



## Guest Editorial

# INVESTMENT IN DISASTER RESILIENCE IN THE BUILT ENVIRONMENT

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The strategies for managing disaster resilience for the next 15 years have been formulated with the launch of the Sendai Framework (UNISDR 2015). It sets out four key priorities for in disaster risk reduction (DRR) as:

- 1) Understanding disaster risk,
- 2) Strengthening disaster risk governance to manage disaster risk,
- 3) Investing in disaster risk reduction for resilience,
- 4) Enhancing disaster preparedness for effective response and to “Build Back Better” in recovery, rehabilitation and reconstruction.

These priorities indicate the primary focus encouraged by the UNISDR for the next decade and half. The fact that the Hyogo Framework of Action (UNISDR 2005) the predecessor to Sendai Framework was successful in achieving its primary goal of reducing the impact of disasters on human life by way of reduced mortality rates and displacements is a testament for the refocus into investment in DRR pronounced in the new framework. It is abundantly clear that the level of importance it attaches to investment in DRR through a dedicated priority action being identified. The fourth priority action is connected to increased investment in DRR and building resilience. Achieving a state of “build back better” depends on enhanced levels of resilience transformed through increased investment in building resilience of the society and its infrastructure.

The built environment is where society live and thrive. The function of the modern society much

depends on the stability and the level of resilience of the both social and physical infrastructure. When disaster strikes both the social fabric including its activities and the physical environment within which it function is disrupted. The level of success of the capacity of the society to rebound much depends on the level of resilience of its built environment. UNISDR recently reported over US \$ 100 billion worth of economic losses caused by disasters worldwide (UNISDR 2013) strengthening the call for greater investment in building resilience of the built environment. When the built environment suffer losses from disasters it not only destroys the space for living but the livelihood of the society affected. When business premises and manufacturing plants are affected by disasters it incur long term damage to the society and the economy. Most economies worldwide consists of over 90% SMEs involved in the economic activities contributing to the society. However, these are the organisations that are more vulnerable to disasters. SMEs often do not have the knowhow or the capacity to invest in resilience. This makes it highly important for organisations to focus on developing ways and means to enhance resilience to disasters. It is within this context this special issue was conceived as a way to address the ever expanding knowledge gap in dealing with issues related to enhancing investment in disaster resilience in the built environment.

This special issue contains eight papers addressing a multitude of problems related to investment and building resilience in the built environment.

The first paper provides and sets the background to the special issue with a comprehensive

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literature review on finance and investment in disaster resilience in the built environment. Adeniyi *et al.* first explore the rationale and need for disaster resilience in the built environment exploring the surrounding issues related to ever increasing levels of economic loss incurred due to disaster worldwide. The paper covers both public and private sector investments in enhancing resilience in the built environment across education, health, tourism, housing, and business sector among others. They conclude that currently bulk of investment in disaster resilience is in the stages of disaster response and recovery stages concentrated on relief operations. There is a developing trend towards encouraging investment and enhancing disaster resilience through the principles of corporate social responsibility, business continuity management and public private partnership. These indicate potential approaches in enhancing investment in disaster resilience in the built environment. They also identify the need for further research on potentially subjective aspects of analysing true cost and benefits of investment in DRR.

The second paper by Akujuru and Ruddock analyses the potential of economic value determination as a methodology for building resilience of communities and applies the concept to communities in the Niger Delta region. They apply and experiment the proposed technique to determine the economic value of wetland properties contaminated by an oil spill disaster in the region. The proposed framework for valuing losses is purported to achieve greater degree of standardisation of the valuation process with benefits to both the victims as we as the polluters as well.

The third paper in this special issue by Bhattacharya-Mis and Lamond focuses on the value and risk imperatives for flood damaged commercial property. They investigate flood disaster and risk perception of commercial property owners and occupiers in a bid to determine the impact on value of property. The vulnerability of value is a multifaceted issue to investigate and it consists of various interrelated factors that require the adoption of a holistic approach in addressing vulnerabilities. They propose an owner/occupier based approach to identifying potential risk factors in advising commercial property owners and occupiers of reducing vulnerability of their properties from flood damage.

The fourth paper in this special issue deals with post disaster housing re-construction related problems. Bilau and Witt carried out an extensive literature review to capture key issues that impact post disaster housing reconstruction. They use this

review to develop a conceptual framework for effective housing reconstruction management strategies consisting of post disaster contextual characteristics and emerging housing reconstruction management issues. The management strategy elements inform a model with outcome characterised by a set of goals. The model is expected to be developed in to a decision support system that helps investment decisions and enhancement of disaster resilience in reconstructed housing.

In the fifth paper, Giuliani *et al.* investigate the need for integration of both technological and social considerations in providing solutions for enhancing the resilience of the built environment. Their focus is on the issues and barriers encountered by multitude of collaborating experts from disparate disciplines identified through a worldwide survey of cross discipline experts contributing to EU program Academic Network for Disaster Resilience to Optimize Educational Development (ANDROID). They concluded that a full integration of associated disciplines into a common shared language and system of axioms is missing and in order to achieve a higher level of integration between disciplines, a better understanding between experts of different disciplines seems essential.

The sixth paper of the special issue analyses the impact of earthquake risk with respect to urban resilience and socioeconomic losses. Ferreira *et al.* state that both community and urban resilience depend on the capacity of built environment to maintain acceptable structural safety levels during and after unforeseeable events, such as earthquakes. In their paper they evaluate the outcome of implementing traditional retrofitting strategies to existing masonry building stock located in urban areas of high seismic risk, using the old city centre of Horta, Faial Island (Azores, Portugal), as a case study. They conclude that the strategy to mitigate seismic risk should address land use zoning (reducing exposure), planning and of adequate strengthening campaigns and the implementation of seismic building codes suitable both for new and existing structures (reducing the seismic vulnerability of the built environment). The development of appropriate and assertive policies, financial and institutional supports at both national and local levels enables to implement this strategy into a workable action plan. They went on to predict more detailed state of outcomes for possible earthquake scenarios in terms of both economic loss and social impact.

In paper seven Ying *et al.* investigates the challenges to seismic rehabilitation decision process for

earthquake damaged buildings in New Zealand. He followed a qualitative data analysis approach in eliciting the expertise of key stakeholders (building owners, government officials, and professionals involved in seismic retrofitting decision-making) to develop an understanding of the decision making process. He found five major factors (various options, diverse considerations, assorted stakeholders, conflicting multiple objectives, and unaided decision making process) that influence this process. He concludes that the provision of an appropriate decision-making framework acknowledging the challenges is likely to assist building owners successfully address the multifaceted decision. He proposes further research in to developing a multi criteria decision framework for resolving seismic retrofitting decisions.

The final paper of the special issue by Edleman *et al.* analyses the resilience characteristics of Finnish prefabricated daycare and school properties. Prefabricated educational space/facilities provide an important function in post disaster reconstruction and more so in providing short and medium term solutions that are cost effective. Tier analysis included detailed analysis of 4 daycare facilities and a school that uses prefabricated educational facilities in their premises. They conclude that the prefabricated education facilities can provide an alternative for municipal development strategy on the education facilities. It has been well affirmed as a cost effective solution for post disaster relief and reconstruction situations. The inadequacies in architectural quality of such facilities can be effectively improved while their life cycle cost characteristics far outweigh the minor shortcomings.

This special issue provided the platform to disseminate research related to wide range of subjects pertaining to the area of investment in disaster resilience in the built environment. They included

a detailed and comprehensive review of problems relating to investment and finance of resilience enhancements in the built environment to wide range of economic and social issues that concern investment in disaster resilience. Research related to disaster resilience is a multi-disciplinary collaborative effort involving a multitude of desperate disciplines that require a focus in developing a common terminology (UNISDR 2009) that goes beyond single discipline. The Sendai Framework 2015 has brought about a greater focus in the need to invest in disaster risk reduction and the need to Build Back better for the future (UNISDR 2015). There is a grave need by academia, the wider society and the public sector to join hands with the private sector in providing local, national and global disaster resilience solutions. This special issue highlighted this need and urges further research on these areas in fulfilling the priority actions of the Sendai Framework.

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