EMERGING COMPETENCIES WITHIN NATIONAL AND LOCAL GOVERNMENT FOR SOCIETAL RESILIENCE TO DISASTERS IN SRI LANKA

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ABSTRACT

Emerging competencies for societal resilience to disaster within the built environment domain of Sri Lanka were analysed in the aim of developing a professional doctoral (DProf) course through the CADRE (EU-FP7) project. Competencies were compiled following the amalgamation of both emerging market needs and skills within the built environment domain of Sri Lanka. In its investigation, qualitative and quantitative data collection was facilitated through a literature review. Data collection was conducted in respective to all stages of the construction cycle (i.e. Preparation, Design, Pre-construction, Construction, Use). The analysis was conducted using resilience themes for five thematic areas (i.e. social, technological, environmental, economic and institutional) in relation to each stage of the construction cycle.

Despite local and national government bodies affecting a central role in policy, planning and implementation of land use changes and construction, built environment professionals with specialised expertise was minimal. Parallels were drawn regarding the gaps within the private sector and local and national government, such as a critical need for skills development programmes to ensure a viable skilled labour force and job security. Finally, it is critical for national and local government to enforce existing certification systems and standards for skilled workers to ensure a safe, viable and competitive construction industry.

Keywords: *Professional Doctorate; Disaster Resilience; Built Environment.*

1. INTRODUCTION

Emerging competencies for societal resilience to disasters were explored, with a focus on the key stakeholder constituents national and local government in Sri Lanka. The compilation of competencies followed the amalgamation of emerging market needs and skills within the built environment for societal resilience to disasters. The literature review was explored through all thematic areas of Resilience I.e. Social, Technological, Environmental, Economic and Institutional. The aim of this paper is to provide guidance for the key stakeholders national and local government to facilitate built environment professionals in their continuing professional development through a professional doctorate (DProf) programme facilitated by the CADRE (EU-FP7) project. The knowledge exchange and training within all thematic areas of Resilience would ensure a holistic, multidisciplinary approach to disaster resilience construction, urban planning and other such activities to provide societal resilience to disasters.

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2. METHOD

The literature review was supplemented by qualitative, primary data collection of in-person interviews for each stakeholder group.

Altogether, 10 interviews were conducted with respondents from local and national government institutions. This includes 05 interviews with respondents from national level government organisations directly involved in disaster resilience in Built Environment (including 02 Divisional Secretariats) and 05 interviews with respondents from local government bodies (including both Pradeshiya Sabhas and local municipal councils). All of these local government bodies were selected from areas in the country that have been identified as being prone to disaster risks.

All of the respondents indicated that they play some role in all three phases (i.e. disaster mitigation/preparedness, relief/ response, recovery/ reconstruction) of the disaster management

3. THE CONTRIBUTION OF THEMATIC AREAS OF RESILIENCE TO SOCIETAL RESILIENCE

Oxfam (2005 cited Maguire and Hagan, 2007) states that in order to 'truly understand the social impacts of disasters, and to manage and prevent adverse consequences, we must understand the impacts of disasters on particular groups within communities'. Accordingly, developing a proper mechanism 'to identify the potential fracture points or social cleavages within a community' and the impacts of disasters on these groups is useful to facilitate the prediction of future breakdowns in social resilience in disasters, and to design preventative initiatives (Maguire and Hagan, 2007).

There is also no systematic means for obtaining valid and timely information that is required to address the myriad of human recovery needs before, during, or after a disaster (Acosta *et al.*, 2011). This is a key issue as in order to achieve significant improvements in social resilience all stages of a disaster cycle need to be considered in emergency management planning (Maguire and Hagan, 2007).

Carrying out 'vulnerability mapping', including local level assessment of structures, occupations, living patterns, cultural practices, etc., (National Disaster Management Authority, 2010) could act as a useful tool in allowing these human needs to be addressed, thereby increasing social resilience.

Differences in communities in terms of their socio-economic status, their degree of geographic isolation, or vulnerability to psychological trauma mean that different groups within the one society can be more or less resilient to a disaster (Maguire and Hagan, 2007). Vulnerable social groups, such as the elderly, children, or the economically disadvantaged, may be particularly susceptible to impacts of disasters as they have fewer resources available to cope. Hence, it is important to ensure that the needs of these vulnerable groups are addressed in designs during design approval.

As described, engaging local contractors and suppliers are an important means of restoring social resilience. The government could facilitate this by stating a preference to local contractors and suppliers during tender processes.

Promoting 'community-driven and locally managed processes' during construction can promote local decision making and ownership (FEMA, 2011).

It is understood that governments cannot prevent all disasters from occurring, or alternatively, 'shield people from all their consequences' (Osterholm, 2005 cited Maguire and Hagan, 2007). Hence, the priority of government should be on strengthening the resilience of communities and addressing this through research, policy and program development, as well as in crisis management and education initiatives (Maguire and Hagan, 2007).

Local governments also lead the community in preparing hazard mitigation and recovery plans, raising hazard awareness and educating the public of available tools and resources to enhance future resilience (FEMA, 2011).

Promoting food security is also an important aspect that can ensure the resilience of communities to hazards as disasters such as droughts, floods and cyclones can disrupt agriculture-based livelihoods (UNISDR, 2005).

Conducting multi-hazard mapping, including development of hazard maps at community levels and collating them for district and national levels, using technologies such as GIS-based community information systems (National Disaster Management Authority, 2010), can provide an accurate source of information on the resilient requirements to be addressed during design and construction phases. Such an activity could be complimented with 'capacity mapping', which would involve identifying capacities (including those of NGOs) from community level upwards.

It is also necessary to review and change the building regulations and codes so that they can be used to more efficiently facilitate improving the structural integrity of buildings and infrastructure (Mannakkara and Wilkinson, 2013).

The inadequate structural capacity of the Built Environment has been highlighted as a primary reason for extensive damage from natural disasters (Mannakkara and Wilkinson, 2013). The government has a key role to play in balancing the use of the land and ensuring that structures are designed and built taking into account the disaster risks for that local area through the proper implementation of Land use planning and building regulations. The majority of mitigation measures are adopted, codified and enforced at the local level. While there are national standards, it is often up to the local governments to adopt and enforce these (FEMA, 2011).

Non-structural mitigation is also a significant aspect of building safety, and can result in avoiding a large percentage of losses and casualties. This may include, inter alia, avoidance of heavy and hazardous building content, avoidance of storing or using hazardous materials in buildings, and avoidance of material with the potential of falling, dislodging, flying or floating that can cause injury and damage (National Disaster Management Authority, 2010).

Care should be taken not to let the obvious time pressures in the recovery process and expectations for fast results to result in hasty design and construction without due regard for building codes and resilience (Mannakkara and Wilkinson, 2013; Bosher and Dainty, 2011).

Special training needs to be provided to service providers, including Built Environment professionals, construction workers, local emergency response agencies and support volunteers on addressing technological resilience.

Having a database of skilled builders who are willing to participate in post-disaster reconstruction during the pre-disaster phase would also assist in guaranteeing construction quality (Mannakkara and Wilkinson, 2013) and in turn technological resilience.

Hence, the importance of regulative authorities conducting periodic inspections to ensure that constructions are being done according to the specified guidelines has been stressed (Mannakkara and Wilkinson, 2013). Without this, it is difficult to ensure proper implementation of building regulations increasing the technological resilience of structures.

Promoting the retrofitting and maintenance of Built Environment in ways which will reduce vulnerability to future disaster impacts (FEMA, 2011). It is particularly important that governments address this in relation to critical public facilities and physical infrastructures such as schools, clinics, hospitals, water and power plants, communications and transport lifelines, disaster warning and management centres, and culturally important lands and structures (UNISDR, 2005). The vulnerability of the existing Built Environment should be continuously assessed throughout the use stage (Witt *et al.*, 2014).

At the same time, ensuring the future safety of new houses and public buildings will require research, documentation and communication of appropriate materials and technologies for disaster-resistant construction.

Proper land use planning at national and local government levels is central to increasing environmental resilience. In Australia, land use planning and building codes (developed by taking hazard risks into account), have been identified as the 'single most important mitigation measure in preventing future emergency losses' in new developments (National Emergency Management Committee - Land Use Planning and Building Codes Task Force, 2012). Land use planning of the Built Environment, as noted by the National Emergency Management Committee - Land Use Planning and Building Codes Task Force (2012), is a 'complex process that must consider the various interests of multiple stakeholders with

respect to physical, social, environmental and economic constraints'. The planners and other involved professionals should be equipped with the necessary competencies for collecting and analysing large amounts of data in order to produce robust strategic plans and to competently assess development applications (National Emergency Management Committee - Land Use Planning and Building Codes Task Force, 2012).

The government has a key role to play in influencing land use planning, building codes and property resilience ratings through legislative and policy changes to increase the resilience of a nation's Built Environment.

As FEMA (2011) notes resilience, sustainability and mitigation need to be incorporated as part of the design for infrastructure systems and as part of the community's capital planning processes (FEMA, 2011). According to Mannakkara and Wilkinson (2013), the damage from the 2004 Indian Ocean Tsunami could be partly attributed to the lack of consideration of coastal risks in the design of structures.

Mannakkara and Wilkinson (2013) further suggest the introduction of monetary incentives to promote the adoption of risk reduction strategies, thereby encouraging the use of hazard resilient designs, materials and specifications.

Various indicators aimed at increasing environmental resilience can be incorporated into the tendering process as contractor/ supplier selection criteria. Use of Green Public Procurement (GPP) criteria, such as the criteria for construction projects developed by the European Commission, could also facilitate addressing environment resilience related issues during reconstruction (SCI-Network, 2007).

Schemes for providing training to building practitioners; conducting inspections; and not compromising quality for speed are some of the key areas highlighted in relation to increasing technological resilience during construct stage. National Disaster Management Authority (2010) emphasises that special skill training on disaster resistant technologies should be provided to construction workers.

Technological resilience during this stage could be adversely affected by poor regulative powers and the lack of strict enforcement building regulations/ codes leading to sub-standard structures. For example, Mannakkara and Wilkinson (2013) observe that during the time the Indian Ocean Tsunami struck, enforcement of building codes was mainly restricted to urban and suburban areas in Sri Lanka resulting in magnified damages to rural and coastal areas, where strict structural standards were lacking.

National and local government bodies need to carry out regular supervisions to ensure that the principles of sustainable and disaster-resistant communities have been adhered to throughout the construction phase through the protection of natural resources such as coastal barriers and zones, floodplains, wetlands and other natural resources critical to risk reduction (FEMA, 2011).

Awareness of end-users of Built Environment facilities, including house owners, families, students, teachers, decision makers, etc., on disaster resilience, should be increased prompting them to take local action to reduce risk (National Disaster Management Authority, 2010).

Although costs vary across nations and within regions in a single nation a number of authors have highlighted the need to a national standard for estimating recovery costs. Acosta et al. (2011) note that the lack of guidance on procedures for estimating the costs of recovery has led to inconsistent estimates being prepared which threaten the credibility of reimbursement of costs. They go on to highlight developing such a standard could benefit national and local governments, by providing them with a more accurate figure on associated costs, as well as NGOs, by ensuring that their appeals to donors are consistent and appropriate.

Extra costs incurred by adopting new technologies and materials to improve structural resilience have been noted to discourage compliance with new building codes (Mannakkara and Wilkinson, 2013). As mentioned, introducing monetary and other types of incentives for construction stakeholders to incorporate disaster resilience could be addressed.

Where the upfront budget for construction work is restricted, it is useful to promote the setting of minimum standards together with higher aspirational targets in relation to incorporating disaster resilience (SCI-Network, 2007).

During pre-construction areas of potential financial challenges need to be identified (FEMA, 2011). In instances, where these costs can go beyond the capabilities of local governments, necessary funding should be arranged from the national government and/or other sources (e.g. NGOs) (IFAS, 1998). Focus should also be given to promoting financial risk-sharing mechanisms (e.g. Insuring against disasters) as well as developing and promoting alternative and innovative financial instruments for addressing disaster risk (UNISDR, 2005).

Mannakkara and Wilkinson (2013) further suggest the following strategies that governments can undertake to help increase economic resilience: i.e. taking the responsibility for funding the extra cost required for improvements not covered by insurance; restricting construction on high-risk lands requiring improvements which are too costly and time-consuming; introduction of "Buy-back" or "Land-swap" schemes for those lands on which construction costs cannot be covered by insurance or government funding (here the high-risk lands are either bought by the government, or exchanged, allowing occupants to settle into lower risk lands).

Promotion of indigenous technologies during construction with appropriate adaptation and promotion of local materials and skills, and low-tech, low-cost technologies is important in increasing economic resilience (National Disaster Management Authority, 2010).

Promoting diversified income options for populations in high-risk areas is important to reduce the vulnerability of these community groups to hazards. Care should also be taken to ensure that their income and assets are not undermined by development policy and processes increasing their vulnerability to disasters (UNISDR, 2005).

Ensuring that disaster risk reduction is a national and a local priority is necessary to provide the strong institutional basis needed for addressing disaster resilience (UNISDR, 2005). The 2009-2011 mid-term review of progress against the Hyogo Framework for Action has highlighted weak capacity in many local governments, which in turn affects their ability to accurately account for disaster risk in investment and development decisions (Hall *et al.,* 2013). Competencies should be developed particularly in relation to identifying hazards and assessing risks and vulnerabilities (FEMA, 2011).

National platforms should also facilitate coordination across sectors, including by maintaining a broad-based dialogue at national and regional levels for promoting awareness among the relevant sectors (UNISDR, 2005). At national government level, steps should also be taken to avoid duplications of effort, lack of alignment between systems and legislation, lack of common standards, lack of clarity about various roles and responsibilities of different agencies involved as well as lack of leadership, teamwork, political will and commitment (National Emergency Management Committee - Land Use Planning and Building Codes Task Force, 2012; Malalgoda *et al.,* 2014). Herein, UNISDR (2005) suggests the importance of 'national integrated disaster risk reduction mechanisms', such as multi-sectoral national platforms that lay out the responsibilities at the national through to the local levels to facilitate coordination across sectors. This is also important to overcome the complexities and long durations taken to resolve issues due to the involvement of the large number of organisations (Malalgoda *et al.,* 2013).

At the same time, Hall *et al.,* (2013) maintain that a clear demarcation of responsibilities is needed at national, provincial and local government levels, whilst establishing strong linkages between local and national government levels with national policies being aligned with local needs. The latter is important since some researchers have found that certain information at the national level was misinterpreted at the local level (Karunasena and Rameezdeen, 2010).

Flexibility (for example in staffing and management structures) is needed at organisations at all levels of government to facilitate the application of laws, regulations and policies in the context of disasters, so that the government's adaptability to govern in unforeseen incidents is enhanced (FEMA, 2011).

Malalgoda et al. (2014) highlight that amending policies so as to provide municipal councils with more authority and power to engage in resilience building. The authors go on to stress the importance of 'raising awareness of council officials on disaster risks and resilient practices', engaging council officers in national level decision processes that affect their local areas and establishing proper communication channels to exchange decisions and information related to resilience. The national government should

also ensure that the necessary resources to address disaster risk reduction are allocated to the local governments (Hall *et al.*, 2013).

It is also important to develop and strengthen partnerships with other stakeholders such as universities, professional associations, the private sector and NGOs to facilitate recovery capacity-building activities and expansion of resources available for planning and decision making (FEMA, 2011).

A strong legal framework and consistent regulations are needed to ensure the enforcement of building codes and regulations aimed at increasing building resilience. Witt *et al.* (2014) stress that 'regular review (and tightening) of urban planning policies and building codes and the continual re-assessment of design guidance and the vulnerability of existing assets' are necessary to ensure Built Environment resilience in the increasingly hazard prone and dynamic future.

Functional and effective intergovernmental relations (FEMA, 2011) are necessary at this stage to influence the efficiency pre-construction stage activities. Transparency in the tender process is also important to minimise corruption or wrongdoing.

Public–Private Partnerships can be promoted to better engage the private sector in resilient construction activities (UNISDR, 2005).

As discussed, greater emphasis needs to be placed on establishing and implementing monitoring and accountability instruments to ensure enforcement of available laws and regulations.

Capturing after-action recommendations and lessons learned during this stage can help all government levels to evolve, adapt and develop new skills and capacities to address the changing landscapes (FEMA, 2011). UNISDR (2005) also highlight that this phase should be used to 'develop capacities that reduce disaster risk in the long term, including through the sharing of expertise, knowledge and lessons learned'.

4. DISCUSSION

National and local government have a crucial role in the process of planning, designing and approval of housing and infrastructure making a significant contribution to making the Built Environment more resilient. In this respect, it holds a central position in all three phases (i.e. disaster mitigation/ preparedness, relief/ response, recovery/ reconstruction) of the disaster cycle.

The literature review highlighted that Government has a key role to play in developing hazard maps, carrying out risk assessments and influencing land use planning, building codes and property resilience ratings through legislative and policy changes to increase the resilience of a nation's Built Environment. However, to accurately account for disaster risk in investment and development decisions competencies need to be developed particularly in relation to identifying hazards and assessing risks and vulnerabilities.

The research found that at present the national and local governments lacked the resources (in terms of technical assistance, finance, equipment and human resources) needed to identify high-risk zones, buildings and other structures, assess risks and carry out resilient designs.

Most of the activities such as identifying risk locations, conducting awareness programmes, preparing construction estimates, overseeing construction process to ensure compliance with guidelines, etc. were mainly carried out by Technical Officers (TOs). The involvement of Built Environment professionals in these activities was not at a satisfactory level. Respondents highlighted that whilst there was only a limited number of TOs available to carry out all these activities, their knowledge and skill level was also not up to the standard that may be expected from Built Environment professionals with specific expertise in these areas. More training and education for current employees was highlighted by national and local government respondents as a vital need to close this competency gap. Not being able to match the lucrative wages offered by the private sector to Built Environment professionals was seen as one of the main impediments to retaining them as permanent staff and hence, most of the government departments resort to retaining them on contract on an 'as-needed' basis. Some of the respondents also highlighted that Built Environment professionals showed a lack of awareness of local contexts (e.g. local climate, lifestyles, geographical location, etc.) and did not give proper attention to selecting materials suitable to a specific location and climate and identifying the needs of local communities.

Being a developing country, there was also consensus that the funds allocated to disaster management were insufficient compared to the associated expenses. The use of public-private partnerships is one suggestion highlighted in literature to engage the private sector in sharing some of these costs. Political interferences from higher levels was also an issue in allocating the available funds.

In relation to reconstruction, national and local government respondents noted that they were involved in all stages of the property life-cycle except the physical construction stage. Requiring TO's report and NBRO recommendations in granting permission for construction projects, site visits by TOs during construction to ensure compliance to aforementioned, providing guidance on resilient designs, conducting awareness programmes, providing funds for rebuilding under the supervision of TOs and conducting risk assessments are some of the actions carried out by national and local government bodies in order to facilitate Built Environment resilience. Respondents also highlighted that more attention should be given to ensuring construction quality, with a professional institute with relevant expertise in the field assessing each construction.

Funds provided for victims not being sufficient to address resilience in design and construction, lack of knowledge on the concept of disaster resilience, lack of technical advisors, not using sufficient risk reduction methods in planning and design of disaster reconstruction were some of the challenges government bodies have experienced in practically implementing disaster resilience. For instance, some of the respondents noted that despite NBRO recommendations being needed to provide building approval, some of the recommendations given by them could not be practically addressed within the budgets available to owners. Respondents also noted that better coordination with private sector institutes could be used to overcome some of the resource requirements.

5. CONCLUSION

Local and national governments have a key role to play in developing hazard maps, carrying out risk assessments and influencing land use planning, building codes and property resilience ratings through legislative and policy changes to increase the resilience of a nation's Built Environment.

The involvement of Built Environment professionals in these activities was minimal with most of the activities such as identifying risk locations, conducting awareness programmes, preparing construction estimates, overseeing construction process to ensure compliance with guidelines, etc. being carried out by Technical Officers (TOs).

More education and awareness should be given to Built Environment professionals, on considering local contexts (e.g. local climate, lifestyles, geographical location, etc.) in designs, selecting materials suitable to a specific location and climate, and identifying the needs of local communities.

Enforcement laws and regulations should be strengthened. At the same time, laws should be revised and updated to meet the present demands in relation to resilience.

There is lack of funds available for disaster management as well as lack of transparency in allocating funds to victims

Funds provided for victims not being sufficient to address resilience in design and construction, lack of knowledge on the concept of disaster resilience, lack of technical advisors, not using sufficient risk reduction methods in planning and design of disaster reconstruction were some of the challenges government bodies have experienced in practically implementing disaster resilience.

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