
Guest editorial: Smart villages, rural infrastructure and sustainable development

Guest editorial

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Introduction

Among a global population of almost 8 bn people, over 40% still live in rural areas. Yet, cities have attracted more attention than rural communities, largely because money, knowledge and power are concentrated in cities. Research and intellectual debate required for supporting growth and development of people in rural areas have been limited. However, in the current race towards rapid urbanisation, there is global interest in research associated with the creation of “Smart Villages” to address the ever growing urban-rural divide. By undertaking this timely special issue “Smart Villages, Rural Infrastructure and Sustainable Development”, the significance of the “Smart Villages” concept as an innovative form of development of rural areas was further highlighted. The Smart Villages model has been highlighted as one of the solutions for stemming the flow of people towards already overcrowded and unsustainably growing cities, globally. Realising the knowledge gap in the mainstream literature and focussing on a large range of interconnected topics, for the first time, this special issue brings together the new knowledge and theories being developed among academia, industry professionals and policymakers required for context specific development of rural infrastructure and promotion of sustainable growth, contributing towards the mitigation of the urban-rural divide.

Smart Villages research being undertaken in the Faculty of Architecture, Building and Planning at the University of Melbourne has been exploring rural community development, practices and relevant policies with a focus on community-centric planning of affordable housing, infrastructure, sustainable development and growth, community empowerment and other issues related to the creation of Smart Villages. The Smart Villages Lab (SVL) within the Faculty is leading the data-driven and evidence-based original research for developing new knowledge and theory with a focus on rural planning, housing and infrastructure. Research in Smart Villages, rural infrastructure and sustainable development have global appeal because policymakers and administrators especially across developing countries are striving to harness the potential and maximise the opportunities leading to rapid upgrading of rural communities. For instance, over the past decade, massive public schemes in India are being rolled out to provide shelter and services for over 850 m people in village communities across the country. The research presented in this special issue with a particular focus on the rural community and harnessing their potential and opportunities for modernisation and sustainable growth supports a growing need for deeper insight and practical solutions within this field. The issues around Smart Villages, Rural Infrastructure and Sustainable Development provide the themes of this special issue of *Built Environment Project and Asset Management (BEPAM)* for advancing the new body of knowledge in the rural development context. The guest editors express their sincere thanks to *BEPAM* Journal for offering to host and support this special issue. The guest editors are confident that the research contributed in this special issue would strengthen institutional capacities of the relevant countries by testing relevant theories and practical implementations. As a result, the articles published in this special issue should provide a sound platform for dissemination of cutting-edge research findings and best practices leading to building smart rural communities.



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Overview of special issue

This special issue comprises of nine research papers. After reviewing these papers and aligning the sub-themes of the research findings disseminated in this special issue, the guest editors aimed to establish a broad representation in relation to the scope, objective, location and context including the background and expertise of the authors of each paper, as well as to provide a progressive flow of information required for empowering rural communities through Smart Villages interventions. The overall Smart Villages theme has helped in unfolding a meaningful intellectual discourse through a set of high-quality papers disseminated through this special issue. A brief summary of these papers is provided below:

The first paper “A network of circular economy villages: design guidelines for 21st century Garden Cities” by Steven Larios presented a strong practitioner viewpoint of a systems-based approach to the design and development of smart rural villages centered around the concept of a network of circular economy villages (CEVs). A hypothetical framework is developed to assimilate visionary ideas from 20th century town planning knowledge and ideas related to decentralisation and the development of new towns in rural areas with a particular focus on design principles and underlying factors. The present trajectory of infrastructure design and emerging development models are then analysed as an alternative to modernise the design principles for implementation in the 21st century. The author claims that the availability of localised, renewable energy micro-grids potentially makes CEVs feasible and affordable. The shift to remote work and movement of people to regional areas suggests that going forward, this may be a desirable development form.

The second paper “Strategies to promote collaborative governance regime in Indian rural road maintenance” by Tharun Dolla and Boeing Laishram Singh evaluated the key factors associated with poor road maintenance in rural roads. Utilising exploratory factor analysis, the authors showed that common collaborative framework, communicating vision and fostering communities, leadership, increasing the industry’s capacity, transparency of power and responsibilities, and technical and financial resources are the six key dimensions in initiating and promoting collaboration. Addressing these six dimensions is considered to be one of the prevailing conditions for promoting the collaborative governance required in a public road maintenance regime. The authors argued that collaborative governance regime can empower the communities by making the non-state actors more closely aligned than in current network relations. Since rural communities are at the epicenter for implementing sustainable development goals, they can also be instrumental in finding innovative and creative solutions for meeting our present and future needs.

The third paper “Biomass as a means of achieving rural energy self-sufficiency: a concept” by Vandit Vijay and Ram Chandra showed the necessity of the local and regional contexts to better understand bioenergy’s role in sustainable rural development and a cleaner environment. The authors provided a conceptual framework for achieving biomass-based energy self-sufficiency in rural areas of developing/underdeveloped countries with a particular emphasis on a strong agricultural sector. Their research laid out a detailed approach to attain energy self-sufficiency in rural areas encompassing identification of surplus biomass resources in a selected area, suitable conversion technologies, consideration of local end-use priorities, skill development and monitoring of the project. Based on a case study analysis, the authors showed how the locally available biomass can substitute more than 75% of the conventional energy demand saving 78% of emissions that would have otherwise been generated by an equivalent coal power facility. The research indicates that creating a local bioenergy production system as a means of substituting/complementing fossil energy can contribute to a cleaner, self-sufficient community.

The fourth paper “Sustainable hydroelectric power project planning under socio-economic and environmental concerns using sustainability index based approach” by Neha Chhabra Roy and NG Roy identified a range of sustainability indicators (SUSIs) for gauging

sustainability of hydroelectric power (HEP) project development. The research examined major SUSIs under the social, economic and environmental (SEE) fronts and categorised them under push and pull impacts which aims to assist in identifying challenges and opportunities associated with such projects. Based on a case study in India, the research asserted that there is a mixed effect of SUSIs on HEP development across various projects. The findings also suggested that index-based assessment and planned collaboration plays a significant role in sustainable HEP development.

The fifth paper “Carbon footprint evaluation of local dwellings in Bangladesh toward low carbon society” by Rezuana Islam, Sajal Chowdhury, Nusrat Jannat and Pranjib Paul investigated the carbon footprint (CF) arising from the selection of construction materials and techniques. The research examined a range of dwellings in Bangladesh built with different local construction materials and finds that brick dwellings’ construction stage CF is nearly 3.86 times higher than that of dwellings built with timber and 6.75 times higher than that of a mud dwelling. The findings also suggested that local brick dwellings emit higher carbon dioxide emissions compared to others during their operation, but the extent of emissions varies with the occupant’s lifestyle and activities.

The sixth paper “Possibilities of a gender-responsive infrastructure for livelihood-vulnerable women’s resilience in rural-coastal Bangladesh” by Azharul Islam, Muntaha Marzan Shetu and Sheikh Serajul Hakim investigated the gender-responsive and livelihood-integrated infrastructure specific to women’s adaptation against increasing coastal vulnerabilities in Bangladesh. Based on a case study, the findings suggested that increased vulnerability of the rural coastal women’s livelihood is due to lack of adequate, spatial/infrastructural, and integrated (socio-economic) facilities and institutions. The research suggested the need for community-level and gender-responsive spatio-physical platforms to empower the female community with enhanced skill and capacity development, income generation including increased sharing and networking possibilities in a consistent and progressive manner.

The seventh paper “Construction sustainability of container-modular-housing in coastal regions towards resilient community” by Obidul Haque, Jayedi Aman and Fahim Mahmmd investigated container modular-housing (CMH) as a potential sustainable solution supporting the growth of resilient-community in relation to the harsh issues associated with the coastal areas in Bangladesh. By undertaking interviews with coastal communities and considering the issues specific to the coastal areas with high exposure to natural disasters, the research suggested that CMH-based home design has the ability to create strategies for resilient and sustainable community development. As recommended in the research, if implemented could transform an informal construction system into a technical, resilient, sustainable architectural and engineering solution to build resilient communities in coastal regions in Bangladesh.

The eighth paper “Impact and awareness of COVID-19 on rural communities – an empirical study of India” by Varinder S Kanwar, Hitakshi Dutta, Ishwar Dutt, Ashok Kumar, C Prakasam and Manvi Kanwar investigated the impact, awareness and preparedness related to the COVID-19 pandemic among a few targeted rural communities in Himachal Pradesh, India, in order to assess their self-sustainability levels. Examining the effect of the issues such as lockdown on social and financial status, difficulties in education, availability of essential commodities, domestic life in relation to the rural households, the findings suggested that the self-reliance on agriculture and traditional lifestyle in targeted rural areas made them relatively safer as compared to urban areas. With a reasonable understanding of COVID-19 and underlying mitigation measures among the rural community, it was found that the villagers had a high degree of resilience against the adverse situation arising from lockdowns. The findings also suggested that such villages with independent lifestyle have higher potential for remarkable

transformation leading to building smart villages or smart communities with further adaption of self-sustainable processes.

The ninth paper “Systems based approach to a small-scale dairy farm (Goshala): a case study” by Vivek Radheshyam Darwai, Sachin Arvind Mandavgane and Prakash Lohia examined the processes for efficient use of regional resources for productive utilisation of small-scale dairy farms (SDFs) as a way of improving economic, social and environmental conditions of the local people. As the SDFs contribute significantly to local economy and welfare of few families in Indian villages, the research developed a mechanism to make SDF not only efficient but effective in operations. A systems-thinking approach is used to identify the variables influencing a SDF and develop a general framework – RAMHI (Resources, Alternate revenue, Manpower, Herd and Infrastructure) comprising of endogenous and exogenous variables. A representative SDF as a case study was chosen to implement RAMHI and assess its implementation, including feasibility and economic benefits. It was found that the implementation of RAMHI gradually improved the economic benefits of SDF.

A total of nine papers presented in this special issue provide a solid theoretical discourse of scholarly contributions supporting development and empowerment of the rural communities within the smart villages’ context. We hope that readers will benefit from these valuable contributions not only through the rich academic content but also by realising the need for a pedagogical shift in the mainstream literature when it comes to context specific interventions in rural infrastructure and sustainability solutions for smart villages. The guest editors would like to thank all the authors who contributed to this special issue and particularly those who have been successful through the rigorous peer-review process of their research before being accepted for publication. The guest editors are also highly appreciative of each of the anonymous reviewers who tirelessly provided their objective feedback on the papers and supported the improvement of the quality of research maintaining the high standard of the BEPAM Journal. A special thanks goes to the Editor-in-Chief Professor Mohan Kumaraswamy for his tireless and valuable advice and handholding support provided throughout the process leading to the successful completion of this special issue in this esteemed journal. Last but not least, the guest editors would also like to acknowledge the unreserved support and technical assistance given by the Emerald Publishing team.

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