

Developing an evidence base of the outcomes of retrofitting commercial properties

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ABSTRACT: The Canterbury earthquakes of 2010-2011 continue to have an indirect but significant effect on other cities in New Zealand. Owners of buildings that fully comply with the current New Building Standard (NBS) are well-placed to meet these challenges as their buildings are now in demand from tenants seeking high levels of seismic safety. There are a range of complex factors that influence building owners' decisions to seismically retrofit their buildings, including regulatory frameworks, financial resources and the perceived benefits arising from the upgrade. Research suggests that owners are influenced by market leaders' behaviour (Alesch et al. 2012), and this paper addresses the knowledge gap of the outcomes of retrofitting that will encourage owners to invest in earthquake strengthening. The risk of reduced demand is one factor that has influenced some commercial building owners in Wellington to proactively retrofit their buildings. In this new study, evidence was sought from these owners of the outcomes of the retrofitting process, including the impacts on building values, tenancies and incomes. The purpose of this investigation is to begin building an evidence base that may give more confidence to owners contemplating investing in the retrofit of their property. This knowledge will contribute to the discourse on earthquake strengthening.

1 INTRODUCTION

The Canterbury earthquakes of 2010-2011 dramatically raised awareness of the hazards posed by earthquake prone buildings. New Zealand's current Building Act (2004) classifies buildings that are less than 34% of the New Building Standard (NBS) to be earthquake prone. According to the New Zealand Society for Earthquake Engineering (2006) structural seismic performance score less than 34% NBS is considered high risk, a score greater than 33% NBS indicates an earthquake risk building, and a score of 67% or more is considered a low earthquake risk. The Act gives local authorities powers to require building owners to mitigate (strengthen or demolish) buildings¹ that are less than 34% NBS. The legislation also requires local authorities to adopt a policy regarding their approach and priorities for earthquake prone buildings within their jurisdiction.

Since the Canterbury earthquakes reduced demand for tenancies in commercial buildings that have lower NBS, compliance has multiple implications for their owners, including lower property values; poor cash flow; and higher insurance premiums (Powell et al. 2014).

There are a range of factors that influence building owners to mitigate their earthquake prone buildings of which the regulatory framework is just one element. As well as being influenced by the actions and beliefs of other owners (or in other words the social context), there is evidence pointing to the importance of the personal experiences and beliefs of owners, and their perceptions of earthquake risk. Also important are financial factors which include the building owner's ability to pay and the extent that owners believe that net benefits will be derived if they decide to upgrade (Comerio 2004; EERI 1998; Spence 2004).

¹ Including buildings used for residential purposes if the building comprises 2 or more storeys; and contains 3 or more household units.

Although building owners' perception that net benefits will result is an important factor in their decision to mitigate their earthquake prone building, there is a dearth of evidence available documenting that it will do so. Thus, the aim of this investigation is to begin to build an evidence base that will give more confidence to owners contemplating investing in the retrofit of their property.

2 METHOD

During February and March 2015 we interviewed nine owners of commercial property in the Wellington CBD about a total of eleven buildings to gain insight into their experiences of earthquake strengthening. This investigation is ongoing and so the findings reported here are preliminary, but already strong consensus viewpoints have emerged from the interviews to date, and it is anticipated that these early findings will be indicative of the completed study. In order to explore the influence of the Christchurch earthquakes of 2010-2011 on the decision to increase %NBS, the strengthening of the buildings had to either have begun after 4 September 2010 (the date of the first Canterbury earthquake), or be in the process of being strengthened, have three or more floors, and have at least one office-based commercial tenant. During the semi-structured interviews participants were asked about the factors which influenced them to strengthen their building/s; their experience of strengthening, including how tenants were provided for; and the outcomes, including any changes building value and rental income immediately before and after strengthening.

3 FINDINGS

The interviews revealed a difference in the outcomes arising from upgrades to heritage or character buildings, and those arising from upgrades to more modern buildings. Of the eleven buildings, seven were built during the period 1900-1930 and are considered to be character buildings, and many of these are noted or listed for heritage features by either the Wellington City Council or New Zealand Heritage List. The other four buildings were built within the period 1960-1990 and are not considered to have heritage features. Two of the owners interviewed had strengthened both a character and a modern building, and reported different outcomes for each building.

As was noted for buildings damaged by the 2007 Gisborne earthquake (Powell et al. 2014), earthquake prone buildings provide an opportunity for construction and property companies to acquire character buildings cheaply, strengthen them using in-house resources or contacts, and increase building value markedly.

3.1 Factors influencing decisions to earthquake strengthen

The interview findings support the extant literature with regard to the wide range of factors influencing owners' decisions to earthquake strengthen their buildings. In particular, the importance of social norms in terms of tenant perception of safety (Alesch et al. 2012; Solberg et al. 2010; Egbelakin et al. 2011; Kohiyama et al. 2008; Wolfe et al. 2014) and compliance with local government regulations (Alesch et al. 2012; Egbelakin et al. 2011; Powell et al. 2014). Indeed the most commonly cited reasons for upgrading were: (1) tenant demand for strengthened buildings following the Canterbury earthquakes of 2010-2011, and (for some) the 2013 earthquakes experienced in Wellington; and (2) a notice from the Wellington City Council (WCC) notifying that the building is potentially earthquake prone.

There was a general perception that the commercial property market in Wellington CBD is characterised by greater office space supply than demand. The Canterbury earthquakes of 2010-2011 brought building safety to the fore for most tenants. Many owners have found that in order to retain tenants or attract new tenants, their building needs to have a high NBS rating. Most owners mentioned that despite the Building Act specifying the less than 34% NBS threshold for being earthquake prone, government departments will not lease space in a building that is less than 67% NBS, which sets a precedent in the market place.

Financial factors play a significant role in the decision to strengthen as an owner must be able and willing to prioritise funds for seismic strengthening (Alesch et al. 2012; CIR 2013; Egbelakin et al. 2014; WEPBCT 2014). Some owners who undertook expensive strengthening mentioned the advantage of owning freehold property and that strengthening would be unaffordable if they had a mortgage on the building.

A number of studies have demonstrated the influence of personal perceptions on a building owner's decision to strengthen (Alesch et al. 2012; Egbelakin et al. 2011; Fujima and Tatano 2013; Matthews 2011; Powell et al. 2010; Solberg et al. 2010), including: risk perception; impressions of the costs and benefits associated with strengthening; sense of control over and responsibility for mitigation; and certainty over the efficacy of seismic retrofitting as an effective mitigation measure. For example some of the building owners sought to strengthen their building as much as possible, whilst others accepted the more affordable of two options, resulting in a lower %NBS rating. There was a general acceptance that all commercial buildings will eventually be strengthened. Some of the owners clearly sought to be market leaders, recognising that "the early movers reap the rewards" in terms of increased rent take per square metre.

3.2 The retrofitting experience

The interview participants emphasised the importance of maintaining good communication with their tenants regarding the upgrades. The nature of the structural engineering solutions determined whether tenants remained in situ for the duration of the retrofit, or relocated elsewhere. Where the strengthening work could be conducted with tenants in situ, good communication meant that tenants were retained. One owner took over from a management company that had lost his tenants through "aggressive rent review behaviour and terrible communication". Unfortunately for that owner, a significant government tenant was lost prior to him taking over management of the building himself. To avoid the costs of compensation, the owners who had to vacate their tenants waited for lease agreements to end before moving tenants out. In one instance, the office tenants could remain in situ but the ground floor restaurant businesses had to move out and cease operation for four weeks for ground anchor strengthening. The restaurant was compensated for this short period of closure and the restaurant owners then took this opportunity to refurbish the premises prior to reopening. Noisy strengthening work was conducted outside of office hours. Where tenants remained in situ and strengthening work was conducted in stairwells, dust generation and obstruction of fire exits had to be carefully managed.

When asked if the outcomes achieved through strengthening were what they had anticipated, all of the character building owners agreed, and some commented that their expectations had been exceeded given tenant demand for their strengthened building. Comments regarding the modern buildings were more mixed, with some owners feeling disappointed that strengthening had not resulted in higher rents. Some of the owners suggested that, government tenants aside, "people are already forgetting" about earthquake prone buildings and that smaller businesses are already willing to trade off lower cost office space for a lower %NBS rating.

Participants were also asked what advice they would give other building owners considering strengthening their building. Some commented that they would not want all buildings to be strengthened as it would weaken their market position. Others emphasised the importance of the peer review process for engineering solutions, as peer review gave them more confidence and in some instances resulted in a cheaper solution. Importance was placed on financial planning, and good communication with tenants was also reiterated. The benefits of selecting engineers with good track record in earthquake strengthening commercial buildings was also evident as they have a good grasp of relevant engineering solutions and local government processes. Similarly, the construction and property companies who dealt with character buildings suggested that for older buildings, owners needed to have a good grasp of engineering solutions themselves and that such buildings were "best left to the experts".

3.3 Outcomes of earthquake strengthening

Participants were asked about the outcomes of the earthquake strengthening process, including the impacts on building values, tenancies and incomes (Table 1). A building's %NBS rating is but one variable influencing building value and the willingness of tenants to pay for office space. For example, where tenants were moved out of the building in order to strengthen, owners took the opportunity to do new fit-outs, which in turn increased building value, appeal to prospective tenants, and the rent tenants are willing to pay. Similarly, some locations are in higher demand than others, which also influences building value and rent take. All other things being equal, the value of an untenanted building is less than a tenanted building, so where we asked owners about the change in building valuation immediately pre- and post- strengthening some of the larger changes in value can be partially attributed to this. Of course, without earthquake strengthening, these buildings would be unlikely to attract tenants. Unfortunately, it is not possible to view the influence of earthquake strengthening in isolation to these other factors.

Table 1. Summary of outcomes from earthquake strengthening.

Outcome factor	Character buildings (built 1900-1930) (n=7)	Modern buildings (built 1960-1990) (n=4)
% NBS pre-strengthening	6-42%	6-59%
% NBS post-strengthening	70-100%	75-100%
Cost to strengthen* (range)	\$600,000-\$10,000,000	\$110,000-\$1,800,000
Cost to strengthen* (median)	\$4,500,000	\$400,000
Change in Value** (range)	17-1054%	23-72%
Change in value** (range)	282%	23%
Change in rental income per m ² *** (range)	50-150%	0-103%
Change in rental income per m ² *** (average)	72%	48%

*Excluding refurbishment costs. **Estimated where strengthening unfinished or official valuation incomplete. ***For office space, on average as can vary per floor

Building owners make trade-offs between the costs of engineering solutions to strengthen their buildings and the resulting %NBS. The cost to upgrade character buildings is higher than modern buildings, with a median cost of \$4,500,000 (range: \$600,000-\$10,000,000) as opposed to a median cost of \$400,000 (range: \$110,000-\$1,800,000) for the more modern buildings. *[Note to reviewer: Cost per metre squared will be added to this discussion as it may be a better indicator than total cost].* This is not surprising, as the engineering solutions for older buildings tend to be more expensive as there are additional costs associated with preserving character and heritage features, for example removing and replacing tiles and interior plaster detailing.

The greater cost to strengthen is somewhat offset by higher market demand for character buildings in Wellington, as demonstrated by increased building value and greater rent take per square metre post-strengthening. On average, earthquake strengthening increased the value of the character buildings by 282% (range: 17-1054%), whilst modern buildings only increased 23% in value on average (range: -23-72%). Similarly, rental values per square metre increased an average of 72% (range: 50-150%) and

48% (0-103%) for character and modern buildings respectively. The owners of modern buildings shared the sentiment that strengthening is necessary to retain or attract tenants, but is associated with a lower rental premium than for character buildings, and the costs of strengthening were thus considered “dead money” or necessary maintenance.

4 CONCLUSIONS

The aim of this investigation was to begin to build an evidence base that may give more confidence to owners contemplating investing in the retrofit of their property. This investigation is ongoing and so the findings reported here are preliminary, but already strong consensus viewpoints have emerged from the small sample of interviews to date, and it is anticipated that these early findings will be indicative of the completed study.

The preliminary findings suggest that the main factors to have influenced the sample of Wellington owners’ to strengthen their building/s were increased tenant demand for higher %NBS following the Canterbury earthquake sequence, and being required to do so by the local council if their building was notified as earthquake prone. All of the building owners interviewed had strengthened to at least 70%NBS in order to meet the demands of the marketplace, the standards of which appear to be well above the regulatory minimum of 34%NBS. Some of the building owners discussed that being in a strong financial position enabled them to undertake work on their building, and that their ability to take such action would have been limited if their finances were otherwise. In general, the owners felt that the strengthening of Wellington’s commercial building stock was inevitable, and some mentioned that being proactive allowed them to lead the market and thus reap greater financial gains.

Dealing appropriately with tenants was important for a successful strengthening project for the building owners we talked to. While the nature of the structural engineering solutions determined whether tenants remained in situ for the duration of the retrofit, or relocated elsewhere, good communication and fair treatment of tenants was seen as leading to better tenant retention across the board. Some of the study participants emphasised the importance of considering the costs and benefits of strengthening to a range of %NBS targets, as well as commissioning an independent peer-review, as these may save money and increase confidence in the engineering solutions used. Additionally, it was seen as beneficial to select an engineer with a strong track record in seismic strengthening as well as one who has good industry and local authority relationships.

It is difficult to view the influence of earthquake strengthening on building values and rental income in isolation, since other factors such as location, refurbishment, and occupancy will also influence these outcomes. That being said, this study found that while character buildings in this sample tended to be more expensive to strengthen than modern buildings, they also benefited from a greater uplift in value and rental income after the work was complete. However, it is likely that earthquake prone character buildings significantly dropped in value in the past five years so some of this value increase is likely to be ‘recovered lost value’. Despite that, there does appear to be a tenant preference for character office space in Wellington, and a shortage of such spaces which are seismically strengthened, leading to a rent premium for those which are. Owners of modern buildings were more likely to consider seismic strengthening to be akin to maintenance, necessary to attract and retain tenants but not associated with significantly increased rental intake.

Further research is needed to understand the relevance of these findings to other places, especially relating to the outcomes for character buildings for which Wellington may have a unique market. For example, there may not be sufficient latent demand for tenancies in character buildings in smaller cities to encourage owners to upgrade. However, the evidence collected in this investigation will contribute to the discourse on earthquake strengthening, and has begun to reveal the diversity and nuance of experiences and outcomes for owners who seismically strengthen their buildings, and these need continue to be better understood.

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