Scientific Bulletin
of Mukachevo State University

Series
Economics

Volume 11, No. 4, 147-159
Journal homepage: https://economics-msu.com.ua/en

UDC 35.07:332.1
DOI: 10.52566/msu-econ4.2024.147

Development of monitoring and evaluation mechanisms for the efficiency of the management system for the comprehensive recovery of territorial communities

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Received: 02.09.2024, Revised: 26.11.2024, Accepted: 27.12.2024

Suggested Citation: Shebanin, V., Shebanina, O., Kormyshkina, I., Reshetilov, G., & Kormyshkin, Iu. (2024). Development of monitoring and evaluation mechanisms for the efficiency of the management system for the comprehensive recovery of territorial communities. *Scientific Bulletin of Mukachevo State University. Series "Economics"*, 11(4), 147-159. doi: 10.52566/msu-econ4.2024.147.

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Abstract. The study aimed to establish a system for monitoring and evaluating the recovery of territorial communities in Ukraine affected by armed conflict. Key areas of monitoring – economic, social, environmental, and governance – were identified. Economic indicators, such as investment and job creation, were established as metrics of stability, while social indicators, including employment and access to services, proved critical for quality of life. Environmental indicators emphasized reducing emissions, improving energy efficiency, and using renewable energy. Governance indicators underscored the need for coordination, participation, and resource transparency. The central achievement was the development of a digital platform capable of real-time data collection and analysis, automating data integration from diverse sources for visualized operational analysis. The platform was accompanied by a roadmap outlining key stages, from planning and integration to testing and full implementation, ensuring its effective deployment across communities. This systematic approach was proved to significantly contribute to sustainable development by promoting efficient resource use, environmental responsibility, and improved governance. The findings highlighted that a comprehensive monitoring system supports recovery processes by enabling timely adjustments and ensuring transparency. These mechanisms were established as essential for achieving long-term stability and resilience in conflict-affected regions. The study's outcomes emphasize the critical role of integrated platforms and structured approaches in enhancing the effectiveness of recovery efforts while fostering trust and collaboration among stakeholders

Keywords: control tools; performance analysis; administration; local associations; territorial communities; management system

Introduction

One of the most relevant tasks for Ukraine in the current difficulties is the restoration of territorial communities affected by the armed conflict. The rehabilitation of the affected regions requires a comprehensive approach that includes not only the restoration of the destroyed infrastructure but also the implementation of sustainable practices that can guarantee sustainability and development in the long term. In this context, it is important to develop effective methods for monitoring and evaluating the effectiveness of recovery management. The relevance of the topic lies in the fact that the recovery of communities after the conflict is critical to restoring social and economic stability in Ukraine. Territorial communities are the basis for regional development, and the recovery of the entire country depends on their effective functioning. There is an urgent need for effective monitoring tools to assess progress in rebuilding infrastructure, the economy and social conditions, ensuring transparency and accountability.

The problematic aspect of the topic is the lack of clear and universal mechanisms for assessing the effectiveness of recovery measures. Currently, many regions of Ukraine are at different stages of recovery, which makes it difficult to assess their progress uniformly (Ismayilzada *et al*., 2024). In addition, there is a need to implement sustainable practices that account for environmental, social and economic aspects of development. Particular attention should be paid to the resilience of infrastructure, the adaptation of local enterprises to new conditions, and access to finance for small and medium-sized businesses. These aspects are critical to the economic stability of communities. Coordination between central and local authorities, international partners, and civil society organisations is also an important challenge to ensure that recovery strategies are implemented in a coordinated manner (Hysi *et al*., 2024). Lack of coordination can lead to duplication of efforts or waste of resources, which will negatively affect the effectiveness of recovery processes.

The development of monitoring and evaluation mechanisms will not only allow for the effective management of recovery processes but also for the timely identification of problems and shortcomings in strategies. This will make it possible to adjust approaches and ensure the sustainability of results, contributing to the long-term stability and development of conflict-affected regions. Currently, this topic is not widespread in scientific works, as the development of mechanisms is quite difficult in a time of war due to the constantly changing situation in Ukraine and partner countries, which support creating tools for monitoring and evaluating the effectiveness of the management system for the integrated recovery of territorial communities.

The role of integrated territorial plans in ensuring resilience to external challenges in Chinese cities was considered by Y. Shao *et al.* (2023). The authors emphasised the need to implement performance measurement systems for community recovery but did not sufficiently address less developed communities, which is a gap. The urban development of Santiago was considered with an emphasis on the importance of strategic planning. C. Boano & F. Vergara-Perucich (2017) found that the integration of social and economic components contributes to more effective recovery, but the authors did not consider the technical aspects of creating monitoring tools. The authors analysed the planning reform in Irish cities with a focus on citizen engagement in the monitoring process. W.M. Brady (2016) concluded that effective monitoring mechanisms can increase trust in government, but did not focus on modern digital monitoring tools. A study of cross-sectoral partnerships in Poland emphasised the importance of social responsibility during recovery. M. Furmankiewicz *et al.* (2016) drew attention to the insufficient coverage of environmental aspects of monitoring in their study.

The importance of territorial approaches to recovery was analysed, emphasising the need for public involvement.

TANGO – Territorial Approaches for New Governance (2013), emphasised the participation of local communities, but the environmental component remained insufficiently explored. Strategic recovery planning emphasised the importance of introducing digital tools to monitor progress. A. Asadzadeh *et al.* (2023) investigated how effective urban governance and planning systems can strengthen the resilience of urban areas to various challenges. They concluded that the integration of innovative approaches and active community engagement are key elements to achieving transformational resilience in the urban environment. J. Katona-Kovács *et al.* (2011) emphasised that economic indicators, such as the level of attracted investment and job creation, should be an integral part of this process. Innovative monitoring methods help to evaluate the effectiveness of the restoration of territories. R. Boschma (2008) emphasised the importance of innovation but did not sufficiently explore the social aspects of monitoring. The author also addressed the need to integrate modern digital technologies, such as big data analysis, to improve the quality of monitoring.

The study aimed to identify effective tools for monitoring the processes of recovery of territorial communities and to introduce methods for objective assessment of the results of management measures aimed at the sustainable development of the affected regions. The objective of this study is to analyse and evaluate existing approaches to the recovery of territorial communities, which will identify the most effective practices and gaps that require further research. The second task is to develop recommendations for the implementation of effective mechanisms for monitoring and evaluating the effectiveness of recovery management, which will ensure sustainable development and long-term resilience of the affected regions.

Materials and Methods

This study used a comprehensive approach that included several stages of analysis and the use of various methodological tools to develop mechanisms for monitoring and evaluating the effectiveness of management of the process of restoring territorial communities in Ukraine. The study was conducted in 2023-2024.

The first stage of the study was to analyse the legal framework governing the restoration of territorial communities, in particular, Law of Ukraine No. 13 "On the Principles of State Regional Policy" (2015) and Regional development strategy: New challenges, plans and digital technologies (2023). A detailed study of international agreements and documents (European Green Deal, 2023) that provide for the implementation of sustainable practices in community recovery processes was conducted. This allowed for the formation of a theoretical basis for further research and ensured the consistency of approaches with international standards.

The second stage involved collecting and analysing socio-economic data on the affected communities. Statistical materials were used for this purpose (Ukraine common country analysis, 2021). Key indicators of community development were analysed, including employment rates, incomes, investment volumes, environmental conditions and infrastructure. This data became the basis for the development of monitoring mechanisms.

The third stage of the study included the development of monitoring mechanisms based on a roadmap. This tool defined the stages of implementation of monitoring processes, as well as to establish the sequence of actions, responsible persons and deadlines. The roadmap included the following key steps: identification of indicators for monitoring, development of data collection tools, analysis of the results and evaluation of the effectiveness of the implemented measures. The method also ensured that the monitoring mechanisms could be adapted to the different conditions and needs of each territorial community. One of the most important tools at this stage was a risk analysis, which helped to identify potential threats to the recovery process. Political, economic, social and environmental risks that could affect the success of the projects were assessed. This helped to develop strategies to reduce risks and increase the resilience of communities to threats (Dorosh, 2023).

At the final stage of the study, a comparative analysis of the results of the roadmap implementation in different communities was carried out to identify the most effective approaches. Performance was assessed using Key Performance Indicators (KPIs) (2024), which included the level of infrastructure restoration, economic growth, social stability, and implementation of environmental standards. Thus, the use of the roadmap as the main monitoring tool allowed for a systematic approach to managing the recovery of territorial communities, as well as the development of tools to assess the effectiveness of these processes at all stages of implementation.

Results

Comprehensive strategies for restoring war-affected territorial communities in Ukraine

Given the current challenges caused by the armed conflict, a key task for Ukraine is to ensure the restoration of territorial communities affected by the war. The process should include not only the restoration of destroyed infrastructure but also the creation of socio-economic stability and the implementation of environmentally friendly solutions. Territorial communities that have suffered significant losses require careful coordination of efforts at all levels – from local authorities to international partners – to ensure long-term development. Improvement of the recovery process requires a systematic approach that includes the assessment of socioeconomic indicators, the use of modern surveillance methods and the monitoring of results at each stage. In this context, the development and implementation of monitoring mechanisms that will allow timely assessment of the effectiveness of recovery measures, respond to changes and adjust strategies in response to new challenges is of particular importance.

Law of Ukraine No. 13 (2015) provides the main principles of regional development that are critical for the recovery of communities from disaster. In the context of this study, this law defines key tasks, including stimulating economic development and ensuring coordination between state authorities and communities. One of the important aspects that needs to be monitored is the implementation of a sustainable development strategy, which involves increasing economic activity by attracting investment and creating new jobs. In the context of community recovery, it is also necessary to ensure environmental sustainability, which is an integral part of the process. European Green Deal (2023), focusing on the principles of sustainable development, defines the introduction of energy-saving technologies and environmentally friendly solutions in the reconstruction of infrastructure (Krawczyńska *et al.*, 2024). In this study, this document is considered as a strategic direction for integrating environmental standards into the process of restoring territorial communities. Emphasis is placed on the modernisation of infrastructure using renewable energy sources and environmentally friendly materials. In addition to national and international documents, it is necessary to address specific plans, such as Planning the Development of Territorial Communities: Training Manual for Local Government Officials (Vasylchenko *et al.*, 2015). The restoration of the affected regions is required, and the author of this document identifies specific steps to support economic development through the introduction of innovative technologies, job creation and improvement of social infrastructure. Monitoring the implementation of this plan is important for assessing the effectiveness of recovery management. Another important document is Green Reconstruction of Ukraine: Position of Civil Society (2022), which focuses on the introduction of energy-saving technologies in the recovery process. This programme is key to integrating environmental standards into the reconstruction of the infrastructure of affected communities. Its implementation will help to achieve high environmental standards in the framework of recovery efforts. Aspects of community recovery are presented in Table 1.

The main areas to be monitored are economic growth, social stability and environmental sustainability. Each of these areas has its unique indicators that can be used to track progress in a timely manner and make the necessary management decisions to adjust the strategy (Table 2).

Table 1. Key aspects of the restoration of territorial communities

Document	Main focus	Metrics to monitor
Law of Ukraine No. 13 "On the Principles of State Regional Policy" (2015)	Economic development of regions, coordination between state and local authorities	Investment attraction, number of new jobs
European Green Deal (2023)	Implementation of environmental technologies in infrastructure rehabilitation	Reducing emissions, using renewable energy sources
Planning the Development of Territorial Communities: Training Manual for Local Government Officials (2015)	Supporting socio-economic development and innovation	Creating jobs, improving social infrastructure
Green Reconstruction of Ukraine: Position of Civil Society (2022)	Restoring critical infrastructure with a focus on the environment	Implementation of energy-saving technologies

Source: compiled by the authors

Table 2. Key metrics to monitor

Area	Value	Measurement unit
Economic growth	Attracting investment	Million UAH
	Number of new jobs	Amount
	Gross regional product (GRP) growth	%
Social stability	Employment level	%
	Share of the population with access to basic social services	%
	Number of people receiving social services	Number of people
Environmental sustainability	Reducing greenhouse gas emissions	t CO_2
	Share of renewable energy sources usage	%
	Energy efficiency of buildings	kW·hour/m² per year

Source: compiled by the authors based on K. Smits *et al.* (2019), Economic Activity Indicators (2022), J. Gyiimah *et al.* (2023) and Regional development strategy: New challenges, plans and digital technologies (2023)

The table shows the key indicators that allow for assessing the effectiveness of community recovery in three main areas: economic growth, social stability and environmental sustainability. Within the framework of economic growth, investment attraction and the number of new jobs are critical in determining the economic development of a community. These indicators can be used to assess the extent to which the community is successfully integrating into the recovery process and the extent to which the resources attracted contribute to its economic revival.

Social stability is equally relevant, as employment rates and access to social services indicate the level of integration of residents into the restored communities (Ponomarenko & Pysarchuk, 2024). The provision of employment and

services, such as healthcare and education, are critical to overcoming the social problems caused by the conflict. Environmental sustainability, including greenhouse gas emission reductions and the use of renewable energy sources, emphasises the importance of environmental aspects in the recovery process (Brovina & Sallaku, 2024). These indicators not only reduce the negative impact on the environment but also increase the level of environmental responsibility of communities, ensuring their long-term sustainability. Thus, the combination of economic, social and environmental indicators in the monitoring system creates a comprehensive picture of the state of community recovery and allows for effective management decisions for further development.

Benchmarking and monitoring governance effectiveness in post-conflict community recovery

In the process of restoring territorial communities in Ukraine, a range of methods are used to assess the effectiveness of governance, particularly in the economic, social and environmental areas. A comprehensive monitoring system based on quantitative and qualitative indicators allows for the assessment of progress in community recovery. This system is based on the analysis of national and international documents. In this context, the benchmarking method is important because it offers a comparative analysis of the effectiveness of community management.

The benchmarking methodology can be used to compare the management results of different communities based on specific indicators, such as employment, per capita income, investment attractiveness and efficiency of local resource use. For this topic, this approach is particularly valuable as it not only assesses the current state of communities but also tracks the dynamics of changes through comparison with other communities. Important indicators for assessing the economic and social efficiency of management are:

1. The number of employed people in the restored communities indicates economic growth and successful job creation.
2. Per capita income, which reflects the economic condition of the community and the level of well-being of its residents.
3. The volume of investments in infrastructure and social projects demonstrates the attractiveness of communities to investors.
4. The efficiency of the use of local taxes indicates the financial stability of the community and the rational use of resources.

As they show the economic stability and progress of communities after conflict, these indicators can serve as the basis for a monitoring system. Benchmarking tools not only assess how well governance is working but also identify areas where additional investment and attention are needed. The main indicators are shown in Table 3.

Table 3. Key indicators for monitoring using the benchmarking methodology

Value	Measurement unit	Values to monitor
Number of employed people	amount	Evaluating the success of job creation
Income per capita	UAH	Level of economic well-being
Investment volume	million UAH	Investment attractiveness of the region
Effective use of taxes	%	Financial sustainability

Source: compiled by the authors based on L. Courtney (2023)

The use of these indicators in the monitoring process provides a comprehensive assessment of the state of community recovery and allows tracking progress in key development areas such as employment, economic well-being and financial sustainability. The monitoring system is based on clearly defined KPIs that are used for an objective assessment of progress in areas such as governance, economic, social and environmental. These indicators will be monitored regularly and the data analysed to help managers make better decisions (Table 4).

Table 4. Economic indicators for monitoring

Value	Description
Gross domestic product (GDP)	The total market value of all goods and services produced in the country.
Inflation level	A measure of the growth of prices for goods and services over time.
Unemployment rate	The share of the population that is actively looking for work but cannot find it.
Consumer confidence index	Reflects consumer optimism about the economy and their willingness to spend money.
Currency exchange rate	The value of the national currency against foreign currencies.

Source: compiled by the authors based on G. Verstraete (2023)

This Table 4 shows the main economic indicators that are key to monitoring and forecasting the economic situation. Indicators such as GDP, inflation, unemployment, consumer confidence and exchange rates provide a snapshot of the overall health of the economy, labour market stability and consumer sentiment. They play an important role in the development of economic strategies and decisions on investment and economic development (Table 5).

Table 5. Social indicators of monitoring

Value	Description
Employment	Percentage of the working population compared to the working-age population of the community
Access to healthcare services	Number of healthcare facilities per 1000 inhabitants, accessibility of services for the population
Access to educational services	Number of educational institutions per 1000 inhabitants, level of provision of educational services
Level of Social Security	Number of people receiving social benefits as a percentage of the total population

Source: compiled by the authors based on Resolution No. 449 "On Approval of the Procedure for Monitoring the Provision and Evaluation of the Quality of Social Services" (2020)

Employment rates, access to healthcare and education services, and social protection are reflected in social indicators. This can be used to observe the quality of life of people in the communities that have been restored. Effective monitoring of these indicators will help improve social stability and prevent social crises (Table 6).

Table 6. Environmental monitoring indicators

Value	Description
Reducing greenhouse gas emissions	The amount of CO_2 emissions reduced in tonnes per year compared to pre-war levels.
Share of renewable energy sources usage	Percentage of total energy capacity generated from renewable sources
Energy efficiency of buildings	Number of modernised buildings with improved energy efficiency, number of buildings meeting new standards

Source: compiled by the authors based on Environment and climate change Canada (2024)

Environmental indicators, such as greenhouse gas emission reductions, the use of renewable energy sources and energy efficiency of buildings, are key to assessing the sustainable development of communities. These indicators can be used to assess the environmental impact of restoration processes and their compliance with modern environmental standards (Table 7).

Governance indicators can be used to assess the effectiveness of different levels of government, community participation in decision-making, transparency of financial management, and responsiveness to new challenges. Monitoring of these parameters will ensure accountability and transparency in the use of resources, as well as increase the effectiveness of recovery management. Thus, all the indicators presented in the tables are important components of the monitoring system. This can be used to quickly assess the effectiveness of treatment and take the necessary corrective actions.

Table 7. Management monitoring indicators

Value	Description	Measurement unit
Level of achievement of goals	Degree of achievement of the organisation's strategic goals and plans	%
Efficiency of management decisions	Effectiveness of management decisions in response to challenges and problems	Number of solutions
Degree of community involvement	Share of the population involved in decision-making and management processes	%
Transparency of the management process	Open access to information on decision-making processes	Number of published reports
Timeliness of management decision-making	Time required to make and implement decisions in crises	Days
Level of coordination between management levels	Cooperation and coordination between different levels of government in the decision-making process	%
Degree of compliance with regulatory requirements	Percentage of decisions that comply with applicable laws and regulations	%

Source: compiled by the authors based on R. Mosse & L.E. Sontheimer (1996)

Digital platform development for monitoring and evaluating community recovery process

Participation in the creation of a digital platform for data collection and analysis is an important part of the process of monitoring and evaluating the effectiveness of the process of restoring territorial communities in Ukraine. The platform will be able to collect, store and analyse important indicators from economic, social, environmental and governance perspectives. The following examples will demonstrate how this platform can improve monitoring and evaluation.

The platform will provide automated data collection from a variety of sources, including private and public organisations, city administrations and non-government organisations. For instance, economic indicators, such as investment attraction and job creation, will be continuously reviewed based on data from local administrations and business registers. The integration of real-time data will allow for a more accurate assessment of the state of recovery and avoid delays in decision-making. This will allow the government to respond quickly to changes, such as job

losses or investments. This platform is designed to analyse data using analytical tools and algorithms that will help identify correlations between different indicators, predict future trends and assess the impact of various factors on the recovery process. For example, data from the environmental monitoring system can be used to analyse environmental indicators such as greenhouse gas emissions or the energy efficiency of buildings. This can be used to quickly identify communities where additional measures need to be introduced to reduce the negative impact on the environment.

The analytical tools on the platform can also be used to conduct comparative analysis using benchmarking methods. This assesses the effectiveness of the recovery of individual communities based on comparisons with other communities. For example, a community that shows less growth in attracting investment will be able to study the strategies of more successful communities and adjust its approaches. A geographic information system (GIS) is an important component of monitoring. Demonstration of data on a map is particularly relevant for infrastructure and environmental monitoring. GIS can track the energy efficiency of buildings in different regions and identify the best locations for retrofitting or introducing renewable energy sources. In addition, GIS can indicate locations with high emissions, allowing the government to take immediate action to reduce harmful environmental impacts (Jonker, 2023).

Another important function of the platform will be to monitor social indicators, such as employment and access to social services. Through automated data collection, the platform will be able to show changes in these indicators at different stages of recovery. For instance, if the employment rate in a particular community is not growing as planned, the system will identify which sectors need additional support or investment. Governance indicators, such as coordination between different levels of government and the level of community participation in decision-making, are also an important element of monitoring (Téllez *et al.*, 2022). The platform will ensure the transparency of these processes by publishing data on project implementation, the number of public consultations, and the speed of response to new challenges. This will not only assess the effectiveness of governance but also involve the public in monitoring processes, increasing the level of trust in local and state authorities.

The system will also include a KPI system. The implementation of KPIs is one of the critical aspects of the monitoring system for the recovery of territorial communities. These indicators allow tracking the success and progress of recovery activities in all 4 areas. The main advantage of implementing KPIs is that the data obtained through the automated platform can be updated in real-time. This allows authorities to quickly and objectively assess the current situation in each community. For example, if the investment attraction indicators in a particular region do not meet the expected results, managers can immediately revise the strategy and take additional measures to attract investors. Similarly, the system can quickly take action to address problems if there is a decline in employment or deterioration in access to healthcare services.

Quarterly and annual reports based on key indicators will allow for the timely recording of recovery progress. Such reports will promote transparency and help communities and government authorities allocate resources more effectively. Quarterly reporting can be used to quickly identify short-term problems and shortcomings in the implementation of recovery measures. For example, KPIs can identify factors that delay project implementation, such as insufficient funding or poor coordination between different levels of government. This allows corrective measures to be taken quickly. Annual reports will be more detailed and will help to assess the overall progress and long-term results of restoration projects.

The automated platform allows for the integration of KPIs into one system, providing real-time transparency and analytics (Abril-Jiménez *et al.*, 2024). This increases the efficiency and trust of the population in the recovery process. For example, communities can see the concrete results of local authorities' work when they have access to information on employment rates and the status of environmental projects in their area. Moreover, the availability of real-time data allows for flexible decision-making. If one community performs well on certain indicators, their experience can be applied to other regions (Trusova *et al.*, 2020).

Once the KPIs for monitoring community recovery have been identified, it is necessary to develop a clear action plan for implementing this system. The roadmap defines the sequence of steps that will allow for the effective implementation of the monitoring system and ensure its successful functioning at all stages of community recovery. Each stage of implementation has its tasks and deadlines. From defining KPIs to the full implementation of the platform, the roadmap helps to coordinate the efforts of all stakeholders and ensure transparency and control at each stage.

The first stage is the planning stage, which takes 1-2 months. At this stage, clear objectives and goals of the monitoring system are developed. This includes analysing the needs of each community, identifying key indicators for monitoring (economic, social, environmental and governance), and forming a team of developers and responsible persons. The planning process involves collecting and assessing the resources needed for implementation and establishing communication between all stakeholders.

The second stage is data integration, which takes 3-5 months. This step involves automated data collection from various sources, such as state registers, local administrations, non-government organisations and the private sector. This stage involves integrating the platform with existing databases and creating a common database for storing and processing information.

The third stage is the development of the platform for 6-8 months. The development of the technical infrastructure and creation of software for data collection, processing and visualisation. At this stage, analytical tools are developed to enable real-time analysis. Particular attention

should be paid to data security and flexibility of the platform for its further development.

The fourth stage is pilot testing 9-10 months. At this stage, the system is launched in several pilot communities to test its performance. Testing will help identify possible technical issues and improve the system's functionality. An important aspect is to receive feedback from users for further improvement.

The fifth stage is a full-scale implementation in 11-12 months. After successful testing, the system will be implemented in all communities. At this stage, local government employees are trained on how to use the platform, and all regions are connected to the system. Users should be supported, and any technical issues should be resolved promptly.

The final stage is continuous monitoring and optimisation, with no end in sight. This stage involves constant data updates and analysis of the system's performance. Prompt adjustments to the recovery process will allow strategies to be adapted depending on the results of monitoring. The platform will also allow for analysis and reporting to the public on the progress of recovery. The roadmap is presented in Figure 1.

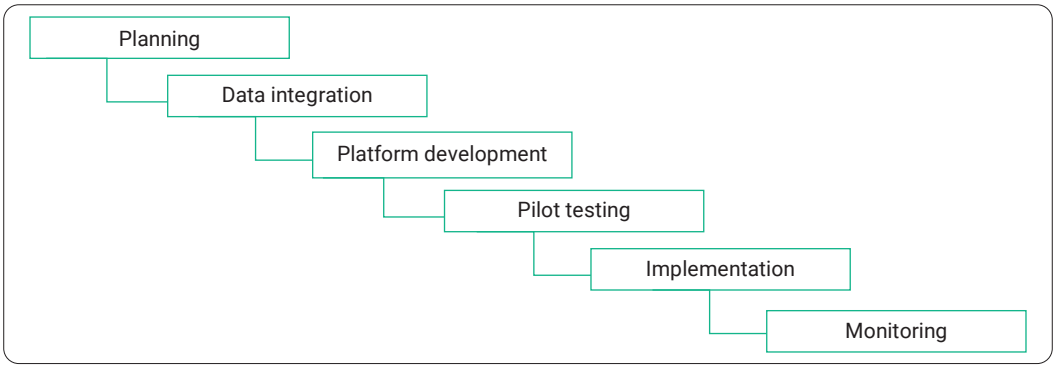

Figure 1. Roadmap for the creation of a monitoring system
Source: compiled by the authors

Effective data integration and the development of a digital platform create the basis for convenient and accurate monitoring of the state of infrastructure, economic performance and social stability of communities. Thanks to these tools, managers can respond quickly to changes, and communities gain transparency and control over the recovery process. Continuous monitoring and optimisation will help make the system flexible and able to adapt to new challenges, ensuring long-term stability and development.

The comprehensive recovery of conflict-affected communities requires a holistic approach and the integration of economic, social, environmental and governance indicators. KPIs are used to monitor and evaluate performance and allow for real-time tracking of progress. The development of a roadmap or itinerary, as well as the use of a digital platform for data collection and analysis, ensures consistency of actions and management at each stage of recovery. This allows for sustainable community development and rapid response to problems.

Discussion

In this study, mechanisms for monitoring and evaluating the effectiveness of the integrated community recovery management system were developed. These include the creation of a digital platform and a roadmap to facilitate monitoring. In the context of Law of Ukraine No. 13 (2015), the research findings confirm the importance of this document for the recovery of communities, especially through its emphasis on regional economic development and investment attraction. The research findings are in line with the approach outlined in the document, which identifies the importance of coordination between different levels of government for the effective management of recovery processes. This analysis confirms that the economic activity of communities after recovery is significantly increasing due to the implementation of measures envisaged in the law.

The study also confirmed the importance of introducing innovative technologies to ensure the sustainable development of communities, which correlates with the Planning the Development of Territorial Communities strategy: Training Manual for Local Government Officials (Vasylchenko, 2015). This study pays special attention to the creation of new jobs and the development of social infrastructure, which is also reflected in the document.

Y. Shao *et al.* (2023) investigated the role of comprehensive territorial plans in Chinese cities, with a particular focus on resilience to external challenges such as natural disasters and social change. In common with this study is the focus on economic indicators such as investment attraction and job creation. Both studies recognise that monitoring the economic aspects of recovery is important to ensure the long-term resilience of communities. However, Y. Shao *et al.* emphasised the regional aspects of planning, while this study focuses on local communities and their ability to adapt quickly. An important distinguishing point is also the attention to environmental aspects in this study, which was not considered in such detail in their approach.

C. Boano & F. Vergara-Perucich (2017) highlighted the integration of social and economic components in the urban regeneration of Santiago. As in the present study, the

importance of an integrated approach that combines several indicators to ensure community resilience was emphasised. However, their work does not pay enough attention to the technical aspects of monitoring and the implementation of digital tools to assess the effectiveness of management processes, which is one of the key components of this study. Additionally, social indicators such as access to social services and employment rates are important in both works, but this study pays more attention to environmental aspects such as reducing greenhouse gas emissions and using renewable energy sources.

J. Katona-Kovács *et al.* (2011) emphasised the importance of economic indicators for monitoring, such as investment and job creation, which is in line with the approach of this study. However, in contrast to this study, their study devotes less emphasis to environmental indicators, which are an integral part of a holistic approach to recovery. In addition, their study does not sufficiently cover the use of digital tools for monitoring, which is considered an important element in this context. R. Boschma (2008) emphasised the importance of innovation for effective monitoring of recovery processes, which is in line with the approach of this study. However, in contrast to the approach proposed in this study, author did not address sufficiently the social aspects of monitoring, in particular, social stability and access to services. The aforementioned study focuses more on economic and innovation indicators, but less on environmental sustainability and the impact of recovery on social change, which are important components of this study.

The U.S. Department of Commerce (2023) identifies commonalities with the theme of community recovery, including the importance of monitoring, data management, and transparency. Both themes emphasise the importance of data collection and analysis for management decision-making. The differences lie in the fact that the report focuses on the technical aspects of information management, while the research on community recovery pays more attention to the physical and social aspects of recovery, including economic and social resilience. The National Intelligence Strategy (2023) shows similarities in the approach to monitoring and performance evaluation. Both strategies emphasise the importance of continuous monitoring to achieve goals and coordination between different levels of government. However, the differences lie in the fact that the intelligence strategy focuses on national security and data collection, while the community recovery strategy emphasises socio-economic aspects such as attracting investment, creating jobs and environmental sustainability.

Research on spatial planning in China focuses on the creation of a system for overseeing and implementing spatial planning from a sustainability perspective. Studies conducted by S. Chen *et al.* (2023) emphasise the importance of building a supervisory system that considers economic and environmental factors that contribute to the sustainability of space. This coincides with the approach taken by Ukrainian scholars, especially in this study, which also focuses on environmental sustainability and the use of renewable energy sources in the process of community recovery. However, the Chinese research focuses on developing a management strategy at a much broader regional level than in the case of Ukrainian communities, which focuses on local aspects of territorial recovery.

The International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) (2023) emphasises the importance of community participation in restoration processes. In particular, the study emphasises the need for transparent monitoring and the involvement of residents in the decision-making process. This approach correlates well with Ukrainian recovery strategies, which also emphasise community participation in the management of recovery projects and monitoring of social stability indicators. Thus, it can be noted that international research and Ukrainian experience in community recovery have common features in terms of environmental sustainability, community participation, and the need for transparent and effective monitoring. At the same time, international practices show opportunities for expanding the Ukrainian monitoring system to the level of broader territorial planning, which could be useful in the future.

H.J. Shatz *et al.* (2022) based a study of previous reconstruction efforts, such as plans for post-World War II Europe, South Sudan and Afghanistan. The focus is on the need for security, transparent funding and clear monitoring at every stage of reconstruction. This overlaps with Ukrainian studies, which also emphasise transparency and security. However, in the case of Ukraine, the emphasis is on the integration of environmental aspects and a sustainable development strategy, which was not so evident in the foreign examples mentioned above. The RAND organisation emphasises the importance of international cooperation for long-term security and economic recovery, as well as the use of private capital and international donors. Another study presented by the Brookings Institution (Wessel & Asdourian, 2022) also considers the reconstruction of countries such as Afghanistan and South Sudan. It emphasises the importance of making less ambitious promises and focusing on practical measures to avoid disappointment. This follows Ukrainian approaches to attracting investment and transparently monitoring governance performance, but Brookings adds the importance of political stability as a key factor in successful recovery, which is also relevant for Ukraine.

In summary, research shows that the recovery of territorial communities after war requires a comprehensive approach that considers economic, social, environmental and institutional factors. The introduction of modern digital platforms to monitor and evaluate the effectiveness of recovery management is an important component of effective recovery, as it allows for the timely identification of problems and adjustments to plans. Thus, transparency, efficiency, and attracting international investment are important factors for long-term economic development.

The results of the study confirm that sustainable development and the introduction of environmental innovations, especially renewable energy sources, are vital, which

is consistent with the methods presented in Ukrainian and international studies. Community involvement in the recovery process is important as it promotes social stability and increases trust in management decisions. International research suggests broader regional strategies that could be used in the future in Ukraine, although Ukrainian methods focus on local aspects of restoration and monitoring. To achieve resilience and community development, cooperation between central and local authorities, as well as international partners, must continue.

Conclusions

The recovery of communities affected by armed conflict requires the implementation of a comprehensive multi-level performance monitoring and evaluation system. This process covers governance, economic, social and environmental indicators that are vital to achieving sustainable development. Attracting investment, creating new jobs and businesses, and increasing the productivity of enterprises are factors that determine economic performance, which is relevant for community recovery. As a result, it helps to strengthen the economic base of communities and restore their economic potential.

In addition, social indicators are very important as they show the level of social stability and well-being. Maintaining social balance and preventing social crises depends on restoring employment, access to health and education services, and the provision of social guarantees. Monitoring these elements facilitates the integration of residents into the restored communities and helps to solve problems quickly. Environmental indicators are also critical in the recovery process, as ensuring environmental sustainability is a key task for preserving natural resources and ensuring environmental safety. Reducing greenhouse gas emissions, increasing the energy efficiency of buildings, and using renewable energy sources contribute to achieving environmental standards and ensuring the sustainable development of local communities. These metrics are important not only for improving the environmental situation but also for improving the quality of life of residents, as environmental safety is an integral part of the overall well-being of communities.

Governance indicators help to assess the effectiveness of government at different levels, coordination between them, and community involvement in decision-making. Transparency in financial and management processes, timely response to challenges, and accountability for the use of resources are key elements to ensure effective community recovery. Citizen participation in decision-making processes is an important aspect, as it increases the level of trust in the authorities and promotes social cohesion. The implementation of key performance indicators is the basis for monitoring and evaluating the results of recovery measures. Importantly, the KPI system can monitor progress in real-time, which enables timely decision-making and adjustments to strategies depending on changes in the situation. Regular reporting on KPIs allows not only to identification of problematic aspects but also to assessment of successes at different stages of recovery, which increases transparency and accountability of the authorities to the community.

Creating a roadmap for the implementation of the monitoring system is a key element to ensure consistent and effective implementation of tasks at each stage of community recovery. This map contains specific steps with clear tasks and deadlines, which helps coordinate the efforts of all stakeholders and ensures control at all levels. From the planning stage to the full implementation of the system, the roadmap helps to structure the recovery process and ensure that the goals are achieved. The successful implementation of the monitoring system will help create conditions for the sustainable development of territorial communities and increase their resilience to external challenges.

One of the main limitations of this study is the dependence on the availability of high-quality and up-to-date data to assess the effectiveness of the community recovery management system. Incomplete or untimely data can negatively affect the accuracy of monitoring and the correctness of decisions. In addition, the study does not address possible challenges related to external economic and political factors that may significantly affect the recovery process. Promising areas for further research include the development of a monitoring system that accounts for the impact of external risks, such as economic instability or changes in the legal framework. It is also important to explore the possibilities of integrating the latest technologies, such as Big Data, to improve the process of data collection and analysis. This will improve the effectiveness of recovery management and make it more adaptive to rapidly changing conditions.

Acknowledgements

None.

Conflict of Interest

None.

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Розробка механізмів моніторингу та оцінки ефективності системи управління комплексним відновленням територіальних громад

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Анотація. Метою дослідження було створення системи моніторингу та оцінки відновлення територіальних громад в Україні, що постраждали від збройного конфлікту. Було визначено ключові сфери моніторингу – економічну, соціальну, екологічну та управлінську. Економічні показники, такі як інвестиції та створення робочих місць, були визначені як метрики стабільності, тоді як соціальні показники, включаючи зайнятість та доступ до послуг, виявилися критично важливими для якості життя. Екологічні індикатори наголошували на скороченні викидів, підвищенні енергоефективності та використанні відновлюваних джерел енергії. Індикатори врядування підкреслили необхідність координації, участі та прозорості використання ресурсів. Головним досягненням стала розробка цифрової платформи, здатної збирати та аналізувати дані в режимі реального часу, автоматизуючи інтеграцію даних з різних джерел для візуалізованого оперативного аналізу. Платформа супроводжувалася дорожньою картою, яка окреслювала ключові етапи, від планування та інтеграції до тестування та повного впровадження, що забезпечило її ефективне розгортання в громадах. Було доведено, що такий системний підхід робить значний внесок у сталий розвиток, сприяючи ефективному використанню ресурсів, екологічній відповідальності та покращенню врядування. Результати дослідження підкреслили, що комплексна система моніторингу підтримує процеси відновлення, дозволяючи вчасно вносити корективи та забезпечуючи прозорість. Ці механізми були визнані необхідними для досягнення довгострокової стабільності та стійкості в регіонах, що постраждали від конфлікту. Результати дослідження підкреслюють вирішальну роль інтегрованих платформ і структурованих підходів у підвищенні ефективності зусиль з відновлення, а також у зміцненні довіри та співпраці між зацікавленими сторонами

Ключові слова: інструменти контролю; аналіз ефективності; адміністрування; місцеві асоціації; територіальні громади; система управління