredictability of the environment, which complicates strategic planning.

2. The need to apply a scenario approach and innovative forecasting methods to ensure the sustainability of enterprises.

3. A shorter horizon for reliable forecasting due to rapid changes in economic and geopolitical conditions.

4. The influence of numerous factors, constraints and risks, which complicates the process of making management decisions.

5. The use of digital technologies, expert systems and artificial intelligence, which changes traditional approaches to strategic management.

6. Acceleration of innovation cycles, which requires rapid adaptation of enterprises to market changes.

7. Increased competition and the need to constantly monitor market conditions and strategic behavior of competitors.

In such conditions, there is an urgent need to transform the methods of strategic management of enterprises, to introduce modern management tools and analysis technologies. This requires revising traditional strategic models and supplementing them with more flexible methods that take into account the dynamics of change and limited management information. The integration of fuzzy logic, cognitive modeling and multi-criteria analysis tools plays an important role in improving the effectiveness of strategic management in the face of crisis challenges.

Analysis of recent research and publications. The problem of strategic management of enterprise development in the context of crisis and military challenges is being actively studied by Ukrainian scholars. They propose various approaches to business adaptation to unstable conditions, focusing in particular on the analysis of the impact of the external environment, adaptation mechanisms, financial sustainability, innovation strategies and corporate social responsibility.

Among the prominent Ukrainian researchers in this field are V. Balan, V. Bondarenko, N. Nosan, P. Romanyuk, and Y. Tkachenko, whose works provide a theoretical and practical basis for developing effective strategies for managing enterprises in the face of crises and military threats. Their research helps to solve important problems of modern business, contributing not only to the sustainability of enterprises but also to their development even in the face of global instability.

Prospects for further research open up wide opportunities for deeper analysis and development of new approaches to management practices. Constant changes in the global economic environment, political instability, and potential military threats challenge enterprises to adapt to new realities. This creates a need to develop effective strategies to respond to these challenges.

The purpose of the article is to analyze the main challenges faced by utilities during the war. This includes an assessment of their financial condition, as well as consideration of strategic management tools that help to increase the sustainability and efficiency of their work in a crisis. Special attention is paid to the role of digital technologies and international cooperation that can strengthen utilities in the face of global and local challenges. The importance of these aspects is growing against the backdrop of an unstable situation that requires enterprises to be flexible, innovative and able to quickly adapt to changes.

Summary of the main research material. Table 1 shows the dynamics of liquidity, solvency and financial stability indicators of PRJSC KYIVVODOKANAL for 2021–2023.

Thus, the war had a negative impact on the financial performance of Kyivvodokanal, in particular on the company's liquidity and solvency. In 2023, there was a decrease in the absolute liquidity and total liquidity ratios, which indicates a decrease in the company's ability to quickly cover its liabilities. The quick liquidity ratio also decreased, although it remained within the regulatory value, which indicates a slight decrease in the financial stability of the company. The solvency ratio continues to decline, which may indicate difficulties in financing and maintaining sustainability in the face of economic instability. At the same time, the asset turnover ratio has increased, which may be a positive signal of more efficient use of the company's resources in the face of limited financial capacity.

A SWOT-analysis was conducted to understand the situation of utility companies during the war period (Table 2).

Thus, the SWOT-analysis of utility companies in wartime indicates important advantages, such as their key role in the life support of the population and the ability to attract international assistance, but they face challenges, including high dependence on public funding and low operational efficiency. Enterprises

Table 1

Dynamics of liquidity, solvency and financial stability indicators of PRJSC KYIVVODOKANAL for 2021–2023

Indicator	2021	2022	2023	Normative value
Absolute liquidity ratio	0,01	0,08	0,05	> 0
Total liquidity ratio	0,87	0,87	0,72	> 1
Quick ratio	0,74	0,7	0,56	0,6–0,8
Solvency ratio	0,12	0,11	0,09	> 0,5
Asset turnover ratio	0,39	0,38	0,42	> 0,1

Source: developed by the authors [12; 13; 14]

Table 2

SWOT-analysis of utility companies in wartime

Strengths	Weaknesses
– key role in providing essential services; – ability to attract international aid; – experience working in crisis conditions.	– high dependence on state funding; – low operational efficiency; – limited access to modern technologies.
Opportunities	**Threats**
– expanding partnerships with international donors; – use of digital solutions; – optimizing resources and processes.	– economic instability; – infrastructure destruction; – loss of qualified personnel.

Source: developed by the authors

have the potential to expand partnerships with international donors, implement digital solutions, and optimize resources, but they are threatened by economic instability, infrastructure destruction, and loss of skilled personnel, which requires active measures to strengthen their resilience in the face of war.

To overcome the military crisis, utilities have 3 groups of tools available to them: financial, organizational, and risk management (Tables 3–5).

Financial instruments play a key role in ensuring the sustainability of utilities in a crisis. One of the most important mechanisms is the optimization of tariff policy based on economic realities. This involves setting tariffs at a level that covers the company's costs, taking into account the social capacity of the population and the economic conditions of the region. This approach helps to maintain a balance between the financial stability of enterprises and the affordability of services for consumers.

Another important aspect is the use of depreciation charges to upgrade infrastructure. Depreciation allows accumulating funds for the gradual modernization of the material and technical base of enterprises, which is especially important in conditions of limited access to external financing. By using these funds efficiently, it is possible to maintain the proper technical condition of fixed assets and minimize the cost of emergency repairs.

Expanding funding sources is another key tool, including attracting international grants and assistance programs. Participation in international projects allows you to receive additional funds for the development of enterprises, the introduction of energy-efficient technologies, and the modernization of infrastructure. Many international organizations provide financial support to utilities, which allows them to implement long-term investment programs.

Another important mechanism is the introduction of a budgeting system based on resource efficiency.

Table 3

Financial tools for overcoming the crisis

Tool	Essence
Optimization of tariff policy considering economic realities.	Adjusting tariffs to reflect current economic conditions.
Use of depreciation deductions for infrastructure renewal.	Allocating depreciation funds to modernize infrastructure.
Expanding funding sources through international grants and aid programs.	Leveraging external financial support for development.
Introduction of performance-based budgeting systems.	Implementing budget systems focused on resource efficiency.

Source: developed by the authors

Table 4

Organizational and managerial tools for overcoming the crisis

Tools	Essence
Introduction of crisis management and strategic planning.	Establishing crisis response frameworks and long-term strategies.
Implementation of Lean methodology to reduce waste and improve operational efficiency.	Adopting Lean principles to optimize processes and minimize losses.
Use of digital technologies for automating business processes and asset management.	Integrating digital tools to streamline operations and manage assets.
Use of benchmarking models to assess company performance compared to peers.	Comparing company performance against industry standards to identify areas for improvement.

Source: developed by the authors

Table 5

Risk-management tools for overcoming the crisis

Tools	Essence
Assessment and monitoring of key risks with the development of adaptation strategies.	Identifying potential risks and creating strategies to address them.
Diversification of resource flows to reduce dependence on a single supplier or financial source.	Spreading resources across multiple channels to mitigate risk.
Ensuring business process continuity by developing contingency plans.	Preparing action plans for emergency situations to ensure operational continuity.
Use of insurance mechanisms to protect key assets.	Utilizing insurance to safeguard vital assets against unforeseen events.

Source: developed by the authors

This allows companies to rationally plan their expenditures, evaluate the efficiency of their use of funds, and make informed financial decisions. This approach helps to increase the economic sustainability of utilities, ensuring their ability to adapt to crisis challenges.

Organizational and managerial tools play an important role in ensuring the effective functioning of utilities in times of crisis. One of the key approaches is the introduction of crisis management and strategic planning. This involves the development of adaptive management strategies aimed at minimizing risks, ensuring the sustainability of the enterprise and optimizing resources. In an environment of uncertainty, it is important to have a flexible management system that allows you to respond quickly to changes in the environment and make informed decisions.

Another effective tool is the implementation of the Lean methodology, which reduces losses and increases the efficiency of operations. The use of lean manufacturing principles helps to optimize internal processes, eliminate unnecessary costs and increase labor productivity. This is particularly relevant for utilities that operate with limited resources and need to ensure uninterrupted service delivery to the public.

Another important area of development is the use of digital technologies to automate business processes and manage assets. The introduction of modern software solutions reduces the human factor in decision-making, speeds up data processing, and ensures effective control over all processes. Automation allows businesses to reduce operating costs, improve control over financial flows, and optimize the use of material and human resources.

Assessing the efficiency of an enterprise is a necessary step for its further development, and in this context, the use of a benchmarking model is of particular importance. Comparing your own performance with the best practices in the industry allows you to identify the strengths and weaknesses of the company, as well as find new opportunities to improve efficiency. Analyzing the activities of similar enterprises allows implementing proven management solutions that help increase competitiveness and adapt to changes in the external environment.

Risk management is an integral part of the strategic management of utilities, especially in times of crisis. An important first step is to assess and monitor key risks and develop adaptation strategies. Regular threat analysis allows for timely identification of potential problems, forecasting their possible impact on the company's operations, and implementing measures to minimize negative consequences. This approach contributes to a quick response to challenges, ensuring the sustainability and flexibility of the organization.

Another effective mechanism is the diversification of resource flows, which reduces the company's dependence on a single supplier or financial source. The use of different channels of supply of materials, energy resources and financing helps to reduce the risks associated with interruptions in the work of key partners or economic instability. Diversification also makes it possible to allocate financial resources more efficiently, minimizing the impact of unfavorable factors on the company's operations. Ensuring the continuity of business processes is critical for the stable functioning of utilities. For this purpose, it is necessary to develop clear contingency plans that include algorithms for responding to possible crises, alternative options for supplying resources, and scenarios for restoring operations. Such preparations help to reduce company downtime, avoid significant losses, and guarantee the uninterrupted provision of vital services to the population.

One of the key risk management tools is the use of insurance mechanisms to protect the company's key assets. Insurance of property, technological equipment and financial risks helps to minimize losses in the event of unforeseen circumstances, such as natural disasters, man-made accidents or hostilities. This ensures the financial stability of the company and increases its readiness for possible crisis situations.

Strategic management of the development of public utilities in the context of instability and crisis should be based on an integrated approach that covers financial, organizational, technological and risk management aspects.

The main components of the strategic management model are shown in fig. 1.

At the first stage, a comprehensive strategic analysis of the environment is conducted to assess external and internal factors influencing the municipal enterprise. PESTEL analysis and Porter's Five Forces Model help evaluate political, economic, technological, and market influences, while SWOT analysis identifies strengths, weaknesses, opportunities, and threats. Special attention is given to economic instability, resource costs, and infrastructure risks, which are critical in wartime conditions.

The second stage focuses on assessing competitiveness and scenario-based planning to ensure strategic flexibility. Multi-criteria decision-making methods, such as Fuzzy TOPSIS and COPRAS, provide an objective evaluation of financial stability, service quality, and operational efficiency. In parallel, scenario analysis is applied to explore different development trajectories, considering possible international aid, particularly from the EU and other global partners, which can offer financial and infrastructural support during crises [4].

Table 6 presents three key scenarios — optimistic, moderately realistic, and pessimistic — outlining their definitions, potential strategies, and expected outcomes.

Scenario analysis enables municipal enterprises to evaluate possible development strategies under different conditions of war. It highlights the importance of

adaptability, external assistance, and crisis management tools. Under an optimistic scenario, enterprises can focus on expansion and innovation, while a moderately realistic approach suggests stability through cost optimization and financial diversification. In a pessimistic scenario, survival strategies become crucial. Effective strategic management requires a proactive approach, integrating international support, investment in efficiency, and flexibility in decision-making to ensure the sustainability of municipal enterprises.

Ensuring financial sustainability is a key task at the third stage, where financial and resource management strategies are implemented. Diversification of financial sources through international grants, govern-

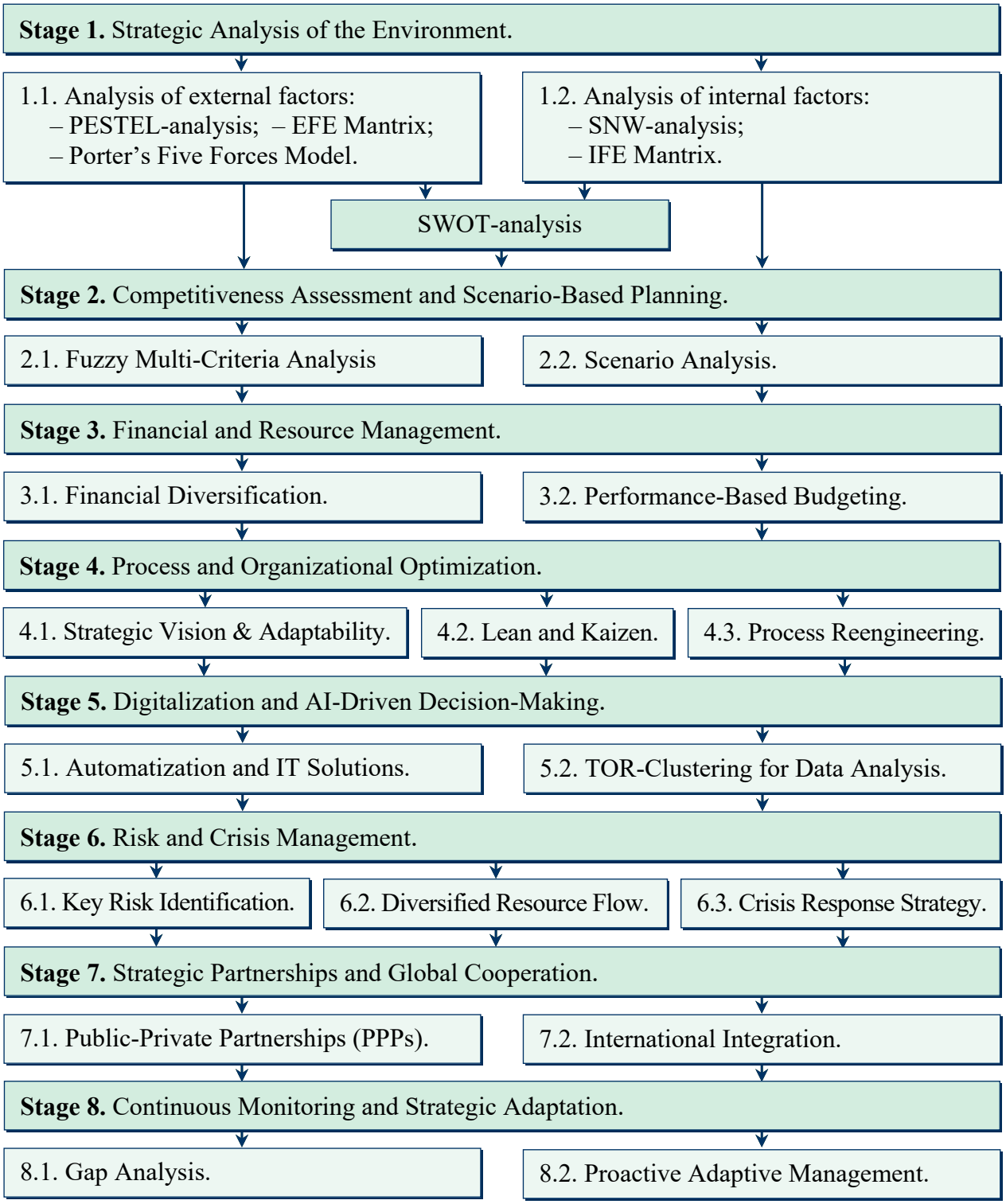

Fig. 1. Model of strategic management of the development of a utility company

Source: developed by the authors

Table 6

Scenario analysis of strategic management of the development of public utilities in the conditions of war

Scenario	Definition	Possible Strategies	Expected Outcomes
Scenario 1: Optimistic	The situation stabilizes, active support from the EU.	– development of new services (energy efficiency, renewable energy); – market expansion; – partnerships with the private sector.	– increased efficiency; – revenue growth; – improved service quality.
Scenario 2: Moderately Realistic	The war continues, partial support from international partners.	– cost optimization; – diversification of funding sources; – maintaining critical functions.	– preservation of essential services; – financial stability.
Scenario 3: Pessimistic	Worsening situation, lack of external support.	– cost reductions; – focus on survival; – implementation of tariffs for essential services.	– decline in service quality; – risk of bankruptcy; – loss of public trust.

Source: developed by the authors

ment subsidies, and investment programs strengthens financial resilience. Additionally, performance-based budgeting allows for more efficient allocation of resources, reducing unnecessary expenditures. Proper management of depreciation funds ensures the long-term sustainability of critical infrastructure.

The fourth stage includes optimizing processes and organizational structures to improve operational efficiency. The introduction of Lean and Kaizen methodologies helps streamline workflows and reduce resource waste. At the same time, business process reengineering (BPR) restructures operations to enhance service quality while minimizing costs. Moreover, developing strategic vision and adaptability ensures the enterprise remains flexible and prepared for future challenges.

At the fifth stage, digitalization and AI-driven decision-making play a crucial role in increasing operational efficiency. The implementation of automation and IT solutions allows for real-time monitoring of assets and infrastructure, enhancing responsiveness. Additionally, TOR-clustering methodology is used for advanced data analysis, uncovering hidden patterns that can improve forecasting, risk assessment, and resource optimization. Expanding digital services, such as online payments and mobile applications, further enhances customer experience and accessibility [15].

In the public utilities sector, neural networks and modern technologies help improve management efficiency, optimize resource utilization, and enhance service quality for the population. Their application enables enterprises to respond more quickly to market changes, predict risks, and ensure stable operations even in crisis conditions. Key areas of application include:

1. Infrastructure Monitoring and Management. Neural networks analyze data from sensors and IoT systems, allowing for the prediction of equipment failures, optimization of maintenance costs, and extension of infrastructure lifespan.

2. Demand and Energy Consumption Forecasting. AI models analyze historical data on water, gas, and electricity consumption to predict future demand and prevent system overload.

3. Automation of Customer Service. Intelligent chatbots and voice assistants improve customer support, handle inquiries, and process service requests without human intervention.

4. Risk and Crisis Management. AI systems analyze risk factors, identify potential threats, and suggest response strategies to ensure service continuity.

Key technologies and their application in the utility sector are presented in Table 7.

The integration of these technologies into the strategic management system of public utility enterprises enhances efficiency, reduces costs, and improves service quality. The use of neural networks enables proactive management, minimizes service disruptions, and enhances customer satisfaction.

Addressing risks and crisis management is the priority of the sixth stage, where key threats, including financial, operational, and infrastructural risks, are identified and mitigated. Diversification of resource flows reduces reliance on a single supplier or funding source, making the enterprise more resilient to disruptions. Furthermore, crisis response strategies, including emergency protocols, risk insurance mechanisms, and rapid recovery measures, ensure business continuity in times of instability.

The seventh stage emphasizes strategic partnerships and international cooperation to strengthen the company's capabilities. Public-private partnerships (PPPs) create opportunities for attracting investment and expertise from private enterprises. Meanwhile, international integration into global development programs allows for the adoption of best practices in urban infrastructure management. Knowledge exchange initiatives, including training programs and industry collaborations, enhance staff competencies and organizational adaptability.

At the final stage, continuous monitoring and strategic adaptation are essential to maintaining long-term efficiency. GAP analysis is used to identify discrepancies between current performance and strategic

Table 7

Key technologies and their application in the utility sector

Technology/Tool	Application in Public Utilities
IoT and Neural Network Monitoring (Azure IoT, Siemens MindSphere)	Real-time tracking of water, heating, and power networks
Demand Forecasting (TensorFlow, Prophet)	Analyzing historical data for efficient resource distribution and waste reduction
Automated AI Chatbots (Dialogflow, ChatGPT API)	Handling citizen inquiries, online consultations, and service request management
Predictive Maintenance Systems (IBM Watson, SAS Predictive Maintenance)	Preventing breakdowns by analyzing equipment wear and tear
AI Analytics and Visualization (Power BI, Tableau AI)	Monitoring key performance indicators (KPIs), cost control, and decision-making support

Source: developed by the authors

goals, allowing for timely adjustments. Adaptive management ensures flexibility in decision-making, enabling the company to respond quickly to market shifts and emerging challenges, particularly in the context of crisis conditions.

Conclusion. Strategic management of public utility companies in wartime requires an adaptable approach to ensure financial stability, operational efficiency, and resilience. These enterprises provide essential services, and their sustainability directly affects infrastructure reliability and public well-being. War exacerbates financial and operational challenges, making strategic frameworks crucial for continued functionality and post-crisis recovery.

Financial analysis of PRJSC Kyivvodokanal highlights declining liquidity and solvency, necessitating urgent financial optimization. Strategies like tariff revisions, efficient use of depreciation reserves, and securing international funding are vital. Performance-based budgeting further enhances resource allocation, ensuring maximum efficiency in financial planning.

Organizational strategies play a key role in sustaining operations. Crisis management frameworks provide rapid response mechanisms, while Lean methodology enhances process efficiency. Digital transformation, including AI-driven analytics, IoT-based monitoring, and automated customer service, strengthens adaptability and operational control. These tools empower public utilities to withstand crises while improving long-term competitiveness.

Risk management is critical in uncertain environments. Diversification of resource flows reduces dependency on single suppliers, ensuring operational continuity. Business continuity planning establishes emergency protocols, while insurance mechanisms protect infrastructure and financial stability. By proactively addressing risks, public utilities can minimize disruptions and maintain service provision.

Scenario analysis presents three potential pathways: an optimistic scenario facilitating innovation, a moderately realistic approach prioritizing cost control, and a pessimistic scenario focusing on survival. Strategic flexibility ensures that utility enterprises remain adaptable regardless of external developments.

International cooperation and strategic partnerships are essential for long-term growth. Public-private partnerships (PPPs) attract investments and technological advancements. Integration into global programs fosters financial access and knowledge exchange, strengthening institutional capacities and infrastructure resilience.

In conclusion, public utility enterprises must adopt adaptive strategies to navigate wartime challenges effectively. A balanced approach combining financial prudence, operational efficiency, digital innovation, and risk management is key to sustaining essential services. By leveraging international partnerships and modern management tools, these enterprises can withstand crises and lay the foundation for sustainable post-war reconstruction and development.

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