

IDENTIFYING THE ADDED-VALUE OF VARIOUS ROLES IN THE POST-DISASTER RESPONSE AND RECOVERY OF CHRISTCHURCH

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Structural and infrastructural damage from the Christchurch earthquakes of September 4th 2010, February 22nd, and June 13th 2011 resulted in necessary and extensive responses from various primarily publicly funded organizations and professional consultants. The multi-disciplinary management framework developed by Kestle (2009) for collaborative international projects was previously tested in scientific, humanitarian aid and post-disaster contexts in Darfur, Aceh, and Antarctica and found to be very effective in modeling and understanding the in-field and management issues related to the provision of aid in remote locations, and following natural disasters. In this paper, the authors extend the application of that framework to identify where value was added (both perceived and actual) by the various roles in the post-disaster response and recovery of Christchurch. Interviews were conducted with a range of operational and consultant participants, to collect data from a representative sample of the wide ranging aid and recovery population involved in the response and recovery post-disaster phases in Christchurch. The Kestle (2009) framework provided the vehicle to compare what was seen and experienced in the field with what may have been planned by management in the various organisations. The data analysis identified the main challenges of this particular disaster as a lack of a relevant management framework in the early recovery phase, gaps in knowledge, and protracted decision processes. The added-value by the various roles was also identified for future reference.

Keywords: added value, Christchurch , framework, management, post-disaster.

INTRODUCTION

The earthquakes that struck Christchurch on September 4th 2010, February 22nd 2011 and June 13th 2011, were unprecedented in their intensity and damage in New Zealand's recorded history. Christchurch is classified as a medium seismic hazard in the NZ Building Code, while Auckland (NZ's largest city) is a low seismic hazard. It was generally anticipated that a significant earthquake event would occur in

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Wellington city (NZ's capital), which has a high seismic hazard classification. The Christchurch Press, (the local newspaper) in December 2011, stated that "This is seen as the biggest earthquake event ever, in an urban area, anywhere in the world". In early May 2012, The Christchurch Press reported that "Insurers have paid out \$7.6 billion dollars in claims, \$4.6 billion from private insurers and \$3 billion from the Earthquake Commission (NZ), but that claims will probably climb to \$30 billion".

Civil Defence and Emergency Management (CDEM) plan and prepare for disasters (both natural and man-made), and quickly swung into action, when the February 22nd earthquake struck, supported by Urban Search and Rescue (USAR), and Land Search and Rescue (LANDSAR). The 'response and early recovery phases' were subsequently coordinated by Civil Defence and Emergency Management (CDEM), under a declared state of emergency that remained in place until 22nd April 2011, and then by the Canterbury Earthquake Recovery Authority (CERA), which was established by the Crown in April 2011, in conjunction with the CERA Act (2011).

What then was the contribution made by building professionals during those phases, and moreover what lessons can be drawn and reflected upon for future events? Previously published research work on the added-value of various roles by post-disaster personnel following natural disasters, appears to be scarce. Furthermore, there is an added dilemma that what people say they will do at times of disasters like these, can be quite different from what they actually do. Therefore this research was undertaken to identify how a selected group of participants in their various prescribed/official roles were involved on the post-disaster Christchurch earthquake scenarios, and what challenges they faced. Arguably, and more importantly, how did they prioritise, what processes did they adopt, how did they record and transfer what they learned, and how was decision-making effected in their various roles whilst dealing with the challenges, thereby adding value. The participants were drawn from the governmental, deconstruction, management and consultant sectors in particular. The Kestle (2009) multi-disciplinary management framework was used as a vehicle to establish how well that framework involving four key factors, represented the actual experiences of the selected participants' in the field during the response and recovery stages of the three significant earthquake events in Christchurch, from September 2010 till June 2011.

SELECTED LITERATURE REVIEW

Only a selection of the reviewed and analysed literature, undertaken in the development of the Kestle (2009) framework is included here for the purpose of addressing the added-value focus of this paper. Case-study methodology and grounded theory were adopted given their relevance to the research approach during the initial development stages of the multi-disciplinary management framework. Grounded theory was originally developed by Glaser & Strauss (1967), as a qualitative research method, and was later described by Glaser (1978) and (Strauss and Corbin 1994), as "being important as a process for developing a researcher's conceptual insights by working in the actual area being researched to obtain experience and expertise", and then "being able to recognise important data and formulate conceptually dense theory". Research published by Kestle (2009) referred to adding-value, and that the integration of a team with knowledge contributing to planning, design, construction and management, was critical to developing and achieving value on projects for the client and stakeholders. Haigh *et al.* (2006), who are leading researchers in the disaster management area further underpinned the

research on the added-value of various roles and responsibilities on the post-disaster response and recovery phases of the Christchurch project. Haigh *et al.* (2006) stated that "there was 'a lack of effective information and knowledge dissemination and unsatisfactory management and performance levels and processes in current disaster management practices". Researchers Salvatierra *et al.* (2010), recently noted that the concept of value varies across time, is context dependent, is relative/comparative, and very subjective, and tends to be restricted to just achieving value for end-users and clients, rather than society as a whole. Salvatierra *et al.* (2010), also referred to research by Ballard (2006) who was working on a model of project definition with a value generation perspective. This gives importance to the stakeholders 'perspective of value'. Development of the 'Target Value Design model' is ongoing. Stakeholders involvement is considered a key element in generating value, therefore it is important to underline the contribution of Emmitt *et al.* (2005), where the concept of value was divided into 'external value', which is the client/customer value, and the value that the project should end up with, and 'internal value' achieved by and between the delivery team'.

METHODOLOGY

The research used a conceptual multi-disciplinary management model developed earlier by Kestle (2009). That model, now used as a management framework, was originally developed in terms of reviewing and synthesizing theoretical published 'production principles' and 'sociological factors' associated with design management, and lean design management, having its theoretical basis in Just in Time (JIT), Total Quality Management (TQM) and Lean Production theories. The Kestle (2009) framework aimed to reflect the experiences of stakeholders participating in an added-value process on collaboratively managed projects such as developing a shared understanding of what is valued on the project and identifying, and agreeing the objectives for a project with the stakeholders. The Kestle framework has already been applied across a range of differing multi-disciplinary collaborative scientific (Antarctic), humanitarian aid (Darfur), post-disaster projects (Banda Aceh, Pakistan), and found to accurately model the in-the-field experiences of the selected participants. The key factors of the Kestle (2009) multi-disciplinary management framework were established as being, 'value generation', 'knowledge integration', 'process integration' and 'timely decision making', and these are discussed briefly below for clarity.

'Value Generation' - refers to the value that the client and stakeholders place on the project outcomes, and will vary according to the differing clients' and stakeholders' expectations of the projects, and these can vary not only between stakeholders but also between client groups.

'Knowledge Integration' - is concerned with capturing and integrating the specialist knowledge of all those personnel involved on a particular project, prior to and during the project phases. This suggests that key personnel be involved with any pre-briefing, pre-planning, and in the regular monitoring and review of the planning and operational stages, as the project progresses. Specialist knowledge is required to ensure the best solutions and results, despite frequently working with non-negotiable timelines.

'Process Integration'- involves the timely and cost-effective co-ordination and planning of a range of processes across the total project, such as planning methodology, logistics, information management, and the management of design/

production interface Logistical planning and implementation is complex, as well as critical in post-disaster response and recovery coordination.

'Timely Decision Making'- refers in the main to financial and design decisions, which are critical to the successful management of collaborative international projects. These decisions are made within the context of frequently non-negotiable windows of buildability timeframes (or deconstructability in the case of Christchurch), fixed or controlled budgetary constraints, and/or health and safety concerns.

INTERVIEWS

Participant selection for this research was made on the basis of the participants' roles and disciplines, and were to be representative of the wide ranging aid and recovery population involved in the response and recovery post-disaster phases in Christchurch. The participants represented design consultants, various project and waste management consultants, demolition (deconstruction) contractors, property managers, and voluntary civil defence personnel. The eight participants personally played a management role, or were key players in the various response and recovery teams. The aim of the participant selection and subsequent semi-structured interviews with them, was to try and establish the participants' perceptions and the realities of their first-hand experiences in-the-field.

Figure 1, visually describes the basic roles and responsibilities of the various sectors of the response and recovery phases in post-disaster Christchurch. Civil Defence coordinated the process at the emergency response phase, then under the early recovery phase, the Canterbury Earthquake Recovery Authority (CERA) was set up by the government to lead, and be the decision-makers, managers and coordinators of the recovery phase. Engineers were engaged immediately by CDEM to establish the accessibility of damaged or destroyed buildings, and then individual commercial property owners were required to engage their own engineers to establish the structural integrity of their buildings. Deconstructors were engaged by CDEM if a building was deemed on the verge of collapse, and if it was not, then the building owner could question such a finding. This work continued once CERA was established. However, property owners were drawn into several areas where building professionals would usually be expected to operate, and this is shown in Figure 1 below. The property owners or building managers therefore had a relationship with every sector, whether Health and Safety, Financial, Physical damage or Legal. The selected participants were either representative of each of the four sectors in Figure 1 below, or were able to respond to the interview questions related to the four sectors.

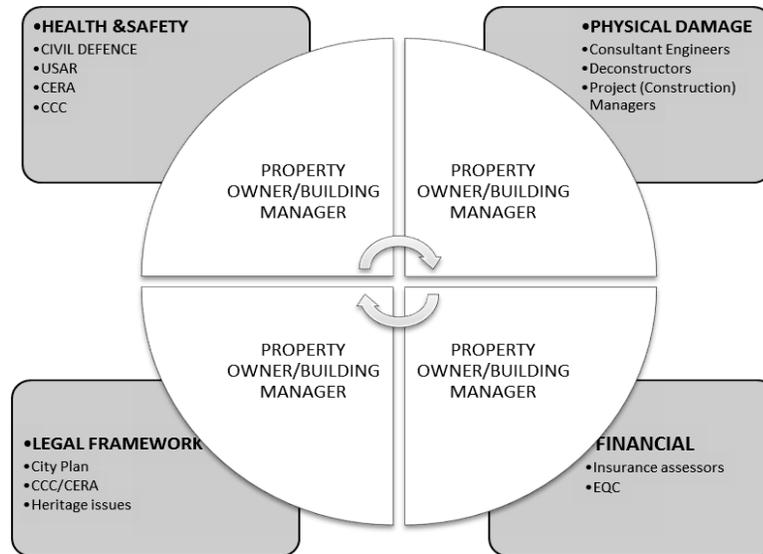


Figure 1. Basic map of the relationships and responsibilities at the Response and Recovery Phases in post-disaster Christchurch.

Semi-structured interviews were conducted with the selected participants over a four month period, in late 2011/ early 2012, and this perhaps allowed participants to reflect on their experiences. The interview questions were directly related to the participants' roles during the response and recovery phases in Christchurch, and to the four key factors of the Kestle (2009) framework. The collected data were clustered using a contextual spreadsheet under these factors, and patterns and themes extracted. These are reported later in the paper with additional commentaries contextually included.

RESULTS/FINDINGS

The results were generally consistent across the selected participants, though some of the respondents appeared to have more autonomy than others. All were faced with slightly differing challenges, for example in terms of whether pre-planning was occurred. According to the participants, there was an overall lack of relevant management guidelines, a lack of timely, and at times untimely decision-making processes, and for some, a lack of health and safety procedures at their organisations. In some instances relevant systems and processes have had to be created 'from scratch'. The scale and ongoing impacts of the 3 major earthquakes and 10000 aftershocks (since September 4 2010) were, and are unprecedented in New Zealand's history. The participants noted that the emergency response phase was controlled and run by Civil Defence, with Urban Search and Rescue teams (USAR), but then came the recovery phase, and none of the interviewed participants (nor their organisations) had any previous New Zealand benchmarks to work to, for a natural disaster on this scale. This was all new. The selected participants either drafted up, or worked to newly created protocols and guideline procedures whilst at times making decisions 'on the hoof', as plans were formulated for the recovery stage. The eight selected participants interviewed, supported the Kestle (2009) multi-disciplinary management framework, as being representative of their experiences on projects such as the post-disaster response and recovery project in Christchurch, and the following key findings were extracted from the collected data, under the framework's 'factor headings'.

Value Generation

- The clients and stakeholder property owners main concern (and hence value to them) was when, and whether and how they could gain safe access to their buildings, and their data/paperwork/equipment so that their businesses could continue in some form somewhere in the city.
- 'Rules of thumb' for the demolition contractors were not specifically documented, but at the very early stages of response where it was strictly about safety, and dealing with the dangerous buildings first, those 'rules' ranged from 'a floor a week to tear it down, a floor a week to strip it out, deal with the dangerous ones first, then the significant ones (over 5 storeys), and what was the safest and most effective equipment to use', to preparing much more detailed and specific deconstruction plan for each (and often unique) building.
- Using any form of 'rules of thumb' for a project management participant was seen as too risky, and instead they always used agreed protocols and formal guidelines for every job undertaken so as not to put their business, or their clients at risk.
- Feedback from clients/stakeholders was sought and received by all of the participants interviewed, either via weekly meetings with the relevant players (for example, property owners, local government representatives, and consultants), or directly via email from the clients, or via council call centres, or at times feedback was received via the media, with no right of reply.
- Accountability proved to be either easy to answer, or difficult to answer, according to the participants' specific roles. The majority acknowledged and identified the contractual and statutory obligations they had to their clients, (whether commercial property owners, tenants, individual property owners), and to council representatives, their larger community, and to the society in which they worked. A management participant identified that their organisation spent "a deal of time on the pre-planning to minimise risk once the job commenced, and that the guidelines and protocols setup subsequent to the September 4th earthquake, acted as a valuable test-run for the February 22nd and June 13th earthquakes that followed".

Knowledge Integration

- Learnings from the post-disaster project were passed on by regular conversations with employees, or they became part of the organisation's core construction management, or engineering systems (called up as 'continual professional improvement'), or have been collated into formal review processes and passed on via training and restructuring. One example was that workers had to now personally come into the office to lodge the paperwork for completed jobs, get that signed off, before being allocated a new project. The workers were then fully briefed and updated on new and applicable systems to be followed, for the new job package.
- Learnings were also passed on through local and national professional seminars, briefings for 'owner pressure groups', and being open with the media to keep the public informed as well. Another participant noted that learnings could be passed on via education of upcoming peers, and in future publishable research papers.

- Learnings resulting regarding necessary changes to organisational structures, funding measures and legislative changes were not considered to be easy to implement in reality.
- According to the deconstructors, the Crown (and therefore Civil Defence) need to understand what has been done/implemented by the deconstruction parties and roll out a plan of what needs to be done in future natural disasters on this scale, and own that body of knowledge.
- One of the biggest gaps in specialist knowledge, was that the property owners/property investors had no idea what risk was. They were blind to the reality of the resilience of their buildings, and in particular earthquake resilience.
- Not enough was known in terms of what knowledge was out there, or the number of people with 'knowledge'. No-one had been through this (response and recovery phases), on this scale before, and were feeling their way, even a year or so later.
- Initially, the engineering world acknowledged that they knew certain 'stuff' but probably not enough to respond and advise on a disaster of this intensity, and on this scale. For example, when measuring the structural integrity of a building, they were maybe only looking at the primary structure in the main, they would not look at the stair structure unless specifically briefed to do so by the client/other consultants.
- Another gap in specialist knowledge was identified by a participant regarding the need for more 'testing of reinforcing steel as it related to specific projects. It was noted that only a few engineering consultants have their own testing labs but others have to rely on generalist engineering testing labs' advice.
- There was a general sense amongst the participants that 'old rules and old ways of doing things' were being applied across the board even though this was a new situation, and the old ways did not fit, and only led to frustration with the process(es).
- In terms of 'responses to disasters' there is now a codified response structure, known as the Coordinated Incident Management Structure (CIMS), as Christchurch's disaster showed up big holes in terms of the 'currency' of the management plan, and the people's understanding of it in 'updates in classroom settings', and that in-the field practice is the best way to establish what does and does not work.
- Many of the consultant and management participants are eagerly awaiting the Report from the Royal Commission, new/amended Building Standards, and the geo- technical investigations to be completed.
- At the upcoming rebuild phase, design and build may not be the right answer for Christchurch going forward. A new form of procurement might be needed, and more appropriately called the 'Christchurch Procurement System'.

Process Integration

- In terms of methods and approaches employed to achieve their roles, the participants noted that at the emergency response stage, organisations had a reasonable idea of what their total capability was, but the biggest problem was communications, as all the emergency phones (police *et al.*) which they usually work with, were being used solely for 'victim identification work.
- Civil Defence coordinated the process at the emergency response phase, then under the recovery phase), the Canterbury Earthquake Recovery Authority (CERA), was set up by the government to lead, and be the decision-makers,

managers and coordinators of the recovery phase. The CERA Act 2011 was legislated and implemented in April 2011, and minor amendments made in September 2011. This Act will be in place till 2016, and reviewed annually until then.

- Property files have been created for every property, and these needed to be signed off by the National Controller at the emergency phase, and in the recovery phase by CERA.
- Communication skills were identified by all participants as paramount, noting the best approach as 'review, consult, briefing, question, verify, communicate, then start a review again'.
- In terms of what role HR might play in terms of training, the participants suggested that HR needs to get more multi-skilled generalists into senior management positions. Specialist managers are not well equipped to deal with unknown and unexpected events. Maybe move people between departments so they gain an awareness and understanding of other areas of the business, and how it all works.
- Pre-planning wherever practically possible, was undertaken and paid dividends when all section leaders met, and talked through the challenges and methodologies that best fitted the situation, before undertaking the task(s). According to the selected participants there was no pre-planning time available as it was 'all hands to the pumps' so to speak, job to do, right now.
- Best practice according to the participants would be to try and make sure that trained up teams of managers are ready to go, it is that follow up stuff, as it may not happen again, but people need to be ready. For example, according to one participant. Auckland and Wellington are both in the wrong place if a sizeable earthquake hit.

Timely Decision Making

- One of the participants noted that they were in the process of coming up with a framework that guides the decision-maker by offering 'indicators'. For example, people sometimes knew the decision needing to be made or the task(s) to be done, but they had no reference legislation, or written guides, or management tools, to support and defend the decisions they might make, leaving them vulnerable professionally.
- Decision-making at the recovery stage was centralised with CERA making the key decisions that affected the majority of the participants' operationally, and yet it was also decentralised in terms of the micro-decision-making required on a day to day, on-site or consultancy basis, with regard to what the management consultant participants could undertake or offer advice on.
- At the emergency response phase the National Controller (Civil Defence) authorised by the Crown, signed off on all decisions (they could in fact overrule any law in the land), and the Emergency Response Fund covered the costs of all decisions made (demolitions for example), as this stage was a State of Emergency (categorised as a Level 3 Military Emergency).
- In the recovery phase, the processes changed. Depending on what roles the participants held, they had differing arrangements in respect of who or which organisation was 'holding the purse strings'. Certain participants were and are paid through CERA (government agency) if deconstructors, or they are paid by the property owners, who get their monies from the insurance companies, if insured, (which means there is a typically client consultant relationship).

- Essentially the participants were agreed that budgets were primarily centralised through CERA, and/or heavily influenced by insurance companies' depending on the participants' roles and the nature of the recovery projects.
- Final accounts are a long way off, according to all of the participants.

Summary of selected 'Lessons Learned'

- Operational and management participants identified that if there was another significant earthquake event in another major town/city in New Zealand, there need to be clear 'rules of engagement', and what the Crown probably should or should not do. The participants suggested that there was a sizeable gap in time between USAR leaving and CERA being set up, commenting that they had to "hit the ground running" after the USAR teams did their job and 'up and left'.
- Property manager participants recommended keeping insurance cover relevant and premiums up to date, particularly if a commercial property owner, occupier/tenant..
- Log all jobs and allocated personnel onto a series of matrices and store them /update them in data bases using web-based software, rather than using 'whiteboards in the office', and always backup data files. The 'Cloud ' approach was supported by a few of the participants.
- Keep detailed records of all work undertaken, be micro-detailed so that the organisation /individual operator has a defensible position as needed.
- Keep tabs' on where staff in individual organisations are, (via texting/calling in every 2-4 hours if out on site).With the ongoing aftershocks it is essential to know which personnel are on which sites, and which jobs.
- The need for individuals and organisations to create 'disaster plans', that are practiced regularly and contain guidelines and tools/indicators to guide decisions, and processes and actions in the event of a significant natural disaster in an urban area.

The added-value of the various roles and responsibilities summarised

For added clarity and coherence, this section should be read in conjunction with Figure 1 that was referred to and included in the Interviews section of this paper. The client was the public- at-large initially, via Civil Defence during the emergency response phase. Then at the recovery phase the clients became the property owners, whether engaged via the usual client base of property owners and developers if design and construction project consultants, or via CERA if conducting waste management or deconstruction projects, generally speaking. Even then, some clients were property owners dealing directly with consultants once their insurance claims were approved. It should be noted that the EQC (Earthquake Commission) dealt with residential property owners' claims whereas CERA worked with insured commercial property owners.

The stand-out challenges, and where significant value was added by the various roles was in respect of process integration. For example, having to work from first principles in the creation of new, defensible and resilient office systems, that often included new Health and Safety provisions that applied to daily operations and out-of-office, on-site behaviours, new financial recovery modes, and organisational processes. This also included very different and untried deconstruction methods for high rise buildings in New Zealand. Centralised decision-making obviously had its

benefits and frustrations for everyone involved, whether property owners, deconstructors or engineering and waste management consultants, or project construction managers.

The next level of added-value, was the knowledge integration learnings gained and created in response to this 'first of this scale of natural disaster for New Zealand'. Property owners and building managers realised just how important keeping their commercial properties correctly insured will be in the future. A few property managers had already realised this, and advised their clients to be fully insured ready to evacuate, and have their business/office data backed up or running on web-based software. This definitely added value to their clients' businesses. The added-value of centralised and usually significant public safety decisions was that it offered uniformity and direction initially. The down-side was the protracted process timeframes that occurred when so many people had to be involved before decisions could be made. Fortunately, on-site decisions were often decentralised to allow common sense processes to prevail, according to the majority of the selected participants.

The added-value contributed by the various design consultants and project managers was the reassurance that relatively safe access could be gained by the property owners/ tenants to their business properties, and repairs initiated. Similarly, the added value of the deconstructors was in the innovative methods they employed on the classified 'dangerous', and then 'significant buildings over 5 storeys', (1400 commercial buildings have been cited for demolition/deconstruction in the city). The scope of the work was off-the-scale of previous experience, but it was a challenge they fervently and professionally undertook. This then was the value generated by them for Civil Defence initially and then for CERA.

CONCLUSIONS

The research undertaken aimed to identify how a selected group of participants in their various prescribed/official roles were involved on the post-disaster Christchurch earthquake phases, what challenges they faced, and how their efforts and/or management systems were coordinated. In addition, the research aimed to establish the ways in which the selected participants' might have added-value to the processes/systems, and to the current outcomes, particularly from a management perspective. The Kestle (2009) multi-disciplinary management framework was the vehicle used to establish whether the framework modelled the experiences of a selection of participants from various sectors, ranging from civil defence volunteers, to engineering, waste and project management consultants, property managers and deconstruction contractors, who were directly involved on the response and recovery phases. Interestingly, there were common threads that emerged even though the participants were playing quite different, and at times disconnected roles from each other. Those threads were the frustrations with the lengthy time periods and processes to get access to their business premises/properties, decisions/approvals to proceed with deconstruction or repairs, and a lack of any central /accessible management framework, or guidelines at the early recovery phase in particular. The added-value of the various roles in terms of the objectives of this research paper were, for example, the creation of new, defensible and resilient office systems, that often included new Health and Safety provisions applied to daily operations, and out-of-office, on-site behaviours. New financial recovery modes, and organisational processes, including very different and previously untried deconstruction methods for high-rise buildings in

New Zealand were created and implemented. Property managers who had already advised their clients to be fully insured, ready to evacuate, and have their business/office data backed up, or running on web-based software definitely added value to their clients' businesses. Similarly the challenges faced by all of the selected participants involved at the response and recovery phases of this project, caused them to reflect on and acknowledge their added-value experiences, in terms of gaining and creating new knowledge on a personal and organisational level, and of being encouraged to be innovative and creative when responding to post-disaster challenges.

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