

Business Resilience and Recovery following the Canterbury Earthquakes

Taking New Mitigation Actions

Results Bulletin 2018-9

Findings from a survey of 206 organisations in the Greater Christchurch Urban area in mid-2016.

Question

Did organisations learn from their earthquake experiences and take actions to mitigate losses from future events? Which kind of organisations engaged in new mitigation activities?

Findings

This analysis examined a subset of 185 organisations with 250¹ or fewer employees and who fully answered questions relevant to the variables included in this paper. The specific findings from this analysis revealed that:

- On average, respondents undertook three new mitigation activities following the Canterbury earthquakes
- Most organisations (over 80%) engaged in at least one activity.
- The most common mitigation measure was having better IT back-ups, followed by improved insurance arrangements.
- The age of the organisation did not predict likelihood of engaging in new mitigation activity after the disaster event.
- The size of the organisation had a moderate relationship with likelihood to engage in new mitigation activity. However, organisation size explained only 8% of the variance observed in engagement scores.
- The Level of impact from the earthquake that organisations experienced had a weak but significant relationship with the number of new mitigation activities they engaged in. Subsequent regression analysis that also included organisational size, revealed that the level of impact experienced was no longer a significant predictor of likelihood to take up new mitigations.

¹ Given organisational size was of interest to this study, three organisations were removed as their employee numbers represented substantial outliers at n = 1745, 5750 and 10,500.

Results

Organisations reported on which new mitigation activities they had engaged in since the Christchurch earthquakes. The figure below details the number of organisations engaging in specific initiatives sorted by frequency. As can be seen in Figure 1, organisations were most likely to improve *IT back-ups* after the earthquakes (n=102), though an almost equal number of organisations indicated *reviewing/improving insurance* (n=93). The least frequent mitigation activity taken post-earthquake was the *creation of a business continuity plan* (31) though data also shows that a further 58 respondents took time to *review an existing business continuity plan*.

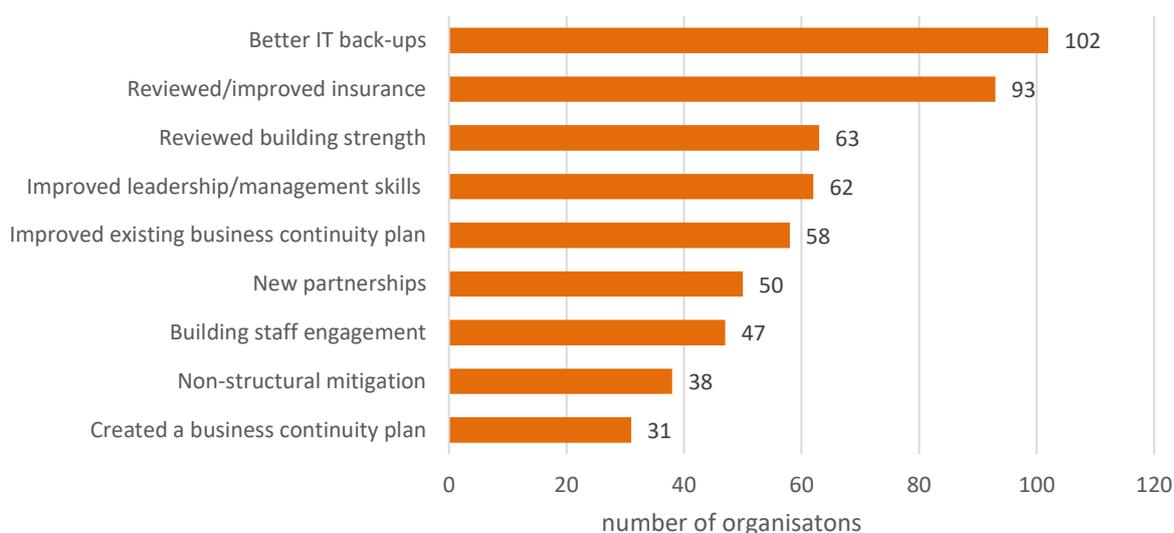


Figure 1: Frequency of engagement with specific mitigations

Many organisations engaged in multiple new mitigation activities in the post-earthquake environment. As figure 2 illustrates, a little over 30 organisations engaged in two or three mitigations, and four organisations indicated having engaged in as many as eight or nine. Despite this, a small number (n=33) of the organisations who took part in this research indicated they *did not undertake any new mitigations*. The average number of activities engaged in was 2.94.

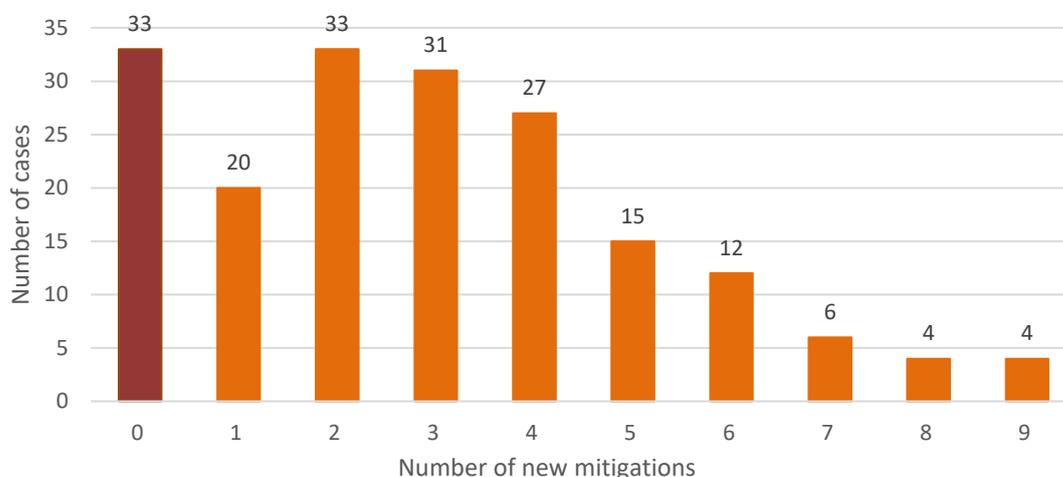


Figure 2: Total number of new mitigations engaged in after the earthquake

The relationship between total number of new mitigations that organisations engaged in and three independent factors were tested. The three factors of interest were:

- *Organisation age* - years (mean - 26.9 yrs; median – 18yrs)
- *Organisation size* - FTE (mean - 17.9 FTE; median – 18 FTE)
- *Impacts experienced* - weighted mean of impacts (scale 0 -1; mean 0.42; median 0.42) see approach section below for more detail on calculation.

Table 1 shows the relationship and strength of association between the three independent factors and organisational engagement with the range of new mitigation activity detailed in figures 1 and 2. No correlation was found between the age of Canterbury organisations and the number of new mitigation activities undertaken post-earthquake. However, size of organisation, and to a lesser extent, the level of impacts experienced were significantly related to propensity to undertake new mitigation activity.

Table 1: Correlations between total number of new mitigations and three independent factors.

	New mitigations	Age	Size	Average impacts
New mitigations	1.0			
Age	.047 ^a	1.0		
Size	.422** ^a	.12	1.0	
Average impacts	.151* ^b	.01	.01	1.0

** Significant at the 0.01 level; * significant at the 0.05 level; ^a Spearman’s rho (non-parametric) ; ^bPearson’s r.

Multiple regression analysis was used to test if organisational size and the level of impacts sustained from the earthquake event could significantly predict engagement in new mitigation activity. Age was excluded based on the non-significant findings in earlier analysis. The results of the regression indicated that only one of the predictors of interest, *Size*, was found to be statistically significant, and it only explained only around 8% of the variance ($R^2=.082$, $F(1,175)=15.646$, $p=.000$).

Table 2: Multiple regression statistics and coefficients

Predictor	B	Std. error	β	t	Sig
Constant	2.661	.322		14.903	.000
Size	.016	.004	.286	3.956	.000

Approach

Have you implemented any new preparedness or mitigation actions since the earthquakes? (*Please tick all that apply*)

The following method was used to calculate impacts experienced. For each of the infrastructure and

- | | |
|--|---|
| <input type="checkbox"/> Invested in better IT backups/cloud computing | <input type="checkbox"/> Reviewed/improved insurance cover |
| <input type="checkbox"/> Created a business continuity process/plan | <input type="checkbox"/> Improved leadership or management skills |
| <input type="checkbox"/> Improved an existing business continuity process/plan | <input type="checkbox"/> Invested in building staff engagement and morale |
| <input type="checkbox"/> Reviewed (and where necessary improved) building strength | <input type="checkbox"/> Built new partnerships |
| <input type="checkbox"/> Implemented non-structural mitigation measures to reduce damage | <input type="checkbox"/> None of these |

Other (please specify)

The impacts experienced as a result of disruptions to infrastructure and non-infrastructure items (detailed below) were recoded from 0-1; *Not disrupted* = 0, *Slightly* = .33, *Moderately* = .66 and *Very disruptive* = 1. A weighted average was then calculated by generating a mean value for overall impact. Measurement of infrastructure items was undertaken using the follow question.

Following the earthquakes, how disruptive was the loss of the following infrastructure services for your organisation?

	No loss of service or not applicable	Not disruptive	Slightly disruptive	Moderately disruptive	Very disruptive
Water Supply	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sewage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Electricity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Gas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Phone networks (cell and landline)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Data networks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Road networks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rail	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Airport	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Port	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fuel	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Measurement of disruption to non-infrastructure items was undertaken using the follow question:

For each of the following factors, please indicate whether they affected your organisation and, if relevant, how disruptive the impacts were.

	Affected my organisation?		Not at all disruptive	Not very disruptive	Moderately disruptive	Very disruptive
	Yes	No				
Difficulty accessing IT data	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Structural damage to building(s) (integrity of building compromised)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Non-structural damage (fittings damaged e.g. windows or light fixtures)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Machinery loss or damage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Office equipment loss or damage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Damage to inventory or stock	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Damage to ground surface	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Damage to or closure of adjacent (next door) organisations or buildings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Damage to local neighbourhood (e.g. other buildings in area, damage to pavements etc.),	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Difficulty accessing premises/site	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Health and safety issues for employees	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Supplier issues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Customer issues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Availability of Staff	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Perceptions of building safety	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Changes in staff emotional wellbeing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (please describe) -	_____					

Limitations:

This survey question accounts for only some of a long list of possible mitigation actions. As survey length was an issue, the number of factors listed were selected to best represent possible areas of effort. Without a baseline measure it is impossible to assess the overall impact of post-earthquake mitigation actions by organisations. While the survey results imply that Canterbury organisations are now better prepared for disasters, we do not know if this moves them from a very low level to a moderate level, or from moderate to high level of preparedness. For general limitations in representativeness, please see Results Bulletin 2016-2.

Reference as:

Sampson, K., Hatton, T., Brown, C., Seville, E., (2018) Business Resilience and Recovery following the Canterbury Earthquakes. Survey 5 Results Bulletin 2018-9, Taking New Mitigation Actions. Resilient Organisations, www.resorgs.org.nz