Assisting Building Owners to Make Informed Decisions Regarding Seismic Mitigation Implementation

A thesis submitted in fulfilment of the requirements for
the Degree of Doctor of Philosophy

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ABSTRACT

This research examines the problems of reducing the impact of natural disasters, particularly earthquakes, on the built environment and the community. The research aim is to determine a method of assisting building owners to make informed decisions on seismic mitigation implementation of their substandard buildings. Generalised knowledge of this decision situation can then be uncovered to help building owners and other mitigation actors to structure and deal with similar situations elsewhere in New Zealand.

Considering the research paradigm, the research nature and the research commitment of this dissertation, four main research methods, under the qualitative research category, are employed to accomplish the research aim. They include a literature review, extensive interviews, and case studies, with the case study method being the overarching methodological strategy. An extensive literature review was carried out to examine the existing research focus of decision-making in seismic risk mitigation, which started to reveal the reasons of slow progress in implementing seismic mitigation. As one of the output of this literature review, Decision Analysis is examined as a method to assist building owners to make informed decisions. Accordingly, a series of interviews including various mitigation actors across the country were carried out to determine the key considerations in the decision making environment. Three real-life projects are studied to identify the characteristics of building owner's decision-making processes in a project environment. The characteristics of the decision problem of implementing seismic mitigation are then compared to those of the decision problem analysed by Decision Analysis to ascertain that Decision Analysis, especially Value-focused thinking Decision Analysis is the appropriate one to be used as a method to develop a decision framework in assisting building owners. The decision framework is then applied to two realistic, comprehensive projects to test the model by checking whether the framework is able to grasp the decision environment; whether the framework is able to illustrate and represent the building owner's thoughts; whether the framework is able to be administered in hindsight; whether an audit trail of the decision-making can be made.

The insight into the decision problem gained through the current research ascertained that Decision Analysis is a much better and more appropriate method to assist building owners than the traditional method, Cost Benefit Analysis. The main reason is that Decision Analysis is able to account for the intertwined features of the decision problem and evaluate the factors that are difficult to be quantified. Thus, this method should be applied to assist New Zealand building owners to make an informed decision in seismic mitigation implementation.

Key word: Decision Analysis, Seismic Mitigation Implementation, Decision Aid, Building Owners

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