



Organisational complexity in infrastructure reconstruction – A case study of recovering land drainage functions in Christchurch ☆

Kristen MacAskill ^{*}, Peter Guthrie

Department of Engineering, University of Cambridge, UK

Received 4 April 2016; received in revised form 29 January 2017; accepted 14 February 2017

Abstract

This paper examines organisational arrangements in a case study of post-earthquake reconstruction in Christchurch, New Zealand. It explores, through qualitative research, the impact of organisational scope on shaping infrastructure reconstruction decisions and how this relates to project management. The study demonstrates how inter-organisational relationships and the remit of individual organisations had a significant bearing on decision-making in addressing land drainage issues in the Christchurch case. Restoring land drainage proved to be particularly challenging in the reconstruction due to issues related to organisational complexity. The study concludes that early recognition and active exploration of organisational scope provides the opportunity for representatives from the relevant organisations to identify possible means of collaboration and can help to overcome complexities presented by a reconstruction context. However, political agendas and different requirements placed on organisations may ultimately hamper the extent to which the intended collaboration occurs.

© 2017 Published by Elsevier Ltd.

Keywords: Post-disaster reconstruction; Infrastructure; Organisational complexity; Christchurch

1. Introduction

Organisational scope and stakeholder responsibilities often change in response to a disaster. A disaster leaves circumstances less defined and less stable than in business as usual conditions; it is more difficult in the recovery context to rely on past experience to develop organisations and choose the right people for the roles (Davidson, 2014). This presents a significant challenge for post-disaster recovery as organisational arrangements create physical and operational boundaries for decision-making and influence how the recovery process is managed.

Project management has a significant role in attending to such challenges to successfully deliver reconstruction projects as part of a wider recovery.

This paper will primarily focus on organisational complexity in delivering infrastructure reconstruction in post-earthquake recovery of Christchurch, New Zealand, following major earthquakes in 2010 and 2011. The paper focuses on procurement, governance and coordination, which are key domains of project management. The case study is centred on the Stronger Christchurch Infrastructure Rebuild Team (SCIRT), a temporary organisation that was formed to deliver the reconstruction of the local council's civil infrastructure, i.e.: water supply, wastewater, stormwater and road networks (collectively referred to here as 'horizontal infrastructure'). The horizontal infrastructure reconstruction programme in Christchurch is a major undertaking; it involves one of the most significant civil engineering contracts ever commissioned in New Zealand (CERA, 2015). For simplicity, the term 'reconstruction' will be used to mean post-disaster reconstruction of horizontal infrastructure, although the authors

☆ Funding: This work was supported by the Cambridge Commonwealth, European & International Trust. Supplementary funding was provided by the Earthquake Commission of New Zealand [Project No. 13/U657] and by the Engineering Department at the University of Cambridge.

* Corresponding author at: Department of Engineering, Trumpington Street, Cambridge CB2 1PZ, UK.

E-mail address: kam71@cam.ac.uk (K. MacAskill).

recognise this encompasses just one aspect of the overall recovery process for the city.

The paper begins with an exploration of existing literature on project management, with a focus on organisational complexity and specific issues associated with disaster recovery. This is followed by a brief outline of the research methodology. The paper then provides a general introduction to the Christchurch case study, outlining the impact of a series of earthquakes and the organisational arrangements for reconstruction, leading to an analysis of the reconstruction process for the city's land drainage (or stormwater) assets. In doing so the paper explores the historical context for land drainage and the organisational complexity specifically associated with land drainage recovery. Finally, it compares the experience in Christchurch with a selection of other international case studies of recovery and discusses what managers of future recoveries may learn from this case.

2. Literature review

Both project management and organisational arrangements are critical in the delivery of infrastructure projects, even more so in a disaster recovery context. The literature dealing with organisational arrangements associated with procurement and governance of infrastructure reconstruction is limited but useful examples are referenced in this review.

2.1. Project management in recovery

Project management involves 'the application of processes, methods, knowledge, skills and experience to achieve the project objectives' (Association of Project Management, n.d.). It is typically conceptualised as the process of managing the (often competing) dimensions of time, cost and quality in the delivery of a project that has a defined scope (British Standards Institute, 2010). Particular challenges for project management in reconstruction include: pressure to deliver with speed; capacity constraints due to high demand on resources; limited funds to distribute across a range of reconstruction (and wider recovery) activities; the emergence of new organisations; the involvement of multiple actors who do not usually work together and the subsequent need for good communication across these stakeholders (Kulatunga, 2011).

Several of these issues relate to the concept of organisational complexity. Baccarini (1996) defines organisational complexity in two parts. The first part is defined as the *differentiation* across vertical structure of an organisation (the organisational hierarchy) and horizontal relationships involved in task structuring, the division of labour and specialisation. The second part is *interdependency*, which relates to the degree of interaction between various elements of a project. Complexity shapes characteristics of projects and influences how they should be managed. Organisational structure can either reduce or increase complexity through the choices made in defining relationships, allocating responsibility, authority and in allocating tasks. Construction projects typically involve separate organisations with different roles that temporarily work together to deliver a project. As such, careful thought needs to be given to these

projects in terms of coordination, communication and control (Baccarini, 1996).

Kim and Choi (2013) examine coordination and control in the context of recovery. They highlight the importance of work packaging for delivering effective recovery projects given that construction contracts create multiple interfaces between stakeholders. Inappropriate work packaging can lead to more intensive work for coordination across different parties (Kim and Choi, 2013). Koria (2009, p.123) also explores complexity of delivering recovery programmes, highlighting that recovery is usually "slow, expensive and complex in terms of coordination and management." Koria suggests that one of the key responses is to create flexibility rather than following tight, predetermined procedures (which can lead to inefficiencies). Also, Koria highlights that a key management issue is the structure of the project management office; a fractured or geographically dispersed organisation can create communication issues and limit transfer of tacit knowledge between people. Packaging of work and the effectiveness of organisational structure will be explored in the Christchurch case study presented in this paper.

2.2. Organisational arrangements and procurement for infrastructure recovery

As suggested above, organisational arrangements shape the context in which decisions are made. The nature of the arrangements influences the ability of stakeholders to make decisions, and influencing decisions "is an essential aspect of effective disaster recovery management" (Johnson and Olshansky, 2012, p.4). Formal organisational structure is just the first step, how these structures are then interpreted and adapted by project managers will affect how decisions are made. Also, the distribution of roles and responsibilities needs to balance technical, social, cultural and administrative issues (Lizarralde et al., 2014). The design of organisations to lead reconstruction is challenging because of the need to make decisions "in a context of competing interests" (Davidson, 2014, p.88).

A key part of the organisational design is the approach to procurement. While there has been interest in the research community over procurement methods for rebuilding housing after a disaster, there is relatively little analysis of procurement for reconstructing horizontal infrastructure (see, for example: Bouraoui and Lizarralde, 2013; Wiek et al., 2010; Hayles, 2010 as studies that focus on housing). However, there are some useful references that cover infrastructure more generally. In an analysis of project management for post-disaster reconstruction of the built environment, Kulatunga (2011) advises that traditional procurement methods involving separate design and construction tend to prolong activities due to the time needed for managing a linear, separated process of design, tendering, document preparation and contractor selection. As such, integration of design and construction processes is encouraged. In a case study of post-flood reconstruction in Korea, Kim and Choi (2013) highlight an issue of delay in confirming contractual arrangements for constructing projects due to uncertainty in scope. In that case, authorities waited until finalising a price for each contract package, resulting delays in project implementation. As such, they promote the use

Download English Version:

<https://daneshyari.com/en/article/4922225>

Download Persian Version:

<https://daneshyari.com/article/4922225>

[Daneshyari.com](https://daneshyari.com)