



Modelling stakeholder-associated risk networks in green building projects

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Abstract

This research aims to model the interactive networks of the risks associated with different stakeholders in green building projects and to gain an understanding of the key risk networks. Case studies of green star accredited office building projects were undertaken in China and Australia. Case data were collected through focused group workshops, face-to-face interviews and desktop studies, and analysed by using social network analysis methods. The results show that while reputation risk is important in both countries, the ethical risk of ‘assessment experience and fairness’ has been highlighted as crucial in the Chinese context. The results further show that government plays an important role in improving the societies’ knowledge and awareness on green technology uptake in China. The social network analysis method in this research improves the effectiveness and accuracy of stakeholder and risk analysis by demystifying the social complexity which is usually overlooked in traditional linear risk impact analysis.

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1. Introduction

Building construction accounts for 40% of global raw materials consumption (U.S. Green Building Council, 2014), and in operation they consume 32% of the world’s renewable and non-renewable resources, 12% of available water, 40% of energy, and produce 40% of CO₂ emissions (GBCA — Green Building Council of Australia, 2013). The urgent imperative these figures present to policy makers has led to a myriad of regulatory attempts to drive green building project over recent decades. While sustainability awareness has grown at a steady rate, the uptake of green buildings has been slower than expected (Mukherjee and Muga, 2010). The implementation of green building project development encounters lots of risks

due to the traditional conservative and reactive behaviour of parties/stakeholders in the built environment (Kibert et al., 2000; Bullen and Love, 2010), and the transient relationship of project teams and stakeholders (Larsson and Cole, 2001). According to the 5th Edition of the PMBOK Guide (2013), project risk is “an uncertain event or condition that, if it occurs, has a positive or negative effect on one or more project objectives such as scope, schedule, cost, or quality”. Various risks, which range from technical challenges, affordability, lack of legal regulations and incentives, to knowledge gaps and unpredictable behavioural patterns, would possibly arise from the complex social reality in the shift towards green buildings (Lu et al., 2013). As stated by Prum and Del Percio (2009), risk sources should be analysed and each stakeholder in a green building project should assess their risks and take measures to mitigate the possible risk impacts. Stakeholder and risk analyses are important not only for developing a comprehensive risk list and recognising the causes of risks, but also contributing to effective decision-making and efficient communication in green building project management.

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With the rapid economic and urbanization development, the construction industry has become a pillar of the Chinese national economy. The Chinese government proposed to develop 10 million new affordable green buildings every year in the next 10 years (Guo and Su, 2011). All buildings in China, including new development and existing buildings, are required to achieve a minimum of 50% energy consumption reduction compared to 1980s (MOHURD, 2011). This is a massive undertaking, which also presents great opportunities for overseas companies, since China is still in its infancy in green building development and management (Wang, 2010). Australia in the Asian Century White Paper clearly emphasised the vital importance to identify the actions that Australian business sector should take to seize the opportunities and meet the challenges arising from China which is already unfolding.

Meanwhile, the KPMG survey in 2014 has shown that the Chinese State Owned Enterprise investment in the Australian Real Estate market has increased steadily in recent years: For example, in Sydney, China Greenland Group has invested over AUD 1.5 billion, followed by China Wanda Group with AUD 425 million, Shima Property with AUD 390 million and Beijing Capital Development Holdings with over AUD 330 million. More Chinese firms are looking for investment and brand promotion opportunities in the green building sector as green has become an industry imperative both in Australia and China.

However working in different business environments where the institutional and economic developments, as well as the political and sociocultural settings are quite different from the host countries is not an easy task (Kytte and Ruggie, 2005). A multinational firm operating in an environment fraught should fully understand the risk exposures to maintain profit, market share as well as long-term stability (Ashley and Bonner, 1987). Most of the risks are associated with project stakeholders including the government and supply chain members, because of different claims, interests, and culture backgrounds (Zhang, 2011). This requires an in-depth understanding of local construction project management mechanism, relevant policies, and project risks.

The central issue is “what the differences and similarities of risks are in green building project development in China and Australia”. Even so, how to identify the critical risks and mitigate them by engaging appropriate stakeholders is more important for the green developers to understand. This study aims to answer abovementioned two questions by analysing case projects. While the study is not intended to be statistically generalizable across the industry, it unveils a deeper understanding of the complexity of the green building project environment. A social network analysis (SNA) method, which is dedicated to demystify complex social environment, was used to assist the case study analysis process. This paper starts with discussions of four research paradigms on risk and stakeholder analysis; then the social network analysis (SNA) method is explained. The results of the two case projects are compared and explained to assist researchers’ and industry practitioners’ understanding of project stakeholder associated risk networks.

2. Literature review and theoretical underpinning

A literature review was conducted to identify and analyse the research paradigms regarding risk and stakeholder analyses in green buildings. To start, a database search was carried out by using Science Direct, Scopus, Google scholar and Ebsco Host searching engines, which are the popular databases in the construction field. The complete search codes are listed as follows:

TITLE-ABS-KEY (sustainable building) OR TITLE-ABS-KEY (green building) AND TITLE-ABS-KEY (risk) OR TITLE-ABS-KEY (stakeholder).

An initial review of the search results was carried out by reading the abstracts and skimming the contents of the articles in order to filter the papers relevant to the research aim. In total, 40 research papers were reviewed in detail to identify the ways of analysing the impact of risks and stakeholders on green building development in these studies. Four research paradigms are inducted as indicated in Table 1. The paradigms and the interactions in and between project stakeholders as well as risks are illustrated in Fig. 1 (a, b, c and d).

2.1. Paradigm (a): linear impact analysis

The first research paradigm is named as linear impact analysis because the publications in this group analysed the impact of project risks or stakeholders separately on green building projects. Three sub-groups are identified:

Sub-(a1) project risks: The five papers mainly focused on a type of risks to analyse organizational performance in green buildings. Rajendran et al. (2009) and Dewlaney et al. (2011) interviewed contractors and designers regarding the safety performance of green and non-green buildings to test the presence of difference in recordable incident rates and lost time case rates between the two project types. Bartlett and Howard (2000), Robichaud and Anantatmula (2011) and Lu et al. (2013) emphasised on cost risks, analysed the cost/benefit of green building development, and proposed strategies to deliver a green building project within acceptable cost constraints and enhanced economic value. These studies provided valuable information/evidence for the industry to integrate green concept into business operation. However, limitations are inevitably related to onefold perspective investigation, which presented facts, but neither analysed the cause-effect relationships existed in system complexity, nor integrated the project stakeholders for performance improvement.

Sub-(a2) project stakeholders: It is not surprising that quite a few papers investigated project stakeholders’ roles in green building project development with the boom of project stakeholder analysis and engagement research in the last decade. Researchers separated project stakeholders into two groups: the first group are those who are leading the green initiative, such as government (Circo, 2008; Henry and Paris, 2009; Theaker and Cole, 2001), contractor/builder (Gunhan,

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