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Effective Time Management in Post-Disaster Reconstruction

Abstract

Natural disasters such as earthquakes, bushfires and flooding cause destructive damage to our built environment. Reconstruction projects can take years to repair the damage and even longer to deliver improved resilience. Experts estimate that the reconstruction period following the impact of Hurricane Katrina will last nearly 10 years.

Speed however, remains to be one of the most common measures of success in the reconstruction phase. The community cares about how quickly houses can be rebuilt, how soon the roads can be repaired and when the vital infrastructure will be replaced. Post-disaster reconstruction projects are therefore subject to compressed timeframes within an environment of close public scrutiny.

Disaster reconstruction relies heavily on government grants, insurance companies and donations to fund the rebuild. These funding bodies often attach comprehensive requirements to their funding agreements relating to time, which can include value for money, compliance within eligibility timeframes and progress reporting requirements.

From project management principles we understand that cost, time and scope are interrelated. In disaster reconstruction, the scope of work is defined by the amount of damage caused and the rules and guidelines that exist for restoration. The costs can be determined through industry rates and benchmarks and controlled through sound procurement practices. Time is therefore considered to be a variable in disaster reconstruction and it is proposed that the ability to control and manage time will determine the project outcome.

All of these factors highlight the need for effective time management in post-disaster reconstruction projects. The focus of this paper is to establish the best practice methods for time management, the tools available to assist with time management and the actions that business and government can take to establish an effective time management framework in the event of a natural disaster.

Keywords

disaster management, time management, disaster preparedness, post-disaster reconstruction, project management, duration, speed

Introduction

Natural disasters such as earthquakes, bushfires and flooding cause destructive damage to our built environment. Much is documented about the financial and economic impact of such damage, for example, it is estimated that disasters caused US$ 123.9 billion of economic damage in 2010 (Guhar-Sapir, *et al*. 2011). Statistical data for how long it takes to rebuild after a large-scale disaster is however, less accessible.

This paper investigates the notion of time in post-disaster reconstruction and outlines the key reasons why it is a critical component. The research indicates that there is a need for time management and the author proposes strategies for effective time management in post-disaster reconstruction to address this need. The purpose is to clearly identify the approach that government, business, humanitarian agencies and disaster management professionals can take to successfully manage time in reconstruction programs.

The need for time management

Reconstruction takes time

Recovery from significant disaster events is an inherently long process. Reconstruction projects can take years to repair the damage and even longer to deliver improved resilience.

While it is difficult to ascertain precise timeframes for post-disaster reconstruction from historical data, there are some reasonable estimates available in the public domain. The reconstruction of Kobe, Japan following the devastating earthquake in 2005 took approximately 4 years (Ruwitch, 2011). Following a public response to the Indonesian tsunami in 2004, it is considered that the post-disaster housing reconstruction program was complete within 5 years (Silva, 2010).

There are forecasts available for the reconstruction timeframes of more recent large-scale disaster events. Authorities responsible for the reconstruction of Canterbury in the wake of the Christchurch earthquakes are planning for a reconstruction period in excess of 8 years (CERA, 2011). Kates, *et al* (2006) estimate that the reconstruction period following the impact of Hurricane Katrina will last almost 10 years. More than half of Japanese local government authorities devastated by the 2011 tsunami estimate a total post-disaster reconstruction period of between 9 and 12 years (The Asahi Shimbun, 2013).

Why does reconstruction after a significant disaster event seem to take so long? Silva (2010) surmises that “post-disaster reconstruction is a complex process”. In addition to the obvious scale of work required to be undertaken, there are various issues in post-disaster reconstruction that affect timely progress. Lloyd-Jones (2006) identified a substantial gap in funding, management and delivery, between short term humanitarian relief and long term reconstruction. Kulatunga (2011) lists multiple challenges in managing post-disaster reconstruction, including capacity, funding, accountability, multiple actors, emergence of new organisations, as well as communication and information.

In response to program delays experienced in the housing reconstruction following the Indonesian tsunami, Silva (2010) indicates that “although there was no shortage of funding, or organisations willing to contribute to reconstruction, the limiting factors in delivery and scaling up proved to be availability of materials and shortage of construction skills.’

The fact is that post-disaster reconstruction is a multi-faceted program with intrinsically long durations and it is proposed that emphasis on time management could provide an opportunity to minimise reconstruction duration.

The need for speed

Despite the fact that post-disaster reconstruction is an inherently long process, there is a competing need for rapid progress and a perception that speed equals success.

“While recovery is inevitably a complex and time-consuming process, there are strong humanitarian reasons for exploring ways for it to be speeded up” (Lloyd-Jones, 2006).

Post-disaster reconstruction can be viewed as undertaking the normal process of gradually replacing the built environment over an extremely short and intense timeframe. This concept is described as ‘time compression’, and is considered the key difference between post-disaster and normal conditions (Olshansky, *et al*. 2012).

Following a disaster, there is an immediate community need for essential infrastructure to be returned to a safe and operational state within the shortest possible timeframe. Olshansky, *et al*. (2012) note that “in the post-disaster environment, there is strong pressure to act quickly” and suggest that “speed is difficult to resist”. This need for speed is widely acknowledged as a challenge in post-disaster reconstruction (Kulatunga, 2011; Fengler, *et al*., 2008; Scribner and Herzer, 2011; Walker, *et al*., 2011; Lloyd-Jones, 2006; Alexander, 2004).

Speed is a key principle of disaster recovery and reconstruction for various government agencies around the world. In Queensland Australia, the relevant guidelines suggest that “following an event, effective recovery arrangements should help re-establish resilience within individuals and communities, and the natural assets that support them, as soon as possible” (The Queensland Recovery Guidelines, 2011). In the United States, the concept that speed equals success is also emphasised in the Federal Emergency Management Agency’s framework, where a core principle states that “a successful recovery process upholds the value of timeliness” (National Disaster Recovery Framework, 2011).

There are other influences, such as politics and the media, which place additional pressure on the need for the speed in recovery. Bun (2012) comments on the fact that governments are judged by the speed in which they return to a “business as usual” state post-disaster, which leads to an emphasis towards “fast” and “low-cost” reconstruction.

The media has historically highlighted instances of poor progress in post-disaster reconstruction. Bun (2012) makes mention of the various headlines following a perceived slow recovery in the wake of the Victorian bushfires in 2009: “Recovery a painfully slow path”, “Black Saturday recovery a slow burner” and “Victoria’s budget will conform [sic] slow recovery from crisis”. There are similar themes around the world with the following news headlines: “After the Quake: A Slow Go in Christchurch”, “Post-quake reconstruction runs slow in Japan” and “Haiti’s slow reconstruction”. This public form of pressure creates a perceived emphasis on speed as a measure of success in post-disaster reconstruction.

There is a real, as well as perceived, need for speed and quick results in post-disaster reconstruction projects and it is proposed that effective time management is required to respond to this need.

Accountability to timeframes

Disaster struck communities rely heavily on external sources for funding reconstruction, such as insurance payouts for private housing or government funding for restoration of public assets and other special needs. Fengler, *et al*. (2008) suggests that in most cases however, “the available domestic resources are not sufficient to meet the financial and human needs”, relying on international donor agencies to finance the reconstruction.

Often, donor agencies attach certain conditions to their funding agreements and governments implement processes as a safeguard to prevent the risk of mismanagement (BBR, 2009). While Hayet and Amaratunga (2011) cite administrative problems from donor agencies as a challenge in post-disaster reconstruction, a lessons-learnt study from the post-tsunami reconstruction in Aceh supports this requirement and reveals that "it is important to maintain accountability and transparency and to not compromise financial safeguards" (BBR, 2009).

"Accountability and transparency are crucial to maintain trust among those who provide reconstruction funds, those who manage funds, and those who use the funds in rebuilding" (Olshansky, *et al*., 2012). Olshansky, *et al*., (2012) acknowledge that "funders may need to pay now, audit later, or potentially accept a slower reconstruction speed".

Accountability measures imposed during post-disaster reconstruction varies but may include demonstrating value for money, satisfying local participation quotas, completing reconstruction within eligibility timeframes and milestones. Failure to comply with required procedures can in some cases result in the funding being withdrawn altogether (BBR, 2009).

Time management is therefore proposed as critical for the purpose of ensuring compliance with progress reporting and timeframe requirements.

Ability to influence time

While there are competing time interests in post-disaster reconstruction, namely long durations and an emphasis on speed and timeframes, it is argued that there is an opportunity to influence time in post-disaster reconstruction.

Kulatunga (2011) concludes that a combination of preparedness strategies and effective project management will enable a more efficient reconstruction and address challenges including the need for speed and time parameters. This supports the view that time can be influenced in post-disaster reconstruction through effective project management.

In project management, time management is a key knowledge area that enables the timely completion of a project and it is considered that cost, time and scope are interrelated (PMBOK, 2004).

In post-disaster reconstruction, the author argues that the scope or quality of work may be broadly defined by the amount of damage caused, combined with the rules (standards), guidelines (like-for-like replacement or betterment strategy) and engineering best-practices. It is also considered that the cost may be understood through historical data and industry benchmarks applied to the scope and then controlled through sound procurement practices. It is proposed that time is a variable in this simplified scenario, whereby the time is a function of how long it will take to expend the resources available (cost) to repair the damage and improve resilience (scope).

Despite the time pressures in post-disaster reconstruction, there is an ability to influence time and it is proposed that through effective time management, there is an opportunity to reduce the duration of post-disaster reconstruction.

Effective time management strategies

Preparing a disaster management plan

Effective time management in post-disaster reconstruction begins with planning. It is widely recognised that post-disaster reconstruction will be more effective with well-considered planning prior to the disaster occurring (Le Masurier, 2006; Sutton and Haigh, 2011; Amin and Goldstein, 2008; Smith, 2010). Planning should be articulated clearly by preparing a disaster management plan in consultation with all relevant stakeholders.

A disaster management plan can be a standalone document or a part of a wider planning policy that considers the risks of potential disasters, a strategy for mitigating such hazards and a process for responding to the impacts of such risks eventuating. Elements to be covered in the disaster management plan that specifically relate to time are:

- Delivery framework
- Time management processes
- Time management tools
- Developing capability and capacity
- Procurement of skilled resources

Each of these critical elements is discussed in detail below, including how they relate to effectively managing time.

Establishing a delivery framework

Establishing an appropriate delivery framework for post-disaster reconstruction activities can enable swift response and minimise delays. A delivery framework in this context is the formal structure under which the reconstruction processes are performed. Due to the time compressed nature of reconstruction projects, there may be a need to create a special purpose structure or modify rules to minimise delays in execution.

Le Masurier (2006) highlights that a clear framework should be established prior to the disaster occurring to be most effective. In reviewing lessons learnt from the reconstruction of Indonesia's housing, BBR (2009) noted that the delivery framework should consider two key elements:

1. The authority to act; and
2. The duration to deliver.

The first point relates to the powers of an individual or entity to make decisions. It is important that there is sufficient authority to execute a disaster management plan as quickly and effectively as possible. This may be achieved through the delegation of authority to enable quick and simultaneous decision making (Olshansky, *et al*. 2012), the modification of policies and regulations to avoid delays in approval or bureaucracy (Le Masurier, 2006) and the early engagement with stakeholders and the community (Adu-Boateng and Oppong, 2011).

The second point relates to the length of time for which the delivery framework applies. There should be a clear delineation between the end of post-disaster reconstruction activities and the re-commencement of business as usual. This will clearly define the duration for which any special purpose structures are applicable and will assist in measuring progress in the overall program.

Ultimately, the delivery framework should facilitate, simplify and support the effective delivery processes.

Implementing time management processes

The first step towards implementing effective time management processes is to create a schedule to reflect the plan of action. Schedule development should begin with the establishment of a relevant work breakdown structure (WBS) for which activities can be logically grouped and sorted and allocated. The WBS should align closely with the delivery framework agreed in the disaster management plan.

A comprehensive schedule will identify key activities, milestones and a critical path to execute the defined scope of reconstruction work required (Silva, 2010) within the delivery framework. The Project Management Institute (2005) recommends that in addition to milestones, the following aspects must also be considered when creating the schedule:

- Implement organisational processes
- Constraint dates due to authorities, weather, procurement, material or resources
- Donor timeframes
- Delivery risks

The schedule must reflect realistic timeframes and sequencing based on industry knowledge of reconstruction programs and should avoid optimistically responding to donor deadlines (Silva, 2010).

Once the schedule has been developed and agreed to by key stakeholders, the schedule is set as a baseline and forms the time component of the project plan. The schedule remains a live document throughout the reconstruction project lifecycle and as it is routinely updated, time performance can be monitored and measured by reviewing progress against the established baseline.

Understanding the progress of the reconstruction works and the impact on the original objectives, milestones and completion date will enable appropriate response and if required, change management strategies. Moreover, this process enables reporting to relevant stakeholders of progress and accurate time estimates, which aids transparency and encourages accountability.

Schedule monitoring as an effective time management process should extend to all aspects of disaster recovery. It is proposed that a preliminary schedule should form part of the disaster management plan, to be developed prior to a disaster event occurring. The schedule will outline the activities required to facilitate a timely transition towards reconstruction and as Silva (2010) suggests, should identify major lead time items such as training and procurement. In the event of a disaster occurring, the schedule can then be easily adapted, tailored and expanded to reflect the full extent of the reconstruction activities required.

Utilising time management tools

Scheduling as a time management process can be simplified utilising time management tools such as scheduling software.

The software can automate the scheduling of activities using critical path methodology, reducing user calculations and saving on rework each time the schedule is updated. Scheduling software also generates Gantt charts, which is an effective tool for viewing the activities, gauging progress and showing where the reconstruction is in relation to its completion (Wallace, *et al*., 2011). In addition, scheduling software will enable baseline comparison, allocation of resources, cash flows over time and time performance analysis such as earned value.

Two examples of scheduling software are Oracle's Primavera P6 and Microsoft's Project 2010. Whilst different, both systems are adequate tools to assist with time management processes. Project 2010 is readily accessible due to cost and compatibility with Microsoft's Excel. Primavera P6 is capable of

managing complex resourcing requirements and supports multiple simultaneous user access for more complicated reconstruction programs.

Whichever system is utilised, it is important to consider software licencing requirements and user capability to implement and manage the software. Addressing these items prior to the disaster occurring will minimise delays due to software procurement and user training.

Developing capability and capacity

It is necessary to consider the local or in-house capability to effectively manage reconstruction post-disaster. By definition, disasters cause damage that is beyond the affected community's ability to cope by utilising its own resources (Lloyd-Jones, 2006) and Silva (2010) identifies the need for expert advice.

In considering lessons from the rebuilding of Aceh following the tsunami, the capacity to effectively respond was impacted by the time required for recruitment, mobilisation and training of staff in post-disaster reconstruction (Silva, 2010). It is therefore prudent to ensure that such up-skilling and bolstering of staff levels is actioned prior to the disaster event.

To ensure sufficient capability and capacity to effectively undertake complex reconstruction projects, it may be necessary to engage the private sector for the necessary expertise (Lloyd-Jones, 2006; Silva, 2010; Sutton and Haigh, 2011). Procurement of such external resources should be considered pre-disaster to avoid delays to commencing reconstruction activities.

Implementing procurement strategies

Establishing procurement strategies for critical resources such as consultants, contractors and systems (e.g. time management software) can save valuable time when responding to a disaster. "An effective procurement strategy will ensure rapid progress of reconstruction work without hampering its progress" (Kulatunga, 2011).

An example of procuring consultants may include appointing a panel of service providers at competitive terms and conditions, which will offer time advantages when the need arises to source such resources at short notice.

There are also procurement strategies for reconstruction contractors that are designed to enable swift progress on the ground. Kulatunga (2011) recommended that non-traditional forms of contract such as design and construct contracts, as well as cost plus fee contracts with bonus incentives and time penalties are advisable procurement options for post-disaster reconstruction.

As mentioned previously, time management software, as well as any other system identified as necessary for post-disaster reconstruction, should be procured as soon as possible.

Conclusion

The research indicates that post-disaster reconstruction projects are inherently complex and therefore take considerable time to execute. Despite the long durations, there is a competing need for speed in reconstruction to satisfy pressure to achieve a fast recovery. In addition, there is a growing need for transparency in progress and accountability to timeframes that is imposed by donors, government and other stakeholders. In light of these challenges however, it has been demonstrated that there is an ability to influence time in post-disaster reconstruction, presenting an opportunity to reduce overall

timeframes. All of these factors confirm the need for a sound approach to time management in post-disaster reconstruction.

There are strategies that will enable more effective time management and the first step is to prepare a disaster management plan. This document is a critical planning tool that will outline the approach to time management and identify means of reducing timeframes.

Establishing an appropriate delivery framework that sets out a clear structure, allocates appropriate authority to act and nominates a duration for the objectives to be achieved will minimise delays in decision making and facilitate an effective reconstruction process.

Another strategy for effectively managing time is to implement time management processes by creating and maintaining a schedule. The process of scheduling will enable monitoring of progress against key project milestones and assist with providing transparency and accountability to imposed timeframes.

There are time management tools available to simplify the process of scheduling. Scheduling software such as Microsoft Project 2010 and Primavera P6 can automate complicated scheduling processes and generate useful time management reports, such as Gantt charts and cash flows graphs.

The capacity and capability to undertake reconstruction post-disaster should be reviewed and enhanced through training and recruiting where necessary. There may be a need to engage the assistance of external service providers to bridge any gap in expertise or resourcing levels.

Procurement of such external resources, including consultants, contractors and systems, should be considered carefully to ensure the engagement strategy minimises mobilisation times. This can be achieved through establishing panel arrangements, utilising non-traditional forms of contract, or simply procuring required resources as soon as practical.

It is apparent that all of the time management strategies outlined are not only effective, but should be adopted prior to the disaster event occurring. Preparing a disaster management plan, establishing a delivery framework, implementing time management processes, utilising time management tools, developing capability and capacity and implementing procurement strategies can all be done now, in preparation for the risk of a disaster. This would result in a shorter lead-time to commence reconstruction and a more effectively managed reconstruction from a time perspective.

In conclusion, preparing now will save considerable time in the seamless transition to the post-disaster reconstruction phase.

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