

Bumpy roads to reconstruction

QuakeCoRE research from Christchurch suggests a real-time, cross-sector construction information reporting system would smooth earthquake recovery and improve the ability to resource future reconstruction.

BY DR ALICE CHANG-RICHARDS, UNIVERSITY OF AUCKLAND, DR CHARLOTTE BROWN, RESILIENT ORGANISATIONS, AND DR NICKY SMITH, MARKET ECONOMICS

WHAT FUNDAMENTALLY differentiates the earthquake rebuilding timeline of Christchurch from other places like Kobe following the 1995 Great Hanshin earthquake and Los Angeles following the 1994 Northridge earthquake?

To find the answer, a recent QuakeCoRE study looked at the progress of restoring and rebuilding homes, infrastructure facilities and commercial buildings in Christchurch following the 2010/11 Canterbury earthquakes. The factors influencing the trajectory of its reconstruction pathways were also investigated.

Christchurch rebuild forecast models

Following the Canterbury earthquakes, an understanding of the volume of reconstruction demand was needed to support decision making by industry stakeholders in the public and private sectors. Several economic models were used to predict how



PHOTO – SNPA/PAM CARMICHAEL

the reconstruction process would evolve and the expected timing:

- Construction forecast model (CFM) - an Excel-based model developed by the Canterbury Earthquake Recovery Authority (CERA) and Ministry of Business, Innovation and Employment (MBIE) that calculates future output of rebuild-related and business-as-usual construction in Greater Christchurch. Demand data and

assumptions are collected from various sources and aggregated to create a forward view on construction activity in the region.

- Forecast of construction activity for Canterbury scenario - an economic tool used by the New Zealand Institute of Economic Research (NZIER) in forecasting the outlook for construction spending in Canterbury on earthquake rebuild activities. The one-off reconstruction spending

forecast was undertaken in 2011 following the 22 February earthquake.

- Canterbury economic outlook - Westpac has made a series of forecasts on reconstruction work with a focus on the anticipated mix of reconstruction spending and the factors shaping this mix. Their predictions on the timing of maximum reconstruction spending have evolved as more data becomes available.
- Estimated profile of the Canterbury rebuild - the Reserve Bank of New Zealand (RBNZ) estimates the profile of rebuild according to its GDP proportion. The overall size of the rebuild has been revised several times as the RBNZ's understanding of the construction cost is improved based on publicly available data and information from those involved in the rebuild.

Despite the multiple forecast models available, the construction sector found it challenging to plan rebuild activities. This is because it is difficult to predict how reconstruction proceeds over time based simply on projected spending intentions without knowing what stopped or delayed construction from happening.

Regulatory changes and insurance issues

The QuakeCoRE study used a systems approach to model decisions throughout the reconstruction process. This revealed system-level insights into how different reconstruction decisions or processes impact on the reconstruction trajectory and the resulting economic and social implications.

For example, the building regulatory changes in anticipation of future seismic events caused changes in the technical capacity landscape. Lengthy lead times for repairing and rebuilding damaged houses were primarily caused by regulatory constraints and complex insurance settlement issues. These were the major decision-making rules affecting the time path of the physical reconstruction process.

The lessons learned from the Canterbury earthquake recovery, however, will improve

the regulatory response and insurance settlement efficiency if a similar disaster strikes.

Information is critical for planning

The analysis of system behaviour shows that the critical links in our model are the information links. The unstable response from the construction sector is largely due to its faulty perception of construction demand and incorrect perceived timing of construction pipelines.

Such information delay and associated oscillation of the system has financial consequences as the sector either overshoots or undershoots and there is significant ineffective and wasteful workforce contraction and expansion.

Need clear timeframes for work

It is important to note that how the construction sector mobilises labour resources in response to the demand depends critically on how it perceives the construction needs.

The flow of construction information is said to be one of the most crucial factors dominating reconstruction profiles. Businesses interviewed from 2012 to 2016 suggested that, although they knew there was a sheer volume of earthquake-related construction, the lack of a clear work pipeline from funding agencies and long lead times for planned projects made workforce planning difficult.

Similarly, without a clear timeframe of rebuild, construction workers from outside the region had a wait and see attitude before they committed to moving to Christchurch.

Hard to know when extra labour needed

The perceived need for more building works meant that the construction sector most likely recruited more labour to meet projected shortages.

In a situation where local construction capacity cannot meet the demand, the relevant question is at what speed the extra labour can be brought into the affected area. Workers outside the quake zone will weigh up the benefits of going to Christchurch against the costs of transportation or temporary accommodation to decide whether to

make a move. All these factors are fundamental in influencing the availability of construction labour.

In many cases, as construction businesses tried to respond to the rising demand, debts were taken on to finance the growing capacity. However, as the lower-than-expected construction pipelines had caused demand to fluctuate, many companies suddenly found themselves carrying capacity for predicted forward workloads that did not materialise.

Some avoided reconstruction work

The time delay for the intention of spending in the reconstruction sector to eventuate made many forward-thinking businesses move away from the reconstruction work.

They realised that the building work in business as usual (non-rebuild construction) with short planning, permitting and construction times was a better investment even though their costs per project were higher.

Implications for future reconstruction

The longitudinal study of earthquake recovery in Christchurch suggested there is a delay in construction demand landing for real construction, which caused incorrect demand perception.

Therefore, three essential components should be considered by the government agency and construction industry bodies taking the lead on disaster recovery for future disaster reconstruction planning:

- A real-time, transparent, cross-sector construction information and intelligence reporting system - not using lagging metrics - that can be publicly accessible, especially for construction businesses.
- Reduced lead time from intentions of spending to real construction.
- Increased visibility of construction pipelines. ◀

For more ▶ The QuakeCoRE study report, *A system dynamics model of post-earthquake reconstruction pathways*, can be downloaded from the Resilient Organisations website at www.resorgs.org.nz/publications.