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UNTAPPED POTENTIALS OF BUILT ENVIRONMENT PROFESSIONALS IN NATIONAL DISASTER RESILIENCE ACTION PLANS IN SRI LANKA

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ABSTRACT

Even though many governments have ambitious plans for speedy and effective post disaster recovery a less success rate has been recorded in many parts of the World including Sri Lanka. In light of this situation, a growing call has been evident for greater engagement of the construction industry in the global effort of disaster resilience. This research is therefore aimed at recognizing the specific role(s) of built environment professionals previously unidentified in disaster resilience action plans in Sri Lanka. The research commenced with a literature review including the Sendai Framework which was the first major agreement of the post-2015 sustainable development agenda. A detailed desk review involved mapping the currently defined roles of the public sector in disaster resilience building in the National Disaster Management Plan (NDPM) in Sri Lanka with the open-source guideline called "The Built Environment Professions in Disaster Risk Reduction and Response" co-authored by Lloyd- Jones et al. (2009) that defines 29 distinct roles of built environment professionals. This research reveals that the built environment professionals in Sri Lanka have been heavily unrecognized and underutilized in the cause of disaster resilience where only 10 roles have been earmarked.

Keywords: *Built-environment Professionals; Disaster Resilience Building; National Disaster Management Plan (NDPM); Sendai Framework.*

1. INTRODUCTION

Since the last two-three decades, there have been a growing recognition of the importance of the construction industry in disaster resilience building. As a matter of fact, the role of built environment professionals in building disaster resilience is highly recognised and reasonably well discussed in the existing academic research, national and local governmental publications, international intergovernmental organisation publications etc. (Haigh and Amaratunga, 2010; Maththews and Warren, 2010; Thurairajah, *et al*., 2011). Additionally, a critical need for incorporation of concerns of disaster resilience into the education of built environment professionals has been pointed out by many authors

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including Hecker *et al*. (2000), Godschalk (2003), Liso *et al*. (2003), Prieto (2004), Lorch (2005), Aldunate *et al*. (2006), Rees (2009), Haigh and Amaratunga (2010), and Bosher and Dainty (2011).

'Sendai Framework for Disaster Risk Reduction 2015-2030', as the underpinning source that defines the key pillars of "disaster resilience" recognizes that the State has the primary role to reduce disaster risk. More significantly, it recommends such responsibility be shared with other stakeholders including local government, the private sector and other stakeholders. The framework is aimed at minimizing disaster risks, loss of lives and other harmful effects of disasters on livelihoods, health, economic, physical, social, cultural and environmental aspects of communities over the coming 15 years (Amina and Virginia, 2015). As it addresses a diverse range of factors endangering masses, Sendai's focus on inclusive and participatory capacity building from local to global level is multi-dimensional. It essentially requires a diversity of stakeholders to mirror the debate centered on prevention vis-a-vis the built environment.

As far as the disaster resilience arena is concerned, Sri Lanka is presently served with a national legislation (Sri Lanka Disaster Management Act No. 13 of 2005), national policy on disaster management, institutional arrangements led by the Ministry of Disaster Management and Disaster Management Centre, a National Emergency Operation Plan and a National Disaster Management Plan. Even though the built environment professionals' roles in the resilience building are well recognized within the context of the built environment, it is not clear whether this is fully recognized in defining the public-sector roles in the above mentioned legislative and policy frameworks. Thus, it is worth investigating the extent to which the specific role(s) of built environment professionals piteously unidentified in disaster resilience legislative and policy frameworks in Sri Lanka, especially in the national action plan (National Disaster Management Plan 2013-2017), if any which is the aim of this study.

2. RESEARCH METHODOLOGY

In order to achieve the aim of this study, an in-depth literature review was conducted. Further to that, a desk review was made on the NDMP 2013-2017 to demystify the currently defined role of the public sector in resilience building across the four priority areas specified in the Sendai Framework 2015-2030 which is considered a global benchmark of disaster resilience building. The next step was to map the foregoing with the Lloyd-Jones's key roles defined for built environment professionals in the disaster management cycle in order to capture the areas untapped for built environment professionals in NDMP which ultimately advocates future potential for inclusion (See Table 1). Content analysis technique was used during this mapping exercise which adopted key functional attributes (themes) identified from Lloyd-Jones *et al*. (2009).

3. LITERATURE REVIEW

3.1 BUILDING DISASTER RESILIENCE

As defined in the voluntary, non-binding post-2015 agenda which is endorsed by the UN General Assembly, Sendai Framework for Disaster Risk Reduction 2015-2030, disaster resilience is '*the capacity of a system, community or society potentially exposed to hazards to adapt, by resisting or changing in order to reach and maintain an acceptable level of functioning and structure*' (UNISDR, 2015). Similarly, DFID (2011, p.6) defines

it as '*the ability of countries, communities and households to manage change, by maintaining or transforming living standards in the face of shocks or stresses – such as earthquakes, drought or violent conflicts without compromising their long-term prospects*'.

It is widely agreed in the literature that disaster resilience is closely embedded in disaster risk management (DRM). However, on the other hand, authors are in the view that approaches and tools for disaster resilience encompass a wider perspective than DRM and it draws and brings together knowledge and practices from fields such as climate change adaptation, poverty reduction, state-building and conflict resolution (Combaz, 2014). Therefore, in the international agenda on disaster resilience, UN's Sendai Framework for Disaster Risk Reduction 2015-2030 (UNISDR, 2015) is actively engaged in building resilience of nations and communities through incorporation of DRM, poverty reduction, climate change adaptation, good governance and sustainable development (UNISDR, 2015). It sets out four priority areas for disaster resilience action namely: understanding disaster risk; strengthening disaster risk governance to manage disaster risk; investing in disaster risk reduction for resilience and enhancing disaster preparedness for effective response and to "Build Back Better" in recovery, rehabilitation and reconstruction.

3.2 ROLES OF BUILT ENVIRONMENT PROFESSIONALS IN RESILIENCE BUILDING AS DEFINED IN THE CONTEXT OF BUILT ENVIRONMENT

As stated by Lloyd- Jones *et al*. (2009) the built environment refers to human settlements, buildings and infrastructure such as transport, energy, and water distribution. The built environment professionals include the practitioners who are primarily concerned with design, construction, planning, procurement, management and technological aspects related to construction and maintenance of built environment structures. It has been now realised that the built environment sector and its professionals have a vital role in disaster resilience (Ofori, 2004; Haigh and Amaratunga, 2010). Built environment professionals have varying roles and related capacities in terms of skills, and knowledge in each stage of disaster management cycle (McEntire *et al*., 2002; Haigh and Amaratunga, 2010; Siriwardena *et al*., 2013). Therefore, this section identifies their roles in general, with their available capacities to perform those roles. Taking a broader view of disaster management cycle, the roles are categorised into three phases as pre-disaster, emergency relief and early recovery and post disaster and reconstruction phase.

3.2.1 Pre-Disaster Phase

The role of built environment professionals during the pre-disaster phase is mainly associated with mitigating and preventing disaster impacts on the built environment and preparing communities for disasters in advance. Planning, designing and constructing quality and durable structures which can adapt for various disasters, including natural (ecosystems and natural buffers) and man-made infrastructures (e.g. flood drainage) can limit or largely reduce the impact of disasters (Palliyaguru and Amaratunga, 2008). Early identification of critical infrastructures prone to impacts from natural hazards together with measures for their rehabilitation is also necessary for reduction of impact (Oh *et al*., 2010). Burby and Dalton (1994), Mileti (1999), and UNISDR (2010) highlight the criticality of better land use planning in this regard. Nevertheless, the significance of traditional line of actions in mitigating disaster impacts such as structural protection and

functional building regulations and codes yet remain the same (Burby and Dalton, 1994; UNISDR, 2010).

3.2.2 Emergency Relief and Early Recovery Phase

This phase of the disaster management cycle is mostly represented by personnel from government and non-government organizations, but the role of the built environment professionals is also not to be overlooked as it may result in serious repercussions (Stringfellow, 2014). The substantial knowledge and technical expertise of the construction industry personnel are crucial in ensuring early recovery following disasters, especially by quickly reinstating and making important infrastructures operational such as water and sanitation, roads, electricity, telecommunication lines, bridges etc.; and providing temporary shelter (Malalgoda *et al*., 2010; Hindustan Construction Company, 2016).

3.2.3 Post Disaster and Reconstruction Phase

Major reconstruction and rehabilitation works in critical sectors such as housing, health, education, railway, water and sanitation, electricity etc. are carried out during this phase. This is a phase where the construction professionals are actively engaged in and thus considered the most important phase for the construction industry (Malalgoda *et al*., 2010). The skills, competencies, knowledge and professionalisms of the built environment professionals are crucial in the decision-making and implementation of works during this phase in order to build back better so as to eliminate the possibility of future impacts from disasters (Malalgoda *et al*., 2010), including assessing the magnitude of damage caused by disasters.

On the foregoing discussion, it was realised that the built environment professionals are competent in many major activities of disaster resilience. In addition to the above findings, Lloyd- Jones *et al*., (2009) reveal the key roles of built environment professionals into disaster management cycle in a detailed manner. Therefore, in order to achieve the aim this study, those key roles were mapped with the current and emerging roles for built environment professionals as identified in NDMP (see Table 1).

4. DESK STUDY FINDINGS

4.1 ROLE OF THE PUBLIC SECTOR IN RESILIENCE BUILDING AS DEFINED IN THE NATIONAL ACTION PLANS

Firstly, the desk study identified the roles of public sector (national and local level) in Sri Lanka for resilience building with reference to the Sri Lanka National Disaster Management Plan (NDMP) 2013-2017, which is the national action plan for disaster resilience in Sri Lanka published by the Disaster Management Centre (DMC). Given the expiration of the Plan, an upgraded version is pending review and approval at the Ministry of Disaster Management Sri Lanka. The roles described in the NDMP were identified and categorized under four priority themes stated in the Sendai Framework for Disaster Risk Reduction 2015-2030 as discussed in Sections 4.1.1, 4.1.2, 4.1.3 and 4.1.4. Sri Lanka being a signatory to the Sendai Framework, it was adopted as a benchmark to classify the public sector roles in a more meaningful manner, in order to overcome the problems associated with the numerous differences in the way the phrase ‘disaster resilience’ has been defined in the literature.

4.1.1 Understanding the Disaster Risk

Apprehending disaster risk in all its dimensions of hazard characteristics and vulnerability (which is composed of capabilities to prepare for and respond to the hazards; and exposure of persons/assets) warrants the government a key role. These include hazard zonation mapping with the aid of computer modelling (i.e. urban flood zonation, landslide hazard zonation, Tsunami zonation), collating geographic information via GIS system, vulnerability and risk assessment, maintaining and coordination of disaster related data bases such as Inventory of Past Disaster Impacts (DesInventar) and Sri Lanka Disaster Resource Network (SLDRN) and fostering a culture of research.

4.1.2 Strengthening Disaster Risk Governance

It is accepted that the overall responsibility in strengthening disaster risk governance for prevention, mitigation, preparedness, response, recovery and rehabilitation through collaboration within and across sectors and partnership with other relevant stakeholders falls on the government. In relation to that, governments have the administrative and legislative power to enforce regulations and policies on building disaster resilience. Accordingly, its role is to review, develop, implement and promote the national and local framework of laws, regulations and public policies as well as disaster risk reduction strategies and plans (UNISDR, 2015).

In view of the national and local level commitments mentioned in the Sendai framework, NDMP 2013-2017 of Sri Lanka identifies few key roles as the government major responsibilities in strengthening the risk governance, namely the development of national and sub national level disaster management plans and emergency operation plans, preparation and implementation of disaster mitigation strategies, provision of training, public awareness and education. This essentially requires proper coordination among all the agencies related to land use and development controls such as Urban Development Authority, as well as all target groups such as vulnerable communities, government officials, school and university students, armed forces etc.

4.1.3 Investing in Disaster Risk Reduction for Resilience

Investing in disaster risk reduction for resilience is another important role of government. Allocating funds, logistics and other resources as appropriate at all levels of government for the development and implementation of disaster risk reduction strategies, policies, plans, laws and regulations in all relevant sectors is vital. This is while strengthening the public private investments to implement disaster prevention and reduction measures in physical infrastructure such as schools, hospitals etc. UNISDR (2015) further mention that investments in health care system is of high significance in disaster risk management. Developing the capacity of health workers in understanding disaster risk, implementing effective disaster risk reduction approaches in health work, supporting and training community health groups in disaster risk reduction approaches, and enhancing the training capacities in the field of disaster medicine are some of the investment opportunities in health care sector (UNISDR, 2015). Risk transferring and financing, planning capacity building and more importantly the private sector engagement have been stressed in the term of ‘investment’ in disaster resilience.

4.1.4 Enhancing Disaster Preparedness for Effective Response and to Build Back Better

Government requires to be well ahead of a disaster through integration of disaster risk reduction in order to ensure that capacities are in place for effective response and recovery at all levels. Accordingly, they require to invest in, develop, maintain and strengthen people-centred multi-hazard, multi-sectoral forecasting and early warning systems, disaster risk and emergency communications mechanisms, social technologies and hazard-monitoring telecommunications systems; promote the resilience of new and existing critical infrastructure including water, transportation, educational facilities and hospitals to ensure that people remain safe, effective and operational during and after disasters, raise the public awareness, and consider relocation of public facilities and infrastructure to areas outside the risk range (UNISDR, 2015). Moreover, Kapucu and Wart (2006) and Ainuddin and Routray (2012) mention that extensive training and awareness programmes, land use plans and national mandates which limit the development in hazardous areas and evacuation plans, zoning and building standards, emergency response plans, emergency communication plans and early warning systems, transportation networks and arrangements for life lines and critical infrastructure are few such plans and procedures that need to be prepared by the government.

Government as an intermediary with local, national and global connections it has a major role in coordinating various stakeholders to achieve success in decision making, attract finance and other resources, technology and good practices and raise awareness and education on disaster resilience (UNDP, 2004 and UNISDR, 2015). Maintaining Emergency Operation Centre in DMC has been identified as a key function of readiness via the application of technical skills in operating high-tech equipment in the emergency operation system. Further, it includes hazard forecasting, early warning and dissemination, coordination of disaster response at different levels, getting the stakeholder involvement in emergency response, recovery, rehabilitation and reconstruction as well as relief and temporary shelter management.

4.2 MAPPING THE ROLE OF THE BUILT ENVIRONMENT PROFESSIONALS WITH THE DEFINED PUBLIC SECTOR ROLES IN RESILIENCE BUILDING

Secondly, the desk study involved delineating the specific roles of the built environment professionals in disaster resilience with reference to Lloyd- Jones's (2009) and exploring whether they have been recognized in the NDMP, as mapped in Table 1.

Table 1: Lloyd- Jones vs public sector defined roles

Roles of Built Environmental Professionals (Source: Lloyd- Jones et al., 2009)	Whether Defined in Public Sector Resilience Building	Key Functional Attributes
Pre-Disaster Phase		
Assess hazards and disaster risks and evaluate vulnerability	Yes	Vulnerability assessment
Assess the stability and vulnerability of existing structures	Yes	Structural integrity

Roles of Built Environmental Professionals (Source: Lloyd- Jones et al., 2009)	Whether Defined in Public Sector Resilience Building	Key Functional Attributes
Advice on the cost and delivery of disaster preparedness measures	Yes	Cost effectiveness
Identify the risks associated with areas; advise on risk reduction; plan for quality development in the right locations	Yes	Disaster risk reduction
Identify, survey and procure safe land for building purposes	Yes	Site selection
Review, implement and advise on the right and correct new and revised building statues	No	Technical review
Provide advice on building use in the event of hazard	No	Evacuation
Design and implement new constructions and engineering that are disaster resilient	No	Construction methodologies
Advise on development cost and financing, planning and managing finance, valuation and cost planning	No	Best value for money
Conduct training and transfer knowledge on construction methods that are safe and sustainable	No	Knowledge transition
Develop emergency response plans to provide vital services (water, wastewater, transport, logistics, communications, power)	Yes	Contingency planning
Emergency Relief and Early Recovery Phase		
Identify usability of existing infrastructure	No	Usability
Estimate the demand for clean water and the locations it will be required	No	Efficient use of water
Evaluate local access issues and plan for transportation and storage/shelter for supplies, services and rescuers to the disaster area	No	Preliminaries/enabling works
Estimate the demand for relief shelter, including number, types and locations; consider medium/long-term issues associated with shelter locations and design and advise on procurement	Yes	Shelter management
Assess initial infrastructure recovery requirements, particularly access, energy, water and food storage.	No	Recovery assessment
Post Disaster and reconstruction phase		
Carry out building condition surveys, including assessment of key buildings and overall damage assessment	No	Damage assessment
Evaluate overall housing needs, establishing the scale and type of infrastructure, and housing and land required for transitional and permanent housing	No	Needs assessment
Review mapping and establish boundaries and provide estimates (if not already available) of land use,	Yes	Mapping and impact assessment

Roles of Built Environmental Professionals (Source: Lloyd- Jones et al., 2009)	Whether Defined in Public Sector Resilience Building	Key Functional Attributes
transport and access lines, waterbodies and the impact on them after the disaster		
Prepare financial compensation package and advise on selection of building materials, construction methods and technology that are part of the package	No	Compensation assessment
Carry out surveys of land and property ownership at the ground level and advise on land boundary and land administration issues etc.	No	Land surveying and advice
Advise on suitability of areas of temporary/ permanent new development	Yes	Location studies
Supervise the removal and clearing of sites, reclaim building material (householders may want to claim material from their individual homes)	No	Deconstruction and supervision
Resolve ownership issues in consultation with authorities and communities	No	Ownership assessment
Project management focusing on resources and cost of provision of transitional shelter	No	Resource management
Advise on building and infrastructure regulations	No	Technical scrutiny
Supervision and advice as the buildings are constructed	No	Site supervision
Provide training in research and risk assessment when designing transitional and permanent settlements; monitoring and compliance of regulations/policies	Yes	Research
Providing guidelines for operations and maintenance to ensure resilience	No	O&M guidance

It is important to recognize the discourse on shared responsibility in disaster resilience as a new social contract, as what exactly the Sendai's focus is and where the role of built environment professional is considered pivotal. From Table 1 it is apparent that one half of the contract is frustratingly missing in the discourse: the potential is untapped. Most of the technical functions have not been adequately earmarked. A need to include a professional-based discourse is therefore evident in contention over core management dilemmas such as the protection of citizen and property holders' rights, the legitimacy and accountability of government agencies and so forth. Without seriously undermining the legitimacy of the new disaster resilience social contract, it is imperative to revisit the NDMP and redefine the role of built environment professionals in the local agenda which is currently pending scrutiny at the Ministry level.

5. CONCLUSIONS AND THE WAY FORWARD

The national disaster resilience framework is deemed to be compatible with the priorities of Sendai Framework for Disaster risk reduction, 2015 to 2030 namely, understanding risks, strengthening activities involved in risk governance, investing in disaster risk

reduction and enhancing disaster preparedness for effective response in line with the concept of Build Back Better. On the other hand, a growing recognition is that those accountable for the built environment have a pivotal role in disaster resilience. However, if these professionals are to be able to contribute to reduce risk through resilient efforts effectively, it is important that they are properly integrated into the overall disaster resilience framework. However, it is evident that their role has been overlooked in the national action plans in Sri Lanka for some reason. This articulates a need for taking a holistic approach in formulating national level actions plans, giving due consideration to the construction life cycle, key stakeholders, their potentials and the elements of resilience. Unfortunately, most of the technical potentials and functionalities of built environment professionals have not been adequately addressed in the NDMP. Accordingly, it is suggested that still there is scope for the potentials of professionals engaged in the built environment to be effectively exploited in the context of disaster resilience building. The conclusion is to clearly delineate the role of built environment professionals in the NDPM as a prerequisite for integrating the role of built environment professionals in disaster resilience.

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