

Exploring Capacity of Construction Industry Post Disaster Housing Reconstruction

Nadarajapillai Sathyendrakajan¹, Gayani Karunasena², Chitra Wedikkara³

Built - Environment - Sri Lanka, Vol. 11 , Issue 01 : 2012: 2-6

Key Words - Capacity, Construction industry, Housing, Disaster reconstruction, Post tsunami

Abstract

The need to manage disasters through construction industry and its wide role in achieving successful reconstruction projects has gained importance in recent years. Hence, construction industry development through capacity building is becoming inevitable to successful management of disasters. This study aims to explore the capacity of construction industry in post disaster housing reconstruction during the recent past. A questionnaire survey was conducted among contracting organizations involved in post disaster housing reconstruction to explore existing capacities. The study found that contractors place more emphasis on human, finance and management aspects in capacity building. Contractors' financing base changed by a considerably smaller proportion in response to reconstruction circumstances and credit facilities indicates an increase. Main challenges faced in reconstruction are shortage of labourers and materials. This study identifies existing capacities and highlights areas which need capacity building to successfully face challenges of future post disaster housing reconstruction.

Introduction

Natural hazards are extreme events that could cause potential harm to both socioeconomic and ecological systems. These could ultimately become a major disaster. Therefore, identification of vulnerabilities and risks of major hazards for a particular country is important. Lack of understanding on issues, co-ordination, scarcity of resources, capacity constraints and their unbalanced activities were identified as key issues which enhance vulnerability of disaster risks of victims (Keraminiyage et al, 2008). Thus, in order to help victims in the short as well as long term governments should have proper understanding of nature of disasters and mechanisms to help victims in short term as well as in long term. It is necessary to identify proper funding systems, specialist knowledge, non government organization's assistance, train people and build up close relationships and proper coordination among stakeholders. in order to achieve this.

These are not exceptions to post disaster reconstruction processes as well. Lack of land and unclear distribution criteria, improper identification of beneficiaries and little to no participation throughout reconstruction process, political and management malpractices, cumbersome government bureaucracy, lack of information available to public, no timely utilization of foreign aid for intended purposes, lack of transparency, lack of coordination have been identified as main issues visible in reconstruction as well (Braunmuhl et al, 2006). These problems are equally applicable in Sri Lanka which is prone to frequent natural

disasters. The United Nations Development Programme Report (2005) states that the national construction industry does not have necessary contractors; equipment; skilled workforce; modern management practices or access to finance required to successfully accelerate post-tsunami reconstruction work. Further procurement delays, environmental safeguards, security in unclear areas and capacity constraints are highlighted as key challenges. Shanmugaratnam (2005) also indicates that there is a capacity gap in the public sector due to political patronage and control; bureaucratic inefficiency and corruption. Further, he argues that capacity of the public sector is too low to meet post-disaster housing needs within a reasonable time in the post tsunami scenario. It is evident from above that the construction industry must be developed in terms of its capacity. Thus, this study aims to explore organizational capacity of contractors in post disaster housing reconstruction and to propose remedies to successfully face challenges in implementing housing reconstruction in future.

Literature Synthesis

Post Disaster Housing Reconstruction

Rotimi et al, (2006) opined that task of reconstruction after a major disaster can be an onerous challenge. Furthermore, the importance of coordinating all stakeholders for effective and efficient recovery of an affected community. is emphasized. Similarly, Toigo (1989) highlighted the importance of reconstruction planning and benefit gained through accumulation of knowledge and experience derived from successive events and research. Haigh et al, (2006) indicate that it is a significant area for research, with particular emphasis on developing countries that are less able to deal with causes and impacts of disasters. Further, they argue that construction industry has a much broader role to anticipate, assess, prevent, prepare, respond and recover from disruptive challenges. The United Nations Report on Post Disaster Settlement, Shelter and Housing (2006) further indicates the importance of reconstruction referring to high-cost and long-term commitments of per capita required. In addition, many authors highlight complexity of post disaster reconstruction, referring to various dimensions as risks and uncertainty (Moe and Pathranarakul 2006; Wu and Lindell 2004).

A main reconstruction activity of a disaster is provision of housing. The United Nations Disaster Relief Coordinator (UNDRO) (1982, p11) defined post-disaster housing as "housing policies and applications following a disaster for meeting the urgent, temporary and permanent sheltering needs of the survivors of the disaster". Further, it indicates that post-disaster housing is not only a dwelling product but also a process which involved a "long chain of social, economic, technological, environmental, political and other interactions" (UNDRO 1982, piii). This interaction combines social consciousness, highly developed technology and economic systems with the participation of affected community (Norton 1980; UNDRO 1982;

¹Employed (overseas), ²Senior lecturer, Department of Building Economics, University of Moratuwa, ³ Professor, Department of Building Economics, University of Moratuwa, ²gayani@becon.mrt.ac.lk

Barakat 2003). The same source indicates that post-disaster housing reconstruction process consists of four different periods: pre-disaster period, immediate relief period, rehabilitation period and reconstruction period (UNDRO 1982).

2.2 Post Disaster Housing Reconstruction in Sri Lanka

Sri Lanka has experienced regular natural disasters commonly caused by floods, cyclones, landslides, droughts and coastal erosion for generations with increasing losses of life and property during the past few decades (Jayawardane 2006). The devastation caused by the Asian tsunami in 2004 took Sri Lanka by surprise warning that Sri Lanka is also vulnerable to low-frequency high impact events with extensive damage. It has been identified that more than 98,000 permanent houses have to be rebuilt (Reconstruction and Development Agency 2006). Although several initiatives were taken by the government in the past to mitigate these damages they were mostly reactive emphasizing on relief and recovery rather than proactive with damage prevention or minimization strategies (Jayawardane 2006). Institute of Policy of Studies of Sri Lanka (2006) states that the most serious constraint is likely to be lack of capacity and material. Further, statistics on housing reconstruction published by Reconstruction and Development Agency (2007) indicates shortfalls in demand created within the stipulated time to complete all houses. In addition, a study on factors adversely affecting post tsunami housing reconstruction in Sri Lanka identified the following inconsistencies in housing policy, conflicts on land titles, ineffectiveness in monitoring funds, insufficient capacity of construction industry, the affected community's crappy unsavoury behaviour, government's lack of planning and recovery strategies, lack of communication and coordination among stakeholders and existence of hostilities as key challenges (Nissanka et al, 2008). In relative to the tsunami. These prove that the capacity of construction industry, is not in a position to cater to the demand created. Despite other reasons which delayed housing reconstruction, capacity of construction industry in post disaster reconstruction is a significant one. In this context, need for understanding the construction industry's capacity to carry out reconstruction and predict performance on future disasters is becoming inevitable. The, following section explains the methodology adopted to identify existing capacities of post disaster housing reconstruction in Sri Lanka.

Research Methodology

Comprehensive literature review was carried out to identify basic concepts on capacity and post disaster reconstruction. It revealed that there are no investigations on existing capacities of the Sri Lankan construction industry in relation to disaster reconstruction.

With reference to research question of the study; "What is the capacity of construction industry in post disaster housing reconstruction?" and stipulated objectives; "explore and identify parameters of capacity specifically to post disaster housing reconstruction" author selected the survey method as the best approach for data collection. "Contracting organization" is selected as the unit of data analysis within Sri Lankan construction industry. 30 contractors having ICTAD (Institute for Construction Training and Development) grading ranging from M1 –M6 within Colombo Metropolitan region who contributed to housing reconstruction in post disaster scenario were selected as the sample for data collection. Housing sector was considered in this study as it has higher

significance over other sectors in terms of economical and social aspects of post disaster reconstruction. Further, investigation of capacities was narrowed down to organizational capacities of contractors since they play a major role in the post disaster reconstruction.

A Questionnaire survey was used as the data collection technique. Structured questionnaire comprised a check list and five point "likert scale rating". A check list was used to identify the important elements of capacity building in contracting organisations While the likert scale is used to assess existing capacities of contracting organisations in terms of labour, finance and management. The authors adopted a scale of 1 to 5 to access existing capacities where "1" represented the "Extremely low" and "5" the "Extremely high" in term of impact of each parameters to existing capacities. Finance management system, financial stability and diverse and sustainable funding are key areas covered under financial capacities while management and staffing capacities, internal performance analysis and customer service orientation are considered as the key management capacities. The analysis techniques used were the Relative Importance Index (RII) and frequency analysis .

$$RII = \frac{\sum (W n)}{A \times N} \times 100 \%$$

Equation 01: Relative Importance Index (RII)

Where,

- W = Constant expressing the weighting given to each response.
- A = the highest weighting.
- n = the frequency of responses
- N = total Number in the Responses
- RII = Relative Importance Index

Key Findings

Important Elements of Capacity Building in Housing Reconstruction

Figure 01 illustrates the RII rating for capacity building elements by the respondents.

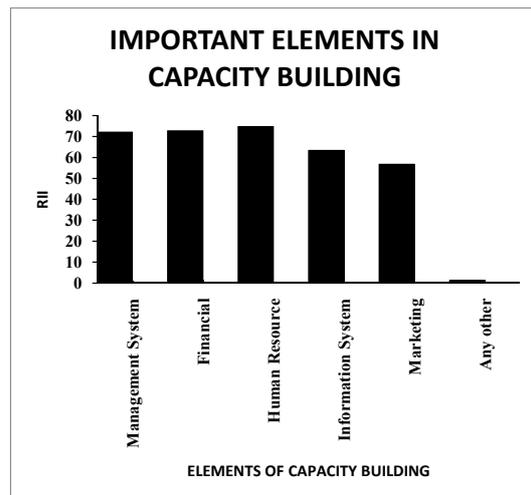


Figure 1 RII and important factors of capacity building

Human resource took the highest rank with (RII) 75%. This proves that human resources, especially skilled labour, is important as a capacity building element in post disaster housing reconstruction. The respondents believed that the financial system is important because

it decides on how much they can commit to any work and also as most donors and government agencies emphasize more on these than experience. Therefore, the financial system was the second highest with (RII) 73%. Therefore further, findings revealed that management was important in order to carry out disaster housing reconstruction projects without any disruptions. It takes third place in the RII, third, with a percentage of 72%. The other elements of capacity building such as information system, marketing and others are concerned with relatively low ratings.

Existing Capacity of Contracting Organizations

Contracting organizational capacity was investigated on two elements of capacity building; finance and management. Financial management system, financial stability, diverse and sustainable funding were considered under finance and management and staffing capacity, internal performance analysis and customer service orientation under the management. In addition to these, human resource capacity and credit facility of contractors were analyzed during 2005-2007.

Financial capacity of the contractor

This provides a basis to determine whether contractors have financial capacity to sustain quality services and support their clients over time. Financial viability is analyzed within the following three components:

Financial Management System

A well-functioning financial management system puts internal policies and practices in place for a contractor to monitor and maintain its financial health and to help ensure its long-term sustainability. Almost 90% of contractors have stated that they conduct yearly or biannual audit which assesses whether financial reports are presented fairly, complied with applicable laws and regulations. Only 76 % stated that they obtained a qualified opinion on its audit and 70% indicated that they have no substantial concerns with internal controls. Internal controls are an organization's accounting and other fiscal control policies and procedures that seek to minimize likelihood that assets are misused or accounts are misstated. These prove that good management practices among the contracting organizations which keep up their grades and to perform well to achieve their objectives.

Financial Stability

Financial stability refers to an organization's ability to manage flow of funds into and out of an organization, and its ability to deal with a short-term cash shortfall. A financially stable contractor will maintain good credit and access to a funding reserve that could support it in times of need. In addition, contractor will maintain its client base (i.e., its main source of revenue) and expand in a reasonable manner to take advantages of opportunities for growth in the market, while not over-extending itself. A contractor's total annual budget serves as an indicator of its general size, and perhaps the scope of its works and size of its client base. Findings revealed that about 65 % contractors recorded an annual budget over Sri Lankan Rupees 20 million. Further, depending on its size and works it does, a contractor may work with many types of clients in many types of environments. In considering types of clients they serve, 54% are residential clients, 62 % government clients, 46% industrial clients, and 53% commercial clients. It shows that a contractor can expand in a reasonable manner to take advantage of

opportunities for growth in the market. Further, almost all contractors (90%) indicated that they have a reserve of funds or ready access to cash where they maintain a line (or lines) of credit or at least some access to cash in case of short-term shortfall or otherwise. However, 14% of respondents state that they delayed payments due to problems with financial stability which tend to cancel contracts in particular circumstances.

Diverse and Sustainable Funding

Healthy businesses receive their funding from a variety of clients and other sources, and work to ensure that financing is sustainable over long term. Almost all contractors (97%) indicate that they plan to grow business in future. However, growth that occurs too quickly or without forethought can actually hinder sustainability. 66% of contractors' finance base is changed below 15% in response to reconstruction circumstances and only 20% of contractors' funding base is changed above 20% in response to reconstruction circumstances.

Management capacity of contractors

This is to determine whether contractors' management capacities align with providing quality services and support to their clients. Management capacity is further classified into following three components:

Management and Staffing Capacity

The leadership and staffing of any organization are critical to its ability to provide high quality and reliable construction to their clients. Survey findings revealed that 26% of staff has "lower level", 46 % of staff has "medium level" and only 10% of staff has "high level of sufficient and relevant education and experience related to the construction industry. It is more so, because most local construction industries do not employ well educated staff due to higher demand for reconstruction. It further revealed that, only 53% of staff has been well trained in contractor's general approaches and rest have not been well trained since most contractors don't provide a standard training system or there are no proper rules and regulations governing training of staff.

Internal Performance Analysis

Any organization that is interested in maintaining and improving its organizational capacity should conduct regular and thorough analyses of its work and how it could improve service delivery as well as its overall outcomes. The survey revealed that 17% stated they assess and review their own performances monthly; 33 % quarterly and 40 % annually while only 10% stated that they neither assess nor review their performance. Most contractors review their performance in order to find whether they are in line with objectives and good organizational practices. Further, 83% stated that they do solicit information from clients to determine their satisfaction. Majority of contractors solicit information because it leads them to review their performance and guide proper functioning of their business.

Customer Service Orientation

Customer service is an important contributing factor providing for successful long-term relationships. The survey revealed that 55% provided adequate and appropriate customer service resources. It is on average level and most contractors do not offer client service orientation except for large scale contracting organizations. Further, only 52% indicated that resources are readily available to clients and staff.



Figure 2
Labour capacity for M1 contractor

Results indicate the need for development of strategies to provide satisfactory service orientation. To facilitate development of working relationship, it is important that a contractor delineates clear pathways for beneficiaries to get answers to questions, work through development of details of work plans or other contractual issues and provide feedback on services.

Human Capacity

The human resource capacity can be explored through the number of labour which comprised of both in-house and subcontracted labourers for years of 2005, 2006 and 2007. Figure 2 indicates the number of labourers for M1 contractors.

M1 and M2 contractors were considered for analysis since data obtained from other grades of contractors

Credit Facility

Credit facility of contractors was also evaluated in same manner for each type of contractors ranging from M1 to M6 for years of 2005, 2006 and 2007. Then percentage change for an year from 2005-2006 and 2006-2007 was calculated. Refer example at figure 3 for credit facility for M1 type contractors for years 2005, 2006 and 2007.

Credit facility of contractors graph indicates increases in years 2005-2006 and 2006- 2007. The percentage of increase in an year from 2005 to 2006 was higher than for year from 2006 to 2007. This is also due to the fact that tsunami housing reconstruction activities were higher in year 2006 when compared to years 2005 and 2007.

Challenges and Remedies for Housing

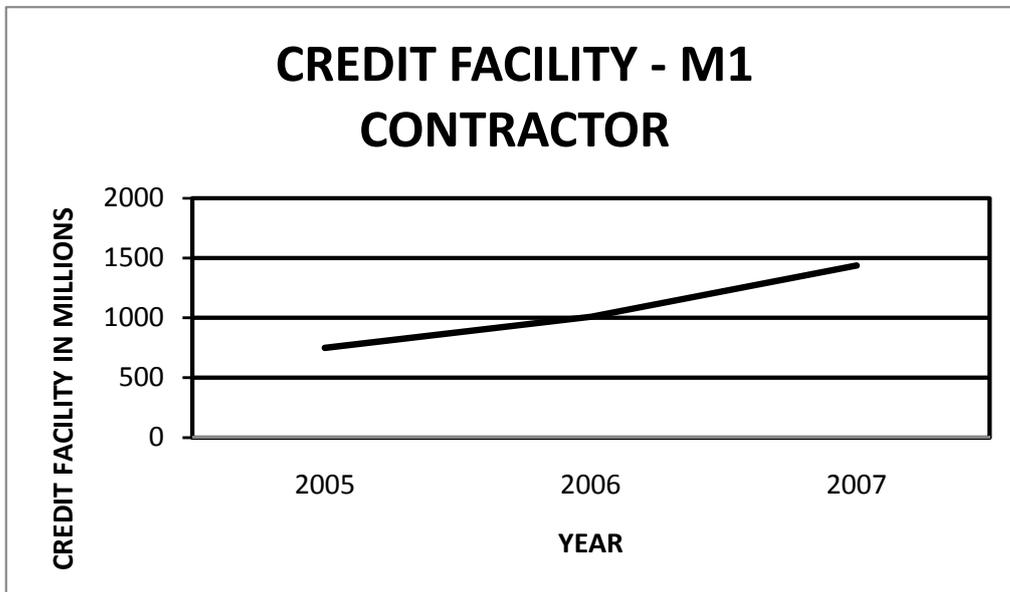


Figure 3
Credit facility M1 contractor

were not sufficient as most contractors are not in a position to maintain their labour levels every year. Both M1 and M2 grades indicate increased labour capacity in year 2006 due to tsunami housing reconstruction activities, compared to years 2005 and 2007.

Reconstruction

The survey findings revealed that contractors have suffered in housing reconstruction by non availability of labourers and materials. Availability of labourers was the biggest challenge recorded with an RII of 86% and materials was second with RII of 83%. These two problems took forefront place compared to other challenges due

to high demand of materials and labourers aftermath the tsunami. Further, this indirectly affected wages of labourers. Challenges related to project management were placed third with RII of 79% due to the fact that availability of labourers and materials caused a lagging effect on project management. Insurance processing and poor IT infrastructure were lowest in contractor's priority due to the nature of Sri Lankan construction industry.

With reference to remedies, the survey revealed that planning of material requisition took the first rank with RII of 81% and pre-demand for construction workers was placed second with RII of 75% to overcome challenges in post disaster housing reconstruction. Further, proper co-ordination is placed third with RII of 70% in order to overcome challenges associated with project management. Cost planning and control and earlier assessment of impacts of disaster elements were concerned relatively low.

Conclusions

The survey findings revealed that most contractors were involved in Tsunami housing reconstruction work compared to other disasters due to magnitude and significance of damage caused in Sri Lanka. Further, it revealed that capacity of construction industry was not adequate to cater to demand created by the tsunami. In this context, capacity building in construction industry will inevitably face challenges in future disasters. The questionnaire survey conducted to explore capacities in construction industry among contractors revealed that human resources, finance and management are considered as most important elements in capacity building of housing reconstruction. In terms of financial capacities, survey revealed that financial management systems of contractors is well above average and indicates good capacity level and financial stability. Diverse and sustainable financial sources of contractors indicate above average levels. Management capacity, management and staffing and customer orientations are below average level and indicate a need for enhancement of capacity. Most contractors do review their internal performance which is generally above average level. Credit facility of a contractor indicates an increasing nature in years after the tsunami. Availability of labourers and materials are the main factors which hinders planned progress of housing reconstruction where planning of material requisition and pre-demand for construction workers were identified as remedies to overcome challenges identified in housing reconstruction.

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