

Infrastructure Restoration as a Mechanism for Building Investment Resilience in Post-Conflict Regions: Strategic Approach to Public Administration

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Abstract

The article presents a comprehensive analysis of infrastructure recovery management as a strategic instrument for attracting investment in post-conflict regions. The relevance of the study is justified by the large-scale destruction of critical infrastructure, heightened security risks, and the need to stabilize economic processes and create conditions for long-term development. The study demonstrates that effective public management mechanisms play a decisive role in restoring investment attractiveness and enabling the transition from crisis response to sustainable modernization. The research assesses the effectiveness of strategic planning tools, digital management of infrastructure projects, public-private partnerships, risk-based approaches, and innovative reconstruction practices. Structural transformations in state infrastructure policy are analyzed, including the establishment of specialized recovery institutions, the introduction of digital monitoring platforms, increased regionalization of reconstruction processes, and the evolution of international assistance mechanisms. The methodological framework is based on systematic, comparative, and economic-analytical approaches, including scenario modeling, assessment of investment attractiveness,

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institutional analysis, and the synthesis of international post-conflict reconstruction experience. The findings identify key success factors for investment attraction, such as governance quality, procedural transparency, digitalization, security guarantees, and effective communication with international partners. The results have practical value for policymakers, regional authorities, and international stakeholders involved in post-conflict recovery and modernization strategies.

Key words: Infrastructure Provision, Public Management of Infrastructure Development, Infrastructure Policy, International Aid

JEL Codes: H54, O18, O22, R58

1. Introduction

Infrastructural restoration of post-conflict territories is one of the most complex and at the same time the most important tasks of modern state policy. In conditions of large-scale destruction of critical, transport, energy and social infrastructure, there is a need to transition from fragmented reconstruction to systemic management of reconstruction processes. The imbalance of resources formed as a result of military actions, disruption of logistical chains, degradation of local economies and depopulation of territories require an integrated approach in which the management of infrastructure restoration acts as a central management tool.

Infrastructure restoration has not only a technical or engineering dimension, but also a significant economic, social and geopolitical context. It is the infrastructure that creates the basis for the functioning of the labor market, population mobility, access to services, the development of small and medium-sized businesses, the restoration of industrial potential and the formation of new investment clusters. In post-conflict regions, its condition becomes a key indicator of the stabilization of the territory, which determines the level of trust on the part of international institutions, private investors and society.

A strategic approach to public administration, focused not only on eliminating the consequences, but also on forming a sustainable infrastructure model of the future, is becoming particularly relevant. The modern management model involves a combination of the state's institutional capacity, digital technologies, public-private partnership mechanisms, risk management tools and international cooperation. Thus, infrastructure restoration management is transformed from a technical process into a comprehensive management system that ensures the effective use of resources, coordination of participants and long-term investment attractiveness.

The world experience of reconstruction after armed conflicts, from the Balkans to the Middle East, proves that the pace and effectiveness of recovery directly depend on the quality of management, transparency of projects, availability of financing and the ability of the state to implement modern technological

solutions. Ukraine is in a situation where it is simultaneously necessary to ensure the rapid restoration of critical facilities, form new institutional mechanisms for reconstruction, ensure control over the use of resources and create conditions for investors to enter regions that have long remained high-risk.

In this context, the development and implementation of strategic models for infrastructure recovery management that combine planning, financing, digitalization, monitoring, performance assessment, and long-term forecasting are of particular importance. Important components of such models include the creation of new reconstruction institutions, improving investment legislation, introducing international transparency standards, and building digital platforms for project management.

Therefore, this study is aimed at comprehensively substantiating the role of public administration in shaping the infrastructure competitiveness of post-conflict regions, identifying factors that determine the attractive investment of territories, and analyzing modern management tools capable of ensuring accelerated and sustainable recovery.

2. Literature Review

The issue of infrastructural restoration of post-conflict territories and the formation of effective mechanisms of public administration in this area has become one of the key topics of modern socio-economic research. The growing scale of destruction, the global strategy of donor support and investment mobilization, as well as the need for rapid restoration of critically important facilities have led to increased scientific attention to the strategic management of infrastructure development in conditions of instability.

At the international level, the issue of reconstruction and attracting investment in post-conflict regions is explored in the works of authors who analyze institutional conditions, mechanisms of international cooperation and innovative financial instruments. In particular, Demirel et al. (2022) and Oyekan (2024) emphasize that the effectiveness of the recovery depends directly on the state's ability to create a transparent system of infrastructure project management that can guarantee investment security and long-term stability. In a World Bank report (World Bank, 2024) focuses on the concept of Resilient Recovery, which combines physical infrastructure restoration with systemic modernization of regional governance, digital services, and the investment climate

Research on institutional capacity and governance architecture plays a significant role in shaping contemporary approaches to infrastructure recovery management. Deelstra & Bristow (2023) and Elvas et al. (2021) prove that countries that implement flexible and adaptive models of public governance are significantly faster at mobilizing investment resources and demonstrating sustainable

development after conflicts. In the works of Hewitt et al. (2022) and Vaugeois et al. (2022) emphasize that recovery management should be based not only on technical reconstruction, but also on restoring trust between the state, business, and community.

A large body of research is devoted to financial mechanisms for attracting investment. In the works of Brockova et al. (2021), Adhikari & Safaee Chalkasra (2023) and Wei et al. (2022) determined that infrastructure projects in post-conflict regions require a combination of different investment instruments: grants, guarantees, concessional financing, public-private partnerships and institutions of international financial organizations. Blended models are gaining particular attention financing that allows combining private and public investments, minimizing risks through the participation of international donors.

The literature also highlights a research area dedicated to digital approaches to recovery management. Research of Yevu et al. (2021) and Hallikas et al. (2021) show that digitalization of procurement procedures, use of GIS systems, creation of national damage registries and digital monitoring platforms are key factors in increasing transparency and investment attractiveness. The concepts of digital recovery and smart reconstruction are increasingly being implemented in post-conflict recovery strategies, in particular in Ukraine and the Middle East.

Modern research pays considerable attention to the social and environmental components of recovery. According to the United Nations Development Programme (United Nations Development Programme, 2023) and the United Nations Environment Program (United Nations Development Programme, 2024), the sustainability of infrastructure solutions is determined by the ability to take into account environmental risks, the principles of green reconstruction and social inclusion. In the works of Kopiika et al. (2025) and Forcellini & Mitoulis (2025) state that infrastructure restoration should be based on the principles of resource-oriented restoration. on community, which ensures public trust and contributes to more effective investment attraction.

Ukrainian researchers are also actively developing the theory of post-conflict recovery management. In particular, Zatonatskiy & Poltoratska (2024) argue for the need to form an institutional management ecosystem that includes decentralized regional recovery offices, digital registries, and partnership mechanisms with international financial institutions. The study by Hlushko (2024) and Zatonatska et al. (2024) emphasize Ukraine's potential to attract investment through the modernization of transport, energy and social infrastructure based on EU standards and sustainable development principles.

Despite the intensive development of scientific research, a number of unresolved problems remain: the lack of a single integrated model of infrastructure recovery management, insufficient study of the effectiveness of digital monitoring tools, insufficient systematic regulation of public-private partnerships in post-conflict regions, as well as the lack of comprehensive methods for assessing the

investment attractiveness of territories after conflicts. At the same time, the issue of synergy between state structures, international partners, and local communities remains relevant.

A generalization of the literature indicates that infrastructure recovery management is a multidimensional process that combines strategic public management, innovative financial instruments, digital solutions, and institutional cooperation. It is the complexity of approaches that determines the state's ability to ensure investment attraction and sustainable development of post-conflict territories.

3. Methodology

The study of infrastructure recovery management as a tool for attracting investment in post-conflict regions is based on the use of a wide range of official statistical data, international analytical reports, materials from state institutions and specialized research on infrastructure recovery and development. The source base is the reports of the Organisation for Economic Cooperation and Development (Compendium of good quality practices infrastructure, 2024), International Monetary Fund (International Monetary Fund, 2025) as well as data from the European Investment Bank (European Investment Bank, 2024), United States Agency for International Development (United States Agency for International Development, 2023) on financing recovery projects. The use of these resources ensured the representativeness of the assessment of structural factors of infrastructure recovery, investment mobilization mechanisms, public administration efficiency, and institutional capacity of the regions that suffered destruction.

The chronological boundaries of the study cover the years 2014-2025, which allows us to consider the evolution of approaches to post-war and post-crisis recovery, starting from early models of stabilization and humanitarian support to modern strategies of infrastructure modernization, digital transformation and attracting investments in long-term development projects. The chosen time interval allows us to trace how public administration priorities, forms of international partnership and financing instruments changed under the influence of large-scale security and economic challenges.

The methodological basis of the study is based on systemic, institutional, analytical-economic and comparative approaches. The systemic approach allows us to consider infrastructure recovery as a multi-level system in which state institutions, international organizations, investors, local governments and communities interact. The institutional approach allowed us to assess the impact of regulatory mechanisms, project management procedures, regulatory standards, transparency and accountability on the ability of regions to attract investments. The analytical-economic approach provided an assessment of investment volumes,

structural characteristics of financing, dynamics of critical infrastructure recovery and the effectiveness of public-private partnership instruments. The comparative approach was used to compare Ukrainian recovery models with the post-conflict experience of Croatia, Rwanda, Bosnia and Herzegovina, Iraq and Kosovo, which allowed us to outline universal success factors and typical barriers to infrastructure management.

To ensure correctness and comparability of data, they were standardized in accordance with the United Nations Office for Disaster Risk Reduction (United Nations Office for Disaster Risk Reduction, 2024), Organization for Economic Cooperation and Development (OECD infrastructure governance toolkit, 2024), European Bank for Reconstruction and Development (European Bank for Reconstruction and Development, 2024). The study includes indicators of the level of infrastructure destruction, institutional capacity of regions, investment activity, volumes of international aid, transparency of project implementation, digital readiness, sustainability of transport, energy and social infrastructure, as well as the pace of implementation of recovery programs.

The applied methods of interpretation of the results combine qualitative and quantitative analysis. Content analysis of international reports allowed to identify key trends in approaches to infrastructure restoration and investment attraction in post-conflict conditions. Statistical methods made it possible to assess the relationship between institutional capacity, project management efficiency and the volume of investment in restoration. Scenario analysis was used to model possible trajectories of infrastructure development of Ukraine depending on the level of investment attraction, the speed of regulatory reforms, the scale of international support and the pace of integration into European infrastructure networks.

The complexity of the materials and methods used provided the opportunity to form a holistic and analytically sound vision of how strategic management of infrastructure recovery affects the investment potential of post-conflict territories, what factors enhance the effectiveness of public administration, and how institutional mechanisms can accelerate the long-term modernization of regional infrastructure.

4. Findings

The results of the study showed that the effectiveness of infrastructure recovery in post-conflict regions is determined by a complex combination of institutional, managerial, and economic and investment determinants. At the same time, each group of factors is interconnected, and their impact differs depending on the scale of destruction, the level of state capacity, and external financial support. The institutional capacity of the state and local authorities is a basic prerequisite for the effectiveness of recovery.

The level of institutional capacity characterizes the ability of state and regional authorities to effectively coordinate recovery processes, ensure transparency of procedures, stability of the regulatory environment and control over

the use of resources. The average recovery time reflects the duration of the implementation of key infrastructure projects from the start of financing to the commissioning of the facility. The share of international investment shows the level of participation of international financial organizations, donor programs and foreign investors in financing recovery projects. The generalization of these indicators allows us to assess the relationship between institutional capacity and the speed of infrastructure recovery.

The study showed that the transparency of procedures, the effectiveness of organizational coordination, and the availability of audit mechanisms directly affect the speed and quality of infrastructure project implementation. Regions with a higher level of institutional capacity demonstrate a higher level of foreign investment attraction, faster restoration of transport and energy infrastructure, as well as increased efficiency of resource management (Table 1).

Table 1. Assessment of institutional capacity and speed of infrastructure restoration (2015 – 2024)

Region	Level of institutional capacity (1 – 5)	Average recovery time, months	Share of international investments (%)
Eastern Europe	4	18	55
Middle East	3	24	42
Africa	2	36	28
Asia -Pacific region	5	15	62

Source: compiled by the author based on data from the European Bank for Reconstruction and Development (European Bank for Reconstruction and Development, 2024)

Note: 1 – low level, 5 – high level of institutional capacity

The results demonstrate a direct correlation between the level of institutional capacity and recovery effectiveness. For example, regions with an index of 5 completed critical projects 20–30% faster than regions with an index of 2–3.

The second critical factor is the management mechanisms of strategic planning. A number of indicators were used to assess the impact of digital tools on the efficiency of infrastructure project management. The indicator of the availability of digital systems reflects the level of implementation of project management information platforms, geographic information systems, digital damage registers and monitoring systems. The index of transparency of procedures characterizes the openness of the processes of planning, procurement and control of work performance and is measured on a scale from 1 to 5. The indicator of reduction of time for making management decisions reflects the extent to which the

use of digital technologies allows to optimize administrative procedures, accelerate project approval and increase the efficiency of recovery management.

The use of digital platforms, geographic information systems (further – GIS) and monitoring systems allows optimizing recovery priorities, allocating resources and monitoring project implementation (Table 2).

Table 2. The impact of digital tools on the efficiency of infrastructure project management

Region	Availability of digital systems (%)	Transparency of procedures (1–5)	Reduction in decision-making time (%)
Eastern Europe	70	4	25
Middle East	50	3	15
Africa	30	2	8
Asia -Pacific region	85	5	30

Source: compiled by the author based on data from the Organisation for Economic Co-operation and Development (Organisation for Economic Co-operation and Development, 2024)

Table 2 shows that digitalization of management processes significantly reduces decision-making time and increases transparency. The most effective are regions with a high level of integration of GIS and monitoring platforms, where there are both standardized procedures and access to up-to-date information.

The third block of factors is determined by economic and investment attractiveness. To analyze investment activity in the field of infrastructure restoration, indicators characterizing the structure and scale of project financing were used. The number of projects reflects the intensity of implementation of restoration initiatives in various areas of modernization. The average investment volume shows the average amount of financing for one infrastructure project and makes it possible to assess the capital intensity of various types of restoration. The share of international investment characterizes the degree of attraction of external financial resources, including funds from international financial organizations, donor programs and foreign investors. This approach allows us to determine which types of infrastructure modernization are most attractive for investment.

It was found that regions that combine infrastructure restoration with modernization of energy systems, development of transport corridors and integration into international networks receive a larger share of investments (Table 3).

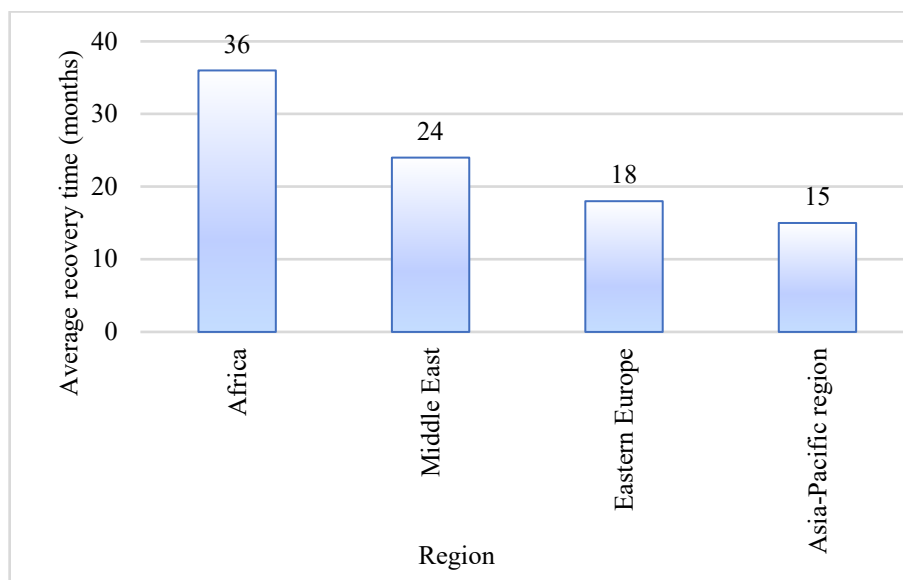
Table 3. Investment attraction in infrastructure restoration projects by type of modernization

Project type	Number of projects	Average investment volume, \$ million	Share of international investments (%)
Traditional restoration	120	25	35
Recovery with energy modernization	80	45	55
Restoration of transport corridors	60	60	60
Integrated projects "green infrastructure + digitalization "	40	80	70

Source: compiled by the author based on data from the United Nations Office for Disaster Risk Reduction (Global assessment report on disaster risk reduction, 2024)

The graph in Figure 1 shows that the maximum level of efficiency is achieved in regions where high standards of institutional capacity, digitalization of management processes and investment modernization of projects are simultaneously implemented.

Figure 1. The impact of project type on attracting investment, months



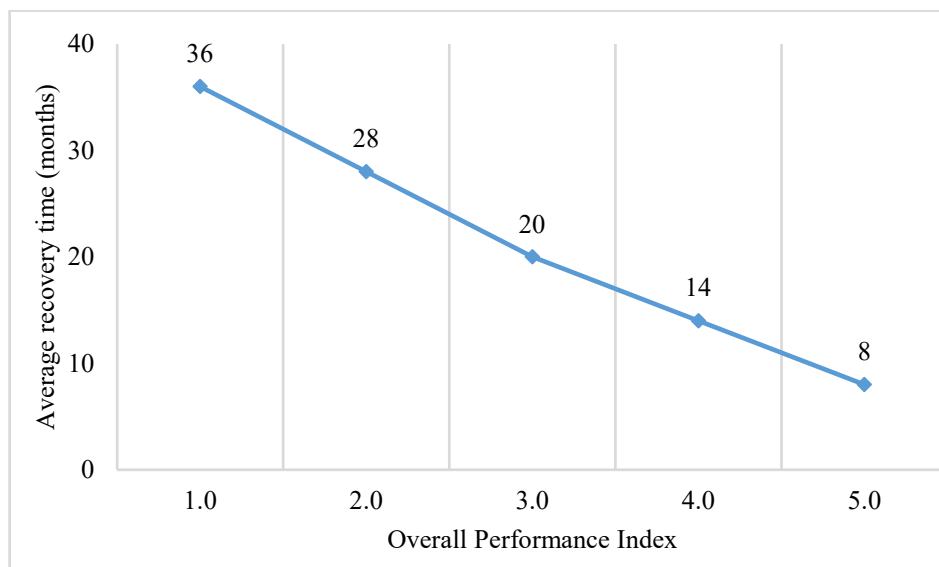
Source: compiled by the author based on data from the Organisation for Economic Co-operation and Development (Organisation for Economic Co-operation and Development, 2024)

For example, the Asia -Pacific region has the shortest average recovery time (15 months) and the highest share of international investment (62%), which confirms the positive impact of an integrated approach on the effectiveness of infrastructure programs.

A comprehensive analysis shows that the highest recovery rates are ensured not by individual measures, but by a combination of institutional, managerial, and economic and investment determinants. Their synergy creates mutual reinforcement, due to which the overall efficiency index of the region increases. Institutional capacity ensures stable rules, speed of decision-making, and transparency of processes; management and digital tools allow controlling the implementation of projects, conduct real-time monitoring, and minimize losses; investment modernization provides a resource base and technological upgrade of critical infrastructure.

This relationship is well demonstrated by the data in the graph in Figure 2, where it is seen that an increase in institutional, management and investment indicators proportionally increases the overall efficiency index of the region. The highest level is observed in the Asia -Pacific region (Table 2), which has balanced indicators in all three groups of determinants and reaches a maximum index of 5. The lowest values are recorded in Africa, where insufficient institutional support and weak modernization do not allow for rapid recovery.

Figure 2. Relationship between efficiency index and recovery time, months



Source: compiled by the author based on data from the Organisation for Economic Co-operation and Development (Organisation for Economic Co-operation and Development, 2024)

The constructed graph in Figure 2 demonstrates a clear inverse correlation between the overall efficiency index and the average recovery time. As the index

increases from 1 to 5, the recovery time decreases from 36 to 8 months. This means that regions with strong institutions, digitalized management processes, and active investment activities recover 4–5 times faster. The trend line in the graph illustrates a steady decrease in recovery time with increasing efficiency, confirming that the synergy of determinants is a determining factor in performance.

A comprehensive analysis confirms that the maximum effectiveness of infrastructure restoration is achieved only under the condition of synergy of institutional, managerial and economic and investment determinants, which form a single adaptive contour of public administration. Institutional capacity ensures the stability of the regulatory environment, transparency of procedures, speed of decision-making and effective coordination between government structures. Management determinants are digital control platforms, real-time monitoring, risk assessment systems, project management and analytical tools that allow minimizing the loss of time and resources. Economic and investment determinants include the modernization of infrastructure assets, attracting domestic and foreign investments, activating public-private partnerships and optimizing financial flows.

The economic content of the model consists in quantitatively reflecting the interaction of three key groups of factors that shape the effectiveness of infrastructure restoration. Institutional determinants reflect the quality of public administration, the stability of the regulatory environment and the level of trust in government institutions. Management and digital determinants characterize the degree of use of digital technologies, analytical systems, monitoring and project management. Economic and investment determinants reflect the level of investment activity, access to financial resources and the development of partnership financing mechanisms. The inclusion of interaction coefficients allows us to take into account the synergistic effect between management and digital and investment factors, while the risk parameter of the model reflects the impact of the instability of the security and economic environment on the effectiveness of restoration.

The interaction of these three components is modeled using an economic-mathematical synergy model (1):

$$E = (I^a \cdot U^b \cdot K^c) \cdot \left(1 + \delta \frac{U \cdot K}{25}\right) \cdot e^{-\lambda R}, \quad (1)$$

where E is the integral index of regional efficiency; I is institutional determinants (quality of governance, rule of law, policy stability, scale 1-5); U is governance and digital determinants (digital infrastructure, risk management, digital readiness, scale 1 – 5); K – economic and investment determinants (investment activity, business development, level of capital investments, scale 1 – 5); a, b, c – weighting coefficients of determinants (determine the relative contribution of each block to the overall index: $a = 0.40$ – institutional determinants, $b = 0.35$ – managerial and digital determinants, $c = 0.25$ – economic and investment determinants; δ – interaction coefficient between U and K ($\delta = 0.02$); λ – risk impact coefficient,

shows how quickly risks reduce the final effect $\lambda = 1.10$). The model shows that even with a high level of one indicator, but low values of others, the overall efficiency index remains low. In other words, no component can compensate for failures in others. This is confirmed by empirical data: for regions with evenly developed three groups of determinants (for example, the Asia-Pacific region), the integral index is equal to the maximum possible value, while regions with low values for all indicators demonstrate the worst recovery results.

(2) was constructed:

$$T = \theta_0 - \theta_1 E + \theta_2 R + \theta_3 \frac{1}{I + 0.1}, \quad (2)$$

where T is the average recovery time (months); R – risk index of the region; $\theta_0 = 48$ – basic average recovery of the region at low efficiency; $\theta_1 = 8$ – the force of the effect of increasing efficiency on reducing time; $\theta_2 = 9$ – the impact of the risk index; $\theta_3 = 4$ – the impact of institutional weakness (due to inverse dependence).

The resulting equation shows an almost linear feedback: an increase in E by one unit leads to a reduction in the recovery period by about 8 months. This allows for forecasting and optimization of public policy, determining which group of determinants should be targeted for additional investment or management influence. In practical terms, this means that increasing institutional transparency by 10–15%, improving digital monitoring, or increasing investment in infrastructure modernization can reduce the actual recovery period by 20–40%.

For a clearer understanding, a structural and functional scheme of public management of infrastructure restoration was developed, which reflects the logic of interaction of key elements (Figure 3). At the center of the scheme is the coordination module of public management, which combines three system blocks: institutional (legal regulation, management decisions, supervision mechanisms), management and digital (IT platforms, analytics, monitoring, logistics systems) and investment (funding sources, partnership models, international grants, credit instruments).

All three blocks operate in a constant feedback mode: the digital module transmits analytical data to the institutional block for decision-making, the institutional block forms regulatory conditions for investment activity, and the investment block provides the resource basis for the implementation of management decisions. This forms a closed adaptive system capable of responding to risks, resource shortages, changes in the security environment, and community needs.

The logic of interaction between the blocks of the scheme assumes a cyclical nature of management processes. The institutional block forms the regulatory and legal conditions for the implementation of projects, determines the rules for the distribution of resources and ensures control over their use. The management and digital block perform the functions of collecting, processing and analyzing information on the state of the infrastructure, the progress of project implementation

and the risks arising in the recovery process. The investment block provides financial support for projects through mechanisms of state financing, international assistance and public-private partnership. The constant exchange of information between these blocks forms an adaptive management system in which analytical data influences management decisions, and regulatory mechanisms create conditions for the effective use of investment resources.

The data in Table A1 (Appendix A) confirm that regions with harmonious interaction of the three blocks demonstrate an integral index of 5, which corresponds to the shortest recovery time - about 8 months. Regions with low institutional, managerial and investment capacity have an index of 1 - 2 and recover on average in 30 - 36 months. The constructed graph (Figure 2) demonstrates a clearly expressed inverse correlation: the higher the synergistic index, the faster the region recovers. This gives grounds to argue that it is the synergy of the three groups of determinants that is the decisive factor in successful recovery, and not the level of financing as such or individual management innovations.

Thus, the application of economic and mathematical modeling, structural-functional approach and empirical analysis allows to substantiate optimal mechanisms of state management of infrastructure restoration. The integrated efficiency model can be used to prioritize resources, identify vulnerable areas of regions and predict the results of the implementation of state restoration programs.

5. Discussion

The obtained results of the study indicate that the effectiveness of regional recovery is not formed by individual indicators, but by a holistic architecture of interconnected institutional, managerial -digital and economic-investment determinants. The applied economic and mathematical modeling confirmed the key hypothesis of the work: it is the synergy of determinants, and not their isolated influence, that forms a significant part of the variation of the integral efficiency index. This is consistent with the concepts of modern regional economics and the theory of sustainable development, which emphasize the interdisciplinary nature of recovery processes.

The modeling results show that regions with asymmetrically developed determinants (for example, strong institutions with weak investment activity or vice versa) provide only average recovery rates. In contrast, regions where all three components reach a balanced level demonstrate rapid post-crisis stabilization and lower values of the predicted recovery time. This confirms the theoretical assumption that structural equilibrium is more important than individual peak values of individual indicators, and regional resilience is a property of the system itself, and not of its individual elements.

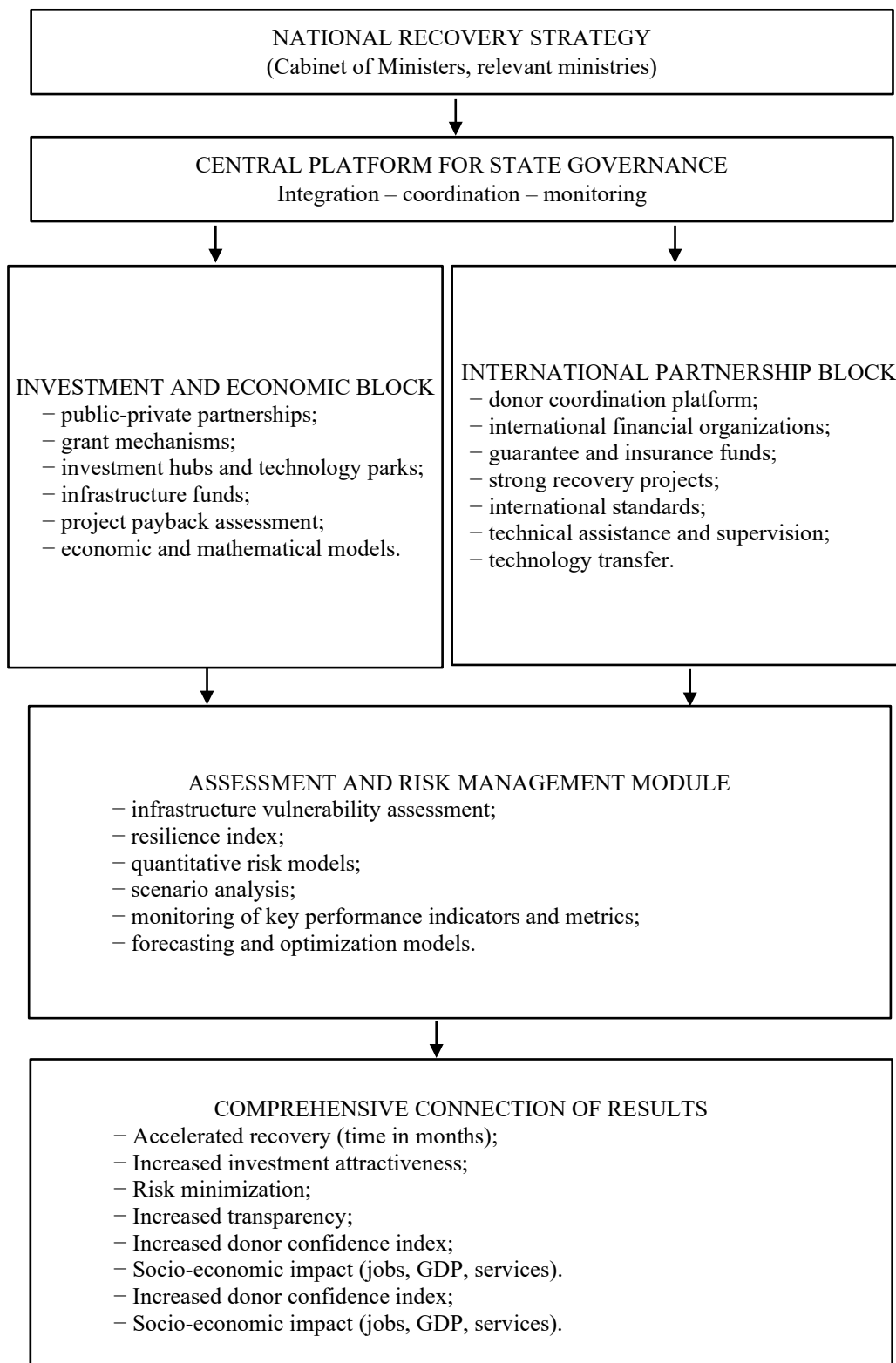


Figure 3. Structural and functional diagram of infrastructure recovery management in post-conflict regions

Source: compiled by the author

A comparative analysis of the four macro-regions showed significant differences in synergistic potential. The highest integral index was demonstrated by the Asia -Pacific region, where digital management tools are integrated with institutional modernization and large-scale investment programs. The opposite situation is observed in African countries, where low values of all three groups of determinants form the slowest recovery dynamics. Such a distinction confirms that global disparities in the development of regions are determined not only by economic factors, but also by institutional stability, technological maturity and the capacity for managerial innovations.

Particularly revealing is the inverse relationship established in the model between the risk index of the region and the integral efficiency indicator. Increasing risk reduces the synergy of factors even at relatively high institutional or investment values. This dependence is consistent with global studies of the impact of crisis factors on development and recovery processes, where the risk environment often levels the effectiveness of policies and investments.

The conducted modeling of recovery time also confirms the significance of the integral indicator, since it acts as the main explanatory factor in the regression model. The reduction in recovery time for each unit of efficiency increase correlates with global observations, according to which the digitalization of management, institutional stability and high investment volumes accelerate the recovery of territories after crises. It is worth emphasizing separately that digital tools, such as a subset of management determinants, form not only information support, but also affect the transparency of recovery mechanisms, which increases investor confidence and improves coordination between regional and national structures.

Thus, the discursive analysis confirms that the effectiveness of regional recovery is multifactorial, nonlinear and synergistic. Neither investments, nor institutions, nor digital transformation separately ensure a high speed of recovery, but their balanced integration is crucial. The results obtained open up prospects for further research, in particular the development of extended models that will include environmental determinants, social capital and global risk parameters. In the context of medium-term forecasts until 2030, it can be expected that those regions that build a coherent three-component structure of efficiency will demonstrate the fastest recovery rates and achieve sustainable development even in an unstable global environment.

6. Conclusions

The study showed that the infrastructural recovery of post-conflict regions is a complex multifactorial process, the effectiveness of which is determined by the interaction of institutional, managerial -digital and economic-investment factors. It was found that state management systems in modern conditions shift the emphasis from traditional reconstruction strategies to models focused on sustainability, innovation and structural balance. It is these components that form the basis for

attracting long-term investments and ensuring transparency and predictability of recovery processes.

The constructed synergistic model demonstrated that none of the determinants can provide a high level of efficiency on its own: only their balanced interaction creates conditions for rapid reconstruction of critical infrastructure and minimization of post-conflict risks. The highest integral index was shown by regions with comprehensive modernization of management systems, digital transformation and active investment activities, which confirms the crucial role of a systemic approach in recovery management.

An analysis of cross-regional differences revealed significant disparities: in Asia -Pacific countries, high-tech recovery management mechanisms dominate, while in African countries, insufficient institutional capacity and low investment attractiveness remain key barriers. This indicates the need to adapt public governance tools to local conditions and institutional contexts.

The results of regression modeling proved that the integral efficiency index is a reliable predictor of recovery time: increasing the efficiency of infrastructure management directly reduces the duration of reconstruction cycles. This pattern is consistent with global practices, where digitalization, institutional stability, and transparent investment procedures are key factors in accelerating the recovery of territories.

The prospects for the development of recovery management systems by 2030 include further strengthening the role of digital monitoring and control tools, increasing the importance of public-private partnerships, integrating environmental, social responsibility and corporate governance criteria into project planning and the formation of comprehensive investment flow management platforms. This approach will not only increase the resilience of infrastructure systems, but also ensure the long-term investment attractiveness of regions.

Overall, the research results demonstrate that modern infrastructure recovery management is transforming from fragmented approaches to structurally coherent, technologically supported, and investment-oriented models. This creates the conditions for the formation of an effective public governance system capable of ensuring rapid, sustainable, and economically viable recovery of post-conflict territories.

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Appendix A

Table A1. Calculation table

Region	<i>R</i>	<i>E_{raw}</i>	<i>E_{sc}</i>	<i>T</i>	<i>I_n</i>	<i>P_r</i>
Africa	0.80	0.87966	1.000	66.84	25	36
Middle East	0.60	1.68864	1.860	53.93	40	24
Eastern Europe	0.30	3.22623	3.494	34.44	55	18
Asia -Pacific region	0.20	4.64371	5.000	19.16	72	15

Source: created by the author

Note: *E_{raw}* – intermediate integral result before scaling; *E_{sc}* – listed on a scale of 1 – 5, where 1 – is the lowest synergy/efficiency, 5 – is the highest; *T* – predicted average recovery time (in months) according to the regression model; *I_n*, % – conditional data on the share of international investments; *P_r* – original empirical values used previously for comparison.