

Editorial Article

Emerging Themes in Built Environment Research: Infrastructure, Community, and Resilience

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Abstract

This editorial introduces the inaugural issue of Built Environment Innovations (BEI) and reflects on the evolving landscape of built environment research. Against the backdrop of global challenges such as climate change, urban inequality, infrastructure fragility, and technological disruption, the editorial emphasizes the need for integrative and interdisciplinary approaches to spatial planning, design, and governance. Highlighting five original contributions featured in this issue, the discussion engages critically with emerging themes at the intersection of infrastructure performance, community-based spatial practices, sustainable material technologies, public space usability, and machine learning for environmental risk prediction. The editorial underscores the journal's commitment to publishing empirically grounded, socially relevant, and globally inclusive research that advances the theory and practice of sustainable and resilient built environments. It also outlines the journal's future vision and invites scholarly contributions that respond to the complexities of contemporary urban and rural development.

Keywords: Sustainable Construction; Public Space Evaluation; Machine Learning; Interdisciplinary Urban Studies; Global South Urbanism.

Introduction

The built environment is increasingly situated at the intersection of critical global challenges, including urbanization, climate change, socio-spatial inequality, technological disruption, and public health. These intersecting pressures have prompted a redefinition of how cities, infrastructures, and human settlements are conceived, studied, and transformed. No longer confined to single-discipline inquiry, the built environment has become a multidisciplinary and transdisciplinary field engaging architecture, urban planning, engineering, social science, environmental studies, and data analytics.

In response to this evolving intellectual and professional landscape, Built Environment Innovations (BEI) is launched as a platform for rigorous, integrative, and forward-thinking scholarship. Our mission is to promote research that not only advances conceptual understanding but also responds to real-world complexity—connecting theory, empirical evidence, and applied solutions. We welcome critical engagement with both traditional and

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emerging questions related to infrastructure systems, spatial equity, resilience planning, material sustainability, and technological integration.

This inaugural issue reflects that commitment. It features five contributions that exemplify the scope, methodological diversity, and relevance we aim to champion. From post-disaster infrastructure assessment to community-based spatial adaptation, and from experimental geotechnics to AI-powered environmental risk prediction, these articles collectively foreground three interrelated themes: infrastructure, community, and resilience. This editorial introduces and synthesizes these contributions while also outlining the journal's vision for future scholarship.

Discussion

The issue opens with a comprehensive analysis by Khalil et al., who assess the performance of urban infrastructure in Banda Aceh—a city that has undergone extensive post-tsunami reconstruction [1]. Utilizing the City Prosperity Index (CPI) developed by UN-Habitat, the study captures key dimensions of infrastructure, including housing, sanitation, electricity, healthcare, digital access, and public transportation. The results show strong progress in housing quality and service provision but also expose critical challenges in urban mobility and digital equity. The article demonstrates the value of multidimensional assessment frameworks in diagnosing systemic infrastructure performance, particularly in post-disaster cities where long-term resilience is as important as immediate recovery. It provides a replicable methodology that urban policymakers and planners can adapt to similar contexts across Southeast Asia and beyond.

Munirwan's article builds on the idea of resilience from a grassroots perspective [2]. Through a qualitative case study in a coastal fishermen's slum settlement in Bandar Lampung, the research explores how residents engage in adaptive co-living strategies within constrained spatial and economic conditions. Shared public spaces—markets, waterfronts, corridors—are used in flexible, multifunctional ways that reflect traditional norms of cooperation and mutual support. The findings challenge top-down, normative models of slum upgrading by foregrounding lived experience and culturally embedded practices. This work argues that revitalization should be less about spatial reconfiguration and more about enhancing what communities already do well. It presents co-living not as a novel design model, but as an expression of spatial resilience rooted in everyday practice, providing a critical lens through which to rethink informality and spatial justice.

Turning from spatial practices to materials and ground performance, the study by Ardika et al. investigates the impact of bentonite sand as a stabilizer for clay soils [3]. Soil instability, particularly in tropical and subtropical regions, undermines structural integrity and increases maintenance costs. This experimental research shows that bentonite significantly improves compaction characteristics and water retention capacity, critical properties for construction durability in moisture-variable conditions. The study not only reinforces the importance of soil engineering in infrastructure development but also contributes to the broader agenda of sustainable construction by highlighting the potential of natural, low-carbon additives. It advances knowledge in geotechnical engineering while offering practical, scalable recommendations for environmentally conscious infrastructure design.

The fourth article, by Aiyub et al., shifts the focus to public space and user-centered planning [4]. The authors assess two key urban parks in Langsa City using a structured evaluation framework based on accessibility, safety, comfort, and activities. Survey results indicate moderate effectiveness, with particular deficiencies in infrastructure such as lighting, sanitation, and play facilities. The study highlights the gap between policy-driven park provision and the actual needs of diverse users. It reinforces the importance of incorporating user perspectives into

the planning and management of public open space, particularly in mid-sized cities where public parks often function as essential, multifunctional community assets. The article also reflects a growing trend in urban planning research that prioritizes experience, perception, and social inclusion as core indicators of spatial effectiveness.

The final article, by Zulhelmi et al., offers a timely review of machine learning and deep learning applications in landslide hazard assessment [5]. Drawing from a systematic analysis of over 90 peer-reviewed studies, the authors compare the effectiveness of various algorithmic models—including Random Forest, Support Vector Machines, Convolutional Neural Networks (CNN), and U-Net—for landslide detection, susceptibility mapping, and temporal prediction. Their review shows that while deep learning models outperform traditional methods in spatial accuracy and generalization, challenges remain in data quality, interpretability, and model transferability. By identifying research gaps and proposing pathways for model integration and data augmentation, the article contributes to a rapidly advancing field where AI and environmental governance increasingly intersect. It underscores how digital technologies can play a transformative role in building adaptive capacities, especially in climate-vulnerable regions.

Together, the five articles demonstrate that research in the built environment must operate across material, social, and technological domains. They also reveal the value of both quantitative and qualitative methodologies, the importance of local context, and the need for cross-scalar thinking—from household behavior to infrastructure networks and digital systems. The convergence of infrastructure, community, and resilience in these studies reflects the editorial orientation of BEI, which seeks to bring together multiple ways of knowing to respond to increasingly complex spatial challenges.

Conclusion

As Built Environment Innovations publishes its inaugural issue, we affirm our commitment to advancing integrative and impactful research that addresses the full spectrum of challenges facing the built environment. The diversity of topics, methods, and contexts represented in this issue speaks to the journal's openness to innovative and interdisciplinary work. At the same time, it reinforces the urgency of our collective task: to understand and shape the environments in which we live, work, and coexist with increasing complexity and vulnerability.

We invite future contributions that explore the intersections of infrastructure systems, community practices, environmental risks, digital tools, and design innovations. We are especially interested in research grounded in empirical evidence, engaged with diverse communities, and attentive to the equity implications of spatial decisions. Whether through case studies, theoretical interventions, technical experiments, or policy analysis, BEI encourages work that expands the boundaries of built environment knowledge and practice.

We thank the authors, peer reviewers, and editorial board members who have supported this first issue. We hope that BEI will serve as a vibrant, inclusive, and critical space for global scholarship and that it will grow through the participation of researchers, practitioners, and institutions committed to building more just, sustainable, and resilient futures.

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Conflict of Interest

The authors declare no conflicts of interest.

Author Contribution Statement

Evalina Zuraidi: Writing- Original draft preparation. **Siti Zahrina Fakhrana:** Writing- Reviewing and Editing.

Data Availability Statement

The data used to support the findings of this study are included within the article.

Ethics Approval

Not required.

References

- [1] N. Khalil, A. Achmad, and F. Aulia, "Assessment of Infrastructure Performance in Banda Aceh City Using the City Prosperity Index (CPI)," *Built Environ. Innov.*, vol. 1, no. 1, pp. 1–15, 2025.
- [2] H. Munirwan, "Co-Living Strategies for Enhancing Shared Spaces in Fishermen Slum Settlements," *Built Environ. Innov.*, vol. 1, no. 1, pp. 16–28, 2025.
- [3] J. Ardika, F. Q. Elmyra, F. Fachri, and R. P. Munirwan, "Enhancing Water Retention Capacity and Mechanical Properties of Clay Soils with Bentonite Sand Additives," *Built Environ. Innov.*, vol. 1, no. 1, pp. 29–40, 2025.
- [4] Z. S. Aiyub, M. Irwansyah, A. Gunawan, and R. Al-fath, "How Effective Are Urban Parks? Insights from Lapangan Merdeka and Taman Bambu Runcing in Langsa City," *Built Environ. Innov.*, vol. 1, no. 1, pp. 41–50, 2025.
- [5] Z. Zulhelmi, E. Elizar, N. Fajri, and A. Rahman, "Machine Learning for Environmental Hazard Assessment : Advances in Landslide Detection and Prediction," *Built Environ. Innov.*, vol. 1, no. 1, pp. 51–63, 2025.