Nsukka Journal of the Humanities
***June* 2026**, 34, (2) *www.njh.com.ng/*

Article

Transforming Infrastructure Development after Crises: Agile Project Management Perspectives

Hanna Kalach[1], Oleksii Tonkykh[2], Myroslava Maslyak[3], Anastasiia Punda[4], Ruslan Lavlinskyy[5]

[1]Department of Management and Business Administration, Faculty of Taxation, Accounting and Auditing, State Tax University, Irpin, Ukraine, https://orcid.org/0000-0002-6031-0591; [2]Department of Tourism, Hotel and Restaurant Business, Faculty of Culture and Creative Industries, Kyiv National University of Technologies and Design, Kyiv, Ukraine, https://orcid.org/0000-0001-7823-4761; [3]Department of Public Management, Public Administration and Economic Policy, Simon Kuznets Kharkiv National University of Economics, Kharkiv, Ukraine, https://orcid.org/0009-0008-8964-0632; [4]Department of Management, Public Administration and Personnel, West Ukrainian National University, Ternopil, Ukraine, https://orcid.org/0000-0003-1695-6464; [5]Interregional Academy of Personnel Management, Kyiv, Ukraine, https://orcid.org/0009-0008-8855-138X
Correspondence: **Ruslan Lavlinskyy**, *https://orcid.org/0009-0008-8855-138X*

Abstract
The large-scale destruction of infrastructure facilities during military events in Ukraine has a destructive effect on the processes of social development. During the recovery period, the main attention should be focused on the active reconstruction of cities on the basis of agile management and sustainable growth. The purpose of the research is to analyze the key concepts of agile project management for infrastructure development in post-crisis conditions and to critically assess the transferability of these concepts – originally developed for software – to physical infrastructure reconstruction. The study identifies potential risks for the urban environment development strategy caused by infrastructure destruction, quantified at 137 billion USD in direct losses as of the end of 2024. The features of the flexible infrastructure project management system have been examined, including iterativeness, incrementality, communication and collaboration, adaptation to change, and focus on results. Key approaches to agile project management are considered – in particular, Scrum, Kanban, Lean development, and scaling frameworks such as SAFe. Unlike purely conceptual treatments, this paper explicitly addresses the documented frictions of applying agile to physical infrastructure – physical dependencies, safety regulation, and procurement constraints – and argues that agile in infrastructure restoration should be understood as an approach that differentiates large-scale projects into short iterations while combining traditional elements with innovative methods for greater flexibility and transparency. The paper concludes with practical tools and a seven-principle framework applicable to post-crisis reconstruction in Ukraine.

Keywords: *Agile project management, Infrastructure, Sustainable development, Reconstruction, Innovation, Incrementality, Adaptation, Critical infrastructure*

Introduction

The trajectory of resilient infrastructure development in the post-crisis period should be built on the basis of an effective project management system, which directly affects resilience to external challenges. The process of managing infrastructure development should have a high level of dynamism, which requires an adaptive approach, rational allocation of resources, and the implementation of modern management tools. In this case, it is necessary to take into account the continuous improvement and scaling of digital technologies.

The use of modern agile management methodologies makes it possible to quickly respond to changes, guarantee high quality of the final result, and ensure resilience to crisis impacts. Among the key advantages are increased accountability and transparency of the process,

Copyright: © 2026 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (https://creativecommons.org/licenses/by/4.0/).

minimization of risks through early diagnosis of problematic aspects, improvement of quality and functionality of infrastructure facilities, and ensuring compliance with the requests of the end user. At the same time—and this is the point of departure for the present study—agile methods were originally conceived for software development, where change is cheap and deliverables are logical rather than physical. Their application to infrastructure construction is far from automatic. Studying the features of the functioning of flexible project management systems for infrastructure development is therefore a necessary prerequisite for identifying not only the *promises* but also the *constraints* of project implementation in the area under study.

Literature Review

Theoretical, methodological, and practical concepts of agile project management are positioned as a subject of modern scientific discourse, forming an interdisciplinary vector of studies that are actively developing in the international scientific field. Among the founders of the subject, it is necessary to note Erian and Halleman [1], Malla [2], Sreejith and Sreeja [3], and Tetteh [4]. Their publications have accumulated the experience of specialized professional organizations in project management—the International Project Management Association and the Project Management Institute, which developed a global certification system of knowledge, the Project Management Body of Knowledge.

Scientific publications of Praveen [5] and Santos and de Carvalho [6] analyze agile project management methodologies such as Scrum, emphasizing the effectiveness of the Agile approach in infrastructure projects due to its adaptability, iterativeness, and flexibility. Maamzi et al. [7] explored the possibilities of changing the approach to teamwork based on agile management as a counterbalance to traditional linear methods, finding that agile management rests on visualization of key processes, working with small batches, focus on the end user, and quality feedback. Gheorghe et al. [8] argue that Agile allows teams to implement projects successfully under variability, prioritizing innovation and responsiveness.

The results of the studies by Kuhrmann et al. [9] and Suvvari [10] demonstrate the crucial importance of flexibility for integrating innovations, maintaining competitiveness, and satisfying consumer demand. The iterative nature of Agile is explained by Al-Saqqa et al. [11] as the possibility of gradual project implementation with guaranteed deadlines, ongoing adjustments, and feedback. Most scientists agree that agile project management significantly increases project efficiency while guaranteeing the relevance and quality of the final product.

At the same time, the problems of risk management in conditions of uncertainty and crisis dynamics—which determine the effectiveness of projects—as well as the conflict between flexible methodologies and the realities of the traditional distributed environment, remain relevant [12]. Importantly, a persistent gap in the reviewed literature concerns the *transfer problem*: the majority of studies premise agile effectiveness on software contexts, while the specific frictions of physical infrastructure—rigid procurement rules, safety compliance, supply-chain dependencies, and high cost of rework—are undertheorized. This creates the need for additional research to develop an optimal system of flexible management of infrastructure projects that accounts for structured planning and regulatory realities.

The purpose of the academic paper is to analyze the key concepts of agile project management for infrastructure development in post-crisis conditions and to critically evaluate their applicability to the Ukrainian reconstruction context.

Materials and Methods

Research design and scope. The research focuses on the concept of agile project management in the context of infrastructure restoration and development after large-scale destruction in Ukraine during the war. Particular attention is paid to the principles, approaches, and practical tools for implementing an agile project management system (Agile) within a traditionally structured environment, with explicit attention to the frictions between flexible methodology and the regulated, physical-natured world of construction.

Data collection and sources. The academic paper implements a comprehensive analysis of publications and scientific articles published in various scientific sources, alongside statistical information on the destruction of infrastructure in Ukraine during wartime. The criteria for inclusion and exclusion of publications were the spatio-temporal indicator (2020–2025) and the level of reliability of information. Sources were screened in three phases: (1) database search using keywords (agile, Scrum, Kanban, infrastructure, reconstruction, post-crisis); (2) abstract screening against the spatio-temporal and reliability criteria; and (3) full-text review of qualifying sources. The brainstorming method was used to evaluate the possibility of bias in the included studies.

Analytical framework and methods. The methodology comprises analysis, synthesis, generalization, comparison, and abstraction. Quantitative studies focused on numerical data capable of statistical evaluation; qualitative studies focused on detailed data about the practical experience and positions of contemporary researchers in sustainable urban development under crisis and instability.

Limitations. The research acknowledges two principal limitations: (a) the lack of access to complete and up-to-date official data, and (b) regional bias. Additionally, because the paper is conceptual rather than empirical, the effectiveness claims advanced here are presented as analytically reasoned propositions for empirical testing rather than as demonstrated findings.

Results

The nature of agile project management

Agile project management is an adaptive, collaborative approach based on the concept of iterative development, which involves replacing a single end result with small, manageable projects—iterations (sprints). The Agile framework guarantees flexibility, adaptation, and stable, continuous feedback, positioning collaboration and interaction of stakeholders as the value basis of project implementation. The main principles of agile project management are set out in the Agile Manifesto [13], whose essence lies in the emphasis on the human factor rather than on tools, processes, and documentation.

https://doi.org/10. 62250/nsuk.2026.34.2.160.170

The main principles of Agile in the context of infrastructure development in post-crisis conditions are:

- implementation of common practices in teams;
- priority of interaction with the client to ensure compliance of the final product with consumer needs;
- development of a fixed plan for responding to changes to ensure rapid adaptation to shifting conditions or requirements;
- regular reflection and adjustment as a result of in-depth analysis at the end of each sprint;
- continuous feedback loop.

These principles support an operational, flexible structure that sustains project effectiveness and team dynamics [14].

The scale of the problem in Ukraine

Infrastructure is one of the most war-affected sectors in Ukraine, posing increased risks to security, logistics, investment, and overall social development [15]. As of the end of 2024, the amount of direct losses from the destruction of Ukraine's infrastructure reached **137 billion USD** (Figure 1). This study reports all loss figures consistently in USD to avoid unit confusion.

Critical civil and industrial infrastructure suffered the most damage, which will determine the vector of post-crisis infrastructure development projects. The process will require large-scale financial transfers and optimized investment support. The establishment of the electronic platform for investment projects, *Advantage Ukraine*—which has amassed over five hundred investment projects in energy-efficient construction, "green" equipment, and critical infrastructure restoration—was a significant decision in this regard [17].

Agile methodologies applicable to infrastructure projects

Infrastructure projects are a specific type of project requiring special management approaches, characterized by increased complexity, variability, and scale. Management must therefore take into account promptness in decision-making, adaptability, effective team interaction, and rapid response to change [18]. Among the key methodological approaches suitable for agile management of infrastructure projects in Ukraine, the following are considered appropriate.

1) Scrum Framework. Structured work in cycles, where each sprint begins with planning and coordinating interaction between the team working on the product. Daily stand-up meetings ensure openness and transparency of communication. Each sprint ends with a review meeting (demonstration of work to stakeholders) and a retrospective (discussion of achievements and improvement paths). Roles are clearly specified, with a special place for the Scrum Master (facilitating the process) and the Product Owner (representing stakeholders). Clear structuring improves the quality of implementation by allowing individual concepts to be changed during the process.

2) Kanban approach. Based on the principles of lean manufacturing, its main difference from Scrum is the absence of clear role differentiation and fixed iterations. The key focus is on visualizing the workflow and limiting work-in-progress. Specialized boards with columns corresponding to stages of the workflow highlight goals, implementation stages, and readiness. Each task moves through the columns as it is implemented, ensuring visibility of status, team involvement, and timely identification of bottlenecks. A basic principle—the ability to start work from the existing state without creating special prerequisites—guarantees ease of implementation, flexibility, and adaptability to the dynamics of the external situation.

3) Lean development. An Agile approach based on lean manufacturing principles, combining waste minimization and value maximization. A key aspect is specifying the value context of the project, allowing unnecessary areas to be cut off to conserve effort and resources. Principal concepts include constant analysis and continuous improvement, a culture of respect in team interaction, delegating decision-making rights to stakeholders, just-in-time production, and a focus on process optimization, quality, and speed. The lean approach demonstrates particular effectiveness in complex, dynamic infrastructure conditions.

Scrum continues to be the most prevalent agile framework globally (Figure 2); in 2024, **71**% of American companies integrated Agile as a basic project management method, and **61**% of them chose Scrum [20].

Agile versus traditional: comparative effectiveness

Although the traditional structured (Waterfall) approach retains some popularity, Agile has a higher success rate (Figure 3). According to 2024 statistics, only **9**% of Agile-based projects failed, compared with **29**% for the traditional Waterfall approach [20]. This headline statistic notwithstanding, the present study emphasizes that such aggregate figures are not a mandate for universal adoption: they compare success rates across *different projects with different requirements*, and the decision between approaches should remain context-dependent (see Section 5).

Principles of agile infrastructure management in post-crisis Ukraine

The principles of agile project management for infrastructure development during post-war reconstruction should be supported by achievements in decentralization, democracy, and adaptability to the needs of society (Table 1).

Table 1. Principles of agile management of infrastructure projects in the post-crisis realities of Ukraine

No.	Principle	Features
1	Iterativity and incrementality	Differentiation of the project into small parts to accelerate achievement of individual working functional elements and obtain feedback from stakeholders
2	Prospects	Preference given to projects with potential for prolonged development and practical impact

No.	Principle	Features
3	Interaction and communication	Ensuring interaction between stakeholders for openness, efficiency, and transparency of decision-making
4	Focus on the result	Working product preferred over exhaustive documentation
5	Adaptability	Ability to make corrective changes in the management process in response to new limiting circumstances regarding infrastructure
6	Monitoring	Regular performance analytics and identification of "bottlenecks" for optimization
7	Cyclic feedback	Any issues and adjustments implemented on the basis of prompt discussion, preventing project implementation delays

Source: summarized and grouped based on [21–23]

Practical tools and scaling frameworks

Practical tools enable effective use of agile management in infrastructure development. Collaboration platforms such as **Trello, Jira, or Asana** allow effective task management, rapid progress tracking, and process transparency by directly tracking sprints and updating status in real time. Communication tools such as **Microsoft Teams or Slack** improve interaction and maintain consistent communication between stakeholders.

Large-scale transformations of infrastructure project management based on agile approaches necessitate additional coordination mechanisms. To support the scaling of agile approaches in post-crisis conditions, specialized frameworks such as **Large Scale Scrum, the Scaled Agile Framework (SAFe), or Disciplined Agile Delivery** are appropriate [24]. SAFe is seen as optimal for integrating agile practices into large infrastructure projects because it assimilates key elements of Scrum, Kanban, and the lean approach, functioning across program, portfolio, team, and value-stream levels [25]. Its key values are built-in quality, program execution, transparency, and alignment. At the same time, the effectiveness of SAFe is largely determined by the quality of synchronization across all levels.

Important performance indicators for the success of agile infrastructure management are sprint velocity, cycle time, and execution schedules, which help predict performance and plan more effectively by identifying potential bottlenecks. Success is further supported by an integral strategy of introducing gradual, small changes that aggregate into significant improvements.

The transfer problem: when agile fits physical infrastructure

A balanced assessment requires acknowledging that agile methods were designed for software, where change is inexpensive and rework is logical rather than physical. In infrastructure, several documented frictions arise:

- **Physical dependencies.** Construction tasks often cannot be reordered at will; structural work must precede finishes, utilities before paving. This constrains the "working small batch" premise central to Scrum.
- **Safety and regulatory compliance.** Building codes, permits, and safety inspections impose fixed, non-negotiable milestones that resist rescheduling—undermining the flexibility that defines agile.
- **Procurement and contracting.** Many public infrastructure contracts are legally required to be fixed-price and competitively tendered, mechanisms that structurally conflict with agile's emergent, change-friendly scope.
- **High cost of rework.** In software, an iteration can be discarded cheaply; in a half-built bridge or hospital, an abandoned iteration represents sunk physical capital.

These frictions do not invalidate agile in infrastructure, but they do mean that agile must be **adapted rather than adopted wholesale**—typically as a *hybrid* model that preserves the structure of traditional contract management while importing agile's iterative delivery, feedback loops, and stakeholder transparency. The seven principles in Table 1 are designed with precisely this adaptation in mind, prioritizing those agile features (monitoring, cyclic feedback, interaction) most portable into the construction context. The empirical verification of this adapted framework is an open research agenda.

Discussion

Modern researchers increasingly conduct comparative analyses of traditional and agile approaches to project management, including in infrastructure. For example, Praveen [5] highlights the advantages of Agile methods under crisis impact and increased uncertainty, emphasizing adaptability, minimization of resource costs, and efficiency of stakeholder interaction. These narratives are complementary to the current results.

Sustainable infrastructure development in the post-crisis period requires new approaches to assessing losses and attracting investment capacity. Kramskyi et al. [26] and Kosse [27] attend to the dynamics of investment processes in Ukrainian infrastructure reconstruction, emphasizing the need for coordination of public–private interaction. In such a case, agile concepts should be integrated by both public and private stakeholders. Post-crisis recovery in Ukraine will encompass critical, industrial, and information–communication infrastructure alike [26].

Marnada et al. [28] and Malla [2] emphasize that the key principles of Agile rest on unity, flexibility, and continuity: flexibility allows teams to respond quickly to challenges, continuity sustains a steady implementation pace, and unity promotes close stakeholder interaction. Havrysh et al. [29] find that agile implementation in infrastructure activity positively affects result quality and optimizes planning and coordination, eliminating unnecessary processes and erroneous decisions at early stages. Guarini et al. [30] identify key risks in infrastructure destruction during military conflicts and position the investment toolkit and security guarantees for critical infrastructure as the basis for effective recovery. Mykytenko [31] and Havrysh et al. [29] link the economic mechanism and sustainable management at the regional level to increase resilience. Kucher et al. [32] and Yehorchenkova and Yehorchenkov [33] update the role of urban planning in post-crisis

conditions, determining priorities, means, and tools for achieving sustainability in cities amid infrastructure destruction.

Critical assessment. Three points of caution emerge from the present analysis that qualify the optimistic tone of much of this literature:

- *Aggregate success statistics are not a mandate.* The 9%-vs-29% failure comparison conflates project types and requirements; it is an argument for situational fit, not for universal agile superiority.
- *The transfer problem is under-researched.* The literature largely premises agile effectiveness on software contexts and gives insufficient weight to procurement law, safety regulation, and physical dependencies in construction. This paper identifies the adapted/hybrid model as the necessary middle ground.
- *Coordination risk.* Integrating an agile system without proper prior assessment, with limited information availability to stakeholders, or with distributed teams can complicate coordination and destabilize infrastructure projects. This reinforces the need to avoid judgments about the universality of agile management; in some cases, a hybrid approach that assimilates the structure of the traditional model and the flexibility of Agile is advisable.

Conclusion

The concept of Agile management, which synergizes Scrum, Kanban, SAFe, and other approaches, is based on an iterative process—a guarantee of flexibility in planning and performing individual project tasks. This approach is proposed as a basis for implementing the infrastructure recovery program in the post-crisis period in Ukraine. Ensuring stakeholder and investor interaction, phasing in functionality, and continuous feedback will allow teams to respond quickly to the dynamics of requirements, minimizing the risk of the final result not meeting expectations. The benefit of Agile is targeted work programs that enable producing better results faster.

Among the practical tools for agile management in infrastructure development projects, collaboration platforms such as Trello, Jira, or Asana play a special role for effective task management, quick progress tracking, and process transparency through sprint tracking, while communication tools such as Microsoft Teams or Slack improve interaction and maintain consistent communication between stakeholders.

The key contribution of this study is its insistence that agile principles for post-crisis infrastructure must be *adapted* rather than adopted wholesale. Because physical infrastructure presents frictions foreign to software—physical dependencies, safety regulation, procurement constraints, and high rework costs—the seven-principle framework and the hybrid-scaling approach advanced here are the paper's most distinctive contributions, and they define an agenda for empirical testing.

Prospects for further studies are seen in: (a) empirical case studies of completed or ongoing Ukrainian reconstruction projects examined through the adapted-agile lens; (b) quantitative testing of sprint velocity and cycle-time indicators within real construction programs; and (c) the development of procurement-reform proposals that would permit agile-compatible

contracting within Ukraine's legal framework. Future work should combine traditional elements and innovative agile methods to differentiate large-scale projects into short iterations while sustaining system adaptability and dynamic development within the established structure of the project support system.

Works Cited

[1] N. Erian and B. Halleman, "Transforming infrastructure projects using agile," in *Advances in Road Infrastructure and Mobility*, A. Akhnoukh et al., Eds. Cham, Switzerland: Springer, 2022, pp. 1–12, doi: 10.1007/978-3-030-79801-7_25.

[2] V. Malla, "Structuration of lean-agile integrated factors for construction projects," *Constr. Innov.*, vol. 24, no. 4, pp. 986–1004, 2024, doi: 10.1108/CI-05-2022-0105.

[3] B. Sreejith and V. Sreeja, "The construction agile managements of different infrastructure projects," *Int. J. Adv. Trends Eng. Manag.*, Aug. 7, 2023, doi: 10.59544/WKYJ3792/NGCESI23P105.

[4] S. Tetteh, "Empirical study of agile software development methodologies: A comparative analysis," *Asian J. Res. Comput. Sci.*, vol. 17, no. 5, pp. 30–42, 2024, doi: 10.9734/AJRCOS/2024/v17i5436.

[5] R. V. S. Praveen, "Agile vs. hybrid project management methodologies in large-scale infrastructure projects," *J. Marketing Social Res.*, vol. 2, pp. 28–40, 2023.

[6] P. D. Santos and M. M. de Carvalho, "Exploring the challenges and benefits for scaling agile project management to large projects," *Requirements Eng.*, vol. 27, pp. 117–134, 2022, doi: 10.1007/s00766-021-00363-3.

[7] A. Maamzi, J. Jamila, and T. Tawfik, "The effectiveness of agile management on traditional projects within public organizations," *IOP Conf. Ser.: Mater. Sci. Eng.*, vol. 1218, no. 1, 2022, doi: 10.1088/1757-899X/1218/1/012037.

[8] A.-M. Gheorghe, I. Gheorghe, and I. Iatan, "Agile software development," *Informatica Economica*, vol. 24, no. 2, 2020, doi: 10.24818/issn14531305/24.2.2020.08.

[9] M. Kuhrmann et al., "What makes agile software development agile?" *IEEE Trans. Softw. Eng.*, vol. 48, no. 9, pp. 3523–3539, 2021, doi: 10.1109/TSE.2021.3099532.

[10] S. K. Suvvari, "Ensuring security and compliance in agile cloud infrastructure projects," *Int. J. Comput. Eng.*, vol. 6, no. 4, pp. 54–73, 2024.

[11] S. Al-Saqqa, S. Sawalha, and H. AbdelNabi, "Agile software development: Methodologies and trends," *Int. J. Interact. Mobile Technol.*, vol. 14, no. 11, pp. 246–270, 2020, doi: 10.3991/ijim.v14i11.13269.

[12] O. Sokil, S. Kucherkova, A. Kostyakova, et al., "The context of 'globalization versus localization' after the world pandemic and quarantine," *Studies in Computational Intelligence*, vol. 1010, pp. 77–88, 2022.

[13] "Manifesto for agile software development," 2001. http://agilemanifesto.org

[14] D. Bushuiev and B. Kozyr, "Hybrid infrastructure project management methodologies," *Innov. Technol. Sci. Solut. Ind.*, no. 11, pp. 35–43, 2020, doi: 10.30837/2522-9818.2020.11.035.

[15] O. Shpatakova, R. Ivanenko, and M. Pohrebytskyi, "Prospects for the recovery of critical infrastructure in the de-occupied territories of Ukraine," *Economy and Society*, no. 40, 2022, doi: 10.32782/2524-0072/2022-40-5.

[16] State Statistics Service of Ukraine, 2024. https://www.ukrstat.gov.ua

[17] Ministry of Economy of Ukraine, *Investment in Ukraine and economic recovery*, 2024. https://surl.li/sygjns

[18] B. Pacek and P. Pacek, "Russia's devastating impact on critical infrastructure during the hybrid war in Ukraine," *Bezpieczeństwo: Teoria i Praktyka*, no. 2, pp. 11–27, 2023.

[19] "Exploring the latest trends in agile statistics," 2024. https://radixweb.com/blog/agile-statistics

[20] O. Carter, "Project management statistics: 33 most important stats for 2026," Flowlu, Jan. 22, 2025. https://www.flowlu.com/blog/project-management/project-management-statistics/

[21] P. Amajuoyi, L. B. Benjamin, and K. B. Adeusi, "Optimizing agile project management methodologies in high-tech software development," *GSC Adv. Res. Rev.*, vol. 19, no. 2, pp. 268–274, 2024, doi: 10.30574/gscarr.2024.19.2.0182.

[22] O. Amosha, D. Cherevatskyi, O. Amosha, and O. Kvylinskyi, "Ukraine infrastructure post-war recovery," *J. Eur. Econ.*, vol. 23, no. 1, pp. 168–184, 2024, doi: 10.35774/jee2024.01.168.

[23] M. Sánchez-Silva, "Design of flexible and adaptable infrastructure systems," *Infrastructure Asset Manag.*, vol. 8, no. 1, pp. 36–48, 2021, doi: 10.1680/jinam.20.00019.

[24] K. Atli and I. Krystallis, "Design flexibility in managing infrastructure projects: Contributing factors and research avenues," *Int. J. Project Manag.*, vol. 43, no. 1, 2025, doi: 10.1016/j.ijproman.2025.102675.

[25] H. Edison, X. Wang, and K. Conboy, "Comparing methods for large-scale agile software development: A systematic literature review," *IEEE Trans. Softw. Eng.*, vol. 48, no. 8, pp. 2709–2731, 2021, doi: 10.1109/TSE.2021.3069039.

[26] S. Kramskyi, S. Kolodinskyi, and O. Zakharchenko, "Conceptual model for managing the phases of implementation of infrastructure projects and programmes in the post-war period," *Sci. Bull. Mukachevo State Univ., Econ. Ser.*, vol. 3, no. 10, pp. 33–40, 2023, doi: 10.52566/msu-econ3.2023.33.

[27] I. Kosse, *Rebuilding Ukraine's infrastructure after the war*, Policy Notes and Reports, no. 72, 2023. https://wiiw.ac.at/rebuilding-ukraine-s-infrastructure-after-the-war-dlp-6621.pdf

[28] P. Marnada, T. Raharjo, B. Hardian, and A. Prasetyo, "Agile project management challenge in handling scope and change," *Procedia Comput. Sci.*, vol. 197, pp. 290–300, 2022, doi: 10.1016/j.procs.2021.12.143.

[29] O. Havrysh, B. Yukhnov, and A. Surai, "Development of public-private partnership in the process of post-war reconstruction of Ukraine," *Adaptive Manag.: Theory Pract., Econ. Ser.*, vol. 18, no. 36, 2024, doi: 10.33296/2707-0654-18(36)-02.

[30] E. Guarini, E. Mori, and E. Zuffada, "Embedding the SDGs into city strategic planning," *Public Money Manag.*, vol. 41, no. 6, pp. 494–497, 2021.

[31] V. V. Mykytenko, "Post-war recovery and development of critical infrastructure of Ukraine," *Herald Econ. Sci. Ukraine*, vol. 1, no. 44, pp. 124–138, 2023.

[32] A. Kucher et al., "Sustainable and efficient water management for resilient regional development: The case of Ukraine," *Agriculture*, vol. 13, no. 7, Art. no. 1367, 2023, doi: 10.3390/agriculture13071367.

[33] N. Yehorchenkova and O. Yehorchenkov, "How can spatial planning and project management help in rebuilding and recovering Ukrainian cities?" *Eur. J. Spatial Dev.*, vol. 22, no. 3, pp. 37–50, 2025, doi: 10.5281/zenodo.17349773.

Publisher's Note/Disclaimer: The statements, opinions, and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of NJH. NJH disclaims responsibility for any injury to people or property resulting from any ideas, methods, instructions, or products referred to in the content.