CRITICAL SUCCESS FACTORS ASSOCIATED WITH POST-DISASTER RECONSTRUCTION PROJECTS

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Post-disaster reconstruction plays an important role in disaster management. This activity aims to restore the living conditions of disaster affected communities by building new houses and infrastructures, but reconstruction is also concerned with future pre-disaster mitigation activities. The success of reconstruction will greatly influence the community's capacity toward the next disaster. Recent major natural disasters show great destruction to constructed facilities, and also pose great challenges in reconstruction. Identification of those challenges and factors that lead to a successful reconstruction project will help to direct efforts and formulate strategies for the next reconstruction. Based on a literature review of project critical success factors (CSF) and of reconstruction projects and processes in different countries, this paper investigates and documents challenges and factors that influence the success of reconstruction.

Keywords: critical success factors, post disaster reconstruction.

INTRODUCTION

Eshghi and Larson (2008) report the frequency of disasters and their effects seem to be increasing. Disaster records were analysed in the Emergency Event Database (EM-DAT, available at www.em-dat.net), showing that from the 100 most costly natural disasters of the 20th century, 65 occurred in the 1990s, 25 in the 1980s and 10 in the 1970s. The reason for the increase in occurrences of disasters is due to better, modern technology, and communication and media to detect and record disasters. Another reason is the growth of populations, where more people live in vulnerable areas. The population has grown sharply from 1.6 billion at the beginning of the 20th century to more than 6 billion in 1999.

In the disaster management cycle, response and recovery phases occur after disaster strikes. Response is the emergency action taken during the disaster and in the short term after the disaster. The main purpose of the response phase is to save human lives in the form of rescue and supplies for immediate needs. Recovery phases take a much longer time, and occur after the emergency actions in the response phase aiming to repair damage, to restore services, and to reconstruct facilities after the disaster has struck (Alexander, 2002).

The reconstruction phase plays an important role in disaster management. Livelihoods of affected communities are restored by building new house units and infrastructures. It is an opportunity to re-plan the community, beginning new life from a new start. Previous living conditions can be restored and may result in better living conditions

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after reconstruction. Regarding the disaster cycle, reconstruction is the key for mitigation and preparedness for the next disaster, by applying structural measures and non-structural measures. The quality of constructed houses and infrastructures during the reconstruction phase will influence vulnerability for the next disaster.

Emergency relief activity directly after the disaster strikes is often considered an effective operation. This activity is built around an international infrastructure of national, international and inter-governmental organisations and backed by media interest to generate public awareness and response (Lloyd-Jones, 2006). On the contrast, recovery activity is usually slow, expensive and complex in terms of coordination and management (Koria, 2009), the reconstruction effort being largely ad-hoc, without strategic frameworks and coordination (Shaw *et al*., 2003). Furthermore, Shaw *et al* also note that inadequate planning, lack of preparedness and mitigation infrastructure, poor dissemination and inappropriate measures for accountability, contribute to problems during reconstruction. This situation seems to be caused by the fact that reconstruction and long term recovery is a local government led activity which local government has a limited and often incapacitated (as result of the disaster) level of planning and implementation recovery strategy skills (Lloyd-Jones, 2006).

So far, however, there has been little discussion about success factors of the reconstruction project. The aim of this paper is to review recent publications on success factors and examine challenges during the reconstruction, by a comprehensive review of the literature on the subject. However, most publications about reconstruction were mainly based on reconstruction in Sri Lanka and Indonesia after the 2004 Indian Ocean earthquake and tsunami.

CRITICAL SUCCESS FACTORS

At the beginning of research about success criteria, it was assumed that the main criteria for success were the 'golden triangle' of time, budget and required quality. Westerveld (2003) argues that the subject of project success is far more than the golden triangle. He argued that there are plenty of potential criteria that can be identified. According to Westerveld, it is a narrow view to consider the golden triangle as the only criteria. Furthermore, decisions about the criteria can be made by different stakeholders and over different time horizons.

Westerveld also points out that it is impossible to create a universal checklist of project success criteria that fits all projects. He argues that criteria will be different from one project to another project; and criteria depend on some project characteristics, e.g. size, uniqueness and complexity. However, a universal clustering of criteria can be formulated to cover the whole issue of project success (Westerveld, 2003).

Project success criteria include:

1. Project results: budget, schedule, quality
2. Appreciation by client
3. Appreciation by project personnel
4. Appreciation by users
5. Appreciation by contracting partners
6. Appreciation by stakeholders

Cookie-Davies (2002) highlights the difference between the success criteria and success factors. Success factors are those which contribute to achieving success on a project. On the other hand, success criteria are the measures by which the success or failure of a project will be judged.

The term 'critical success factors' was first introduced by Rockart (Nguyen *et al*., 2004). Rockart (1979) defined critical success factors (CSFs) as those few key areas of activity in which results, if they are satisfactory, will guarantee successful competitive performance for organisation. Boynton and Zmud (1984) defined CSFs as those few things that must go well to ensure success for a manager and an organization and, therefore, they represent those managerial or enterprise areas that must be given special and continual attention to bring about high performance. Also in a business context, success factors are defined as any knowledge, skill, trait, motive, attitude, value or other personal characteristic that is essential to perform the job or role and that differentiates solid from superior performance (PEPDS, 2010).

In 1986, Ashley (cited in De Wit, 1988) identified seven success factors and six success criteria in construction projects. These success factors are planning effort (construction), planning effort (design), project manager goal commitment, project team motivation, project manager technical capabilities, scope and work definition and control systems. The six success criteria are budget performance, schedule performance, client satisfaction, functionality, contractor satisfaction and project manager/team satisfaction.

Nguyen *et al*. (2004) argue that implementation of the CSFs method is very promising. CSFs can be used to direct an organization's efforts in developing strategic plans (Munro and Wheeler, 1980), to fabricate a set of strategies and to identify critical issues associated with implementing a plan (Boynton and Zmud, 1984). In addition, Anderson (1984, cited in Boynton and Zmud, 1984) observed that CSFs can be used by managers and organizations to help achieve high performance. Also, Toor and Ogunlana (2008) showed three benefits of identification of CSFs: help to analyse the potential reasons of project success or failure; help to choose team members and to identify their development needs; and help for companies to decide their strategic standing on the project.

From previous studies, success factors have been identified and presented in table 1. However, there is paucity of research on success factors in a reconstruction context. The table will be an initial basis for an ongoing PhD research to identify CSFs of the reconstruction project.

It is notable in identifying CSFs from previous studies that there is a range in number of success factors from each publication. For example, Kezner (in 1987, cited in Lim and Mohamed, 1999) proposes six critical success factors for successful projects. These factors are corporate understanding of project management, executive commitment to project management, organisational adaptability, project manager selection criteria, project manager's leadership style and commitment to planning and control. In comparison, a recent study by Toor and Ogunlana (2008) has identified 39 critical success factors, although they have grouped these factors into four categories. Therefore Nguyen *et al*. (2004) found out that research on project success factors needs further efforts; too general or too specific success factors pose certain difficulties when implemented in practice, particularly in developing countries where knowledge infrastructure, including state-of-the-art managerial skills, is not available (Nguyen *et al*., 2004).

Table 4. Identified Success factors from publications

No.	Factor	Literature	Count of citations
1	Effective project control and monitoring	Ashley (1986), Pinto & Slevin (1987), Munn & Bjeirmi (1996), Bellasi and tukel (1996), Cicmil (1997), Westerfeld (2002), Cooke-Davies (2002), Chan *et al* (2004), Nguyen *et al* (2004), Fortune & white (2006), lyer & Jha (2006), Toor & Ogunlana (2009)	12
2	Effective project planning	Ashley (1986), Pinto & Slevin (1987), Morris and Hough (1987), Munn & Bjeirmi (1996), Bellasi and tukel (1996), Cicmil (1997), Westerfeld (2002), Chan *et al* (2004), Nguyen *et al* (2004), Fortune & white (2006), Jefferis (2006), Toor & Ogunlana (2009)	12
3	Competent project manager	Ashley (1986), Kezner (1987), Bellasi and tukel (1996), Westerfeld (2002), Chan *et al* (2004), Nguyen *et al* (2004), Fortune & white (2006), lyer & Jha (2006), Toor & Ogunlana (2009)	9
4	Appropriate project organisation	Bellasi and tukel (1996), Cicmil (1997), Cooke-Davies (2002), Chan *et al* (2004), Fortune & white (2006), Jefferis (2006), Toor & Ogunlana (2009)	7
5	Competent project team	Bellasi and tukel (1996), Westerfeld (2002), Nguyen *et al* (2004), Fortune & white (2006), lyer & Jha (2006), Jefferies (2006), Toor & Ogunlana (2009)	7
6	Involvement of stakeholder/ community	Westerveld (2002), Chan *et al* (2004), Nguyen *et al* (2004), Fortune & white (2006), lyer & Jha (2006), Jefferies (2006), Toor & Ogunlana (2009)	7
7	Personnel	Ashley (1986), Pinto & Slevin (1987), Morris and Hough (1987), Munn & Bjeirmi (1996), Fortune & white (2006), lyer & Jha (2006), Toor & Ogunlana (2009)	7
8	Sufficient resources	Bellasi and tukel (1996), Westerfeld (2002), Nguyen (2004), Fortune & white (2006), lyer & Jha (2006), Jefferies (2006), Toor & Ogunlana (2009)	7
9	Top management / parent company support	Kezner (1987), Pinto & Slevin (1987), Chan *et al* (2004), Nguyen *et al* (2004), Fortune & white (2006), lyer & Jha (2006), Toor & Ogunlana (2009)	7
10	Feedback capabilities in the system	Pinto & Slevin (1987), Cooke-Davies (2002), Chan *et al* (2004), Fortune & white (2006), lyer & Jha (2006), Toor & Ogunlana (2009)	6
11	Good written contract	Morris and Hough (1987), Sanvindo *et al* (1992), Munn & Bjeirmi (1996), Bellasi and tukel (1996), Nguyen *et al* (2004), Toor & Ogunlana (2009)	6
12	Information and communication	Pinto & Slevin (1987), Sanvindo *et al* (1992), Chan *et al* (2004), Nguyen *et al* (2004), Fortune & white (2006), Toor & Ogunlana (2009)	6
13	Political environment	Morris and Hough (1987), Munn & Bjeirmi (1996), Bellasi and tukel (1996), Chan *et al* (2004), Fortune & white (2006), Jefferies (2006)	6
14	Fast-trouble shooting capabilities in the system	Kezner (1987), Pinto & Slevin (1987), Cooke-Davies (2002), Fortune & white (2006), Toor & Ogunlana (2009)	5
15	Learning from previous experience	Sanvindo *et al* (1992), Chan *et al* (2004), Nguyen *et al* (2004), Fortune & white (2006), Toor & Ogunlana (2009)	5
16	Use of technology and IT	Bellasi and tukel (1996), Chan *et al* (2004), Nguyen *et al* (2004), Fortune & white (2006), Toor & Ogunlana (2009)	5
17	Adequate funding	Morris and Hough (1987), Nguyen *et al* (2004), Fortune & white (2006), Jefferis (2006)	4

No.	Factor	Literature	Count of citations
18	Consultation/coordination/meeting	Pinto & Slevin (1987), Nguyen *et al* (2004), lyer & Jha (2006), Toor & Ogunlana (2009)	4
19	Physical environment	Bellasi and tukel (1996), Chan *et al* (2004), Fortune & white (2006), Jefferies (2006)	4
20	Economic environment	Bellasi and tukel (1996), Westerveld (2002), Chan *et al* (2004)	3
21	Size of project	Ashley (1986), Chan *et al* (2004), Fortune & White (2006)	3
22	Social environment	Morris and Hough (1987), Bellasi and tukel (1996), Chan *et al* (2004)	3
23	Team composition	Sanvindo *et al* (1992), Jefferis (2006), Toor & Ogunlana (2009)	3
24	Absence of bureaucracy	Nguyen *et al* (2004), Toor & Ogunlana (2009)	2
25	Awarding bid to right contractor	Nguyen *et al* (2004), Toor & Ogunlana (2009)	2
26	Complexity of the project	Chan *et al* (2004), Jefferies (2006)	2
27	Industrial relation environment	Bellasi and Tukel (1996), Chan *et al* (2004)	2
28	Procurement and tendering method	Chan *et al* (2004), Jefferies (2006)	2
29	Project duration	Cooke-Davies (2002), Morris and Hough (1987)	2
30	Urgency	Morris and Hough (1987), Chan *et al* (2004)	2
31	Privately or publicly funded	Chan *et al* (2004)	1

Chan *et al*. (2004) carefully reviewed the literature on CSFs and suggested that CSFs can be grouped under five main categories: human-related factors, project-related factors, project procedures, project management action, and external environment. Their findings are supported by a study by Toor and Ogunlana (2008) who grouped success factors into four categories: human-related factors, project-related factors, project management-related factors, and external environment related factors.

CHALLENGES IN POST-DISASTER RECONSTRUCTION

The recovery phase in disaster management begins after the emergency response has ended; a stage to restore and, when possible, to improve facilities, livelihoods and living conditions of disaster-affected communities. Reconstruction is a task in the recovery phase with the purpose to rebuild structures that have been damaged by disaster.

The reconstruction phase poses a chance for affected communities to rebuild with consideration of preparation for the next disaster and also the ability to get better living conditions by building better facilities. Jargon such as ‘build back better’ was often introduced after the 2004 Indian Ocean tsunami reconstruction, even though the word ‘better’ has different interpretations (Kennedy *et al*., 2008): does better mean more modern, more environmentally friendly, more resistant to disaster, more oriented towards livelihoods, or a combination? Kennedy *et al* also suggest it is difficult to fulfil all those characteristics of ‘build back better’ where there is a trade off between characteristics. It seems that post-disaster reconstruction is heavily tagged with expectation to provide better conditions. However, the nature of the reconstruction is quite different, commonly with the addition of chaotic conditions, rarity of resources and many simultaneous projects at the same time (Davidson *et al*., 2007, Siriwardena *et al*., 2009). With regards to size of the disaster, the reconstruction has challenges that are different to common construction. In table 2, the list of challenges in the

reconstruction is shown, identified from journals and other publications on post-disaster reconstruction in recent years.

It can be seen from table 2 that coordination is the most cited challenge of reconstruction in publications. Many organisations are involved in the reconstruction process and it makes it difficult for local government to coordinate them in such chaotic conditions after the disaster. In the Aceh reconstruction after the 2004 tsunami, more than 100 organisations were involved in housing reconstruction and in general almost 500 organisations were involved in the recovery process. Coordination problems led to gaps, duplication, inefficiencies and areas of uncertainty (BRR, 2005). Mesurier *et al* (2006) stated that routine construction has proved adequate for small-scale disasters but in reconstruction after a large-scale disaster, a higher level of coordination and management is needed.

Table 5 Challenges of reconstruction identified across 50 publications

No.	Challenges	Count of citations
1	Coordination between stakeholders	20
2	Availability of resources	16
3	Capacity of local government/agency	11
4	Quality of the construction and its inspection	10
5	Information and Communication	10
6	Reconstruction that culturally fit local people	9
7	Conducive safety and political situation in the reconstruction region	9
8	Land acquisition and location	9
9	Organisation of Reconstruction	8
10	Adequate number of qualified people	8
11	Regulation and legislation that apply to big disasters	8
12	Finance the reconstruction	7
13	Rising materials, labour cost	7
14	Adequate skills for reconstruction	6
15	Start reconstruction as soon as possible; tight schedule	5
16	Establish property rights (land ownership, leaseholds and tenant)	5
17	Accountability and transparency	5
18	Corruption	4
19	Lack of services and facilities, infrastructures	4
20	Construct housing that withstands future disaster	4
21	Transportation and distribution, logistic coordination	3
22	Turn the reconstruction into development opportunities	3
23	Selection of beneficiaries	3
24	Introduce and implement new technology (e.g. materials) in reconstruction	2
25	Limited site information	2
26	Meet the minimum standard of house design requirement	2
27	Keep reconstruction process equal	2
28	Governance	2
29	Planning as a whole system of reconstruction	2
30	Social-cultural difference (i.e. language and religious) between organisations and victims	2
31	Clear debris and its disposal	2
32	Community participation in local decision	2

NGOs also play an important role in the reconstruction, as the interface between the affected communities and the government (Shaw, 2003). However, many NGOs received large amounts of private funds that made them able to start the reconstruction process without funding from bilateral and multilateral organisations and minimal coordination with the government (GAO, 2006). There is also reluctance from NGOs

to coordinate with the government (Ophiyandri *et al*., 2009) as perhaps they consider themselves as being independent organisations (Shaw, 2003).

The second most pertinent challenge in reconstruction is the availability of resources. Davidson *et al* (2007) consider challenges of housing projects in reconstruction as similar to those challenges met in low-cost housing projects in developing countries. The massive scale of destruction after the 2004 Indian Ocean tsunami in Aceh had paralysed its supply chain for construction projects, as the impact (damage and losses) to GDP ratio in Aceh province was almost 100 percent (BRR, 2005). Shortage of materials for construction was the most common problem and they had to be imported from outside Aceh.

Local governments were also affected by the disaster. Members of staff were also victims and office buildings were also heavily damaged by the disaster. Hadi (2005) estimated that 9% of the local governments' staff had perished and some office buildings were washed away, though he points out that it was the low level of capacity, not the losses, that made local governments a less important player in relief and reconstruction. As a result, despite having a large budget, there was poor planning and a lack of focus on reconstruction need and occurrence of corruption. Perhaps, it was because public officials had little disaster management experience (Oloruntoba, 2005), another possibility is as Koria (2009) showed that it was due to lack of appropriate technical and managerial expertise and knowledge in organisations involved in the reconstruction.

Also from table 2 it may be seen that quality of construction is also one of the challenges in reconstruction. The scale of reconstruction work is far beyond the ability of available inspectors. Alexander (2004) noted that normal regulations, design procedures and building permits processed are suspended after a disaster, in order to speed up the reconstruction. It may lead to careless conditions, which are exacerbated by poor quality building inspection systems and few inspectors with large workloads (Alexander, 2004). In his review of housing reconstruction in Aceh, Indonesia, Steinberg (2007) highlights the quality problem in reconstruction. NGO-produced housing units were not acceptable by communities and one NGO had to destroy more than 300 poorly constructed houses. Steinberg's study also supports Alexander's (2004) study that there was no existence of a building permit system.

Several studies have revealed that reconstruction often does not culturally fit with local people (Jigyasu, 2002, Boen and Jigyasu, 2005, Pardasani, 2006, Johnson, 2007). In extreme conditions, houses in the relocation area were abandoned by disaster affected communities since the houses did not fit their culture and the communities went back to their original vulnerable place. A study by Boen and Jigaysu (2005) report few examples of reconstruction which did not take social, culture and economic considerations into account. The introduction of new technology, e.g. concrete material to local people that were perceived as 'modern', also poses problems of vulnerability due to the skills of local people.

As a system, reconstruction is also affected by its environment. Progress of the 2004 tsunami reconstruction in Sri Lanka and Indonesia were influenced by political factors, as Aceh and Sri Lanka were conflict areas. The increase of violence in the north and east of Sri Lanka had slowed the reconstruction. Similarly, Aceh had been a conflict area for a long time and that affects the attitude of the people and distrust in national government (Ochiai and Shaw, 2009).

From table 2, the next challenges in the reconstruction process that were elicited from the literature are land acquisition and location; and an adequate number of qualified people. Destructive disasters, for instance earthquakes and tsunamis, often turn the disaster location into an unbuildable area. The victims relocate to a new place as a temporary area while the disaster location is being cleared or the relocation area becomes a permanent place for the victims. Because no appropriate location had been identified earlier, it took time to find a sufficient location and as a result it slowed the reconstruction process (Johnson, 2007).

CONCLUSION

This paper reviews recent publications on the success factors and challenges during reconstruction in disaster struck areas. From the literature review, this paper has identified 32 challenges in the reconstruction process. Related to the CSFs, these findings suggest that general coordination of organisations; the availability of resources; and human resources are important success factors in the reconstruction process. Research is currently being undertaken to identify CSFs in post disaster reconstruction projects.

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