



Why sustainable construction? Why not? An owner's perspective



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ARTICLE INFO

Article history:

Available online 5 February 2015

Keywords:

Sustainable construction
Critical factors
Owners
China

ABSTRACT

Rapid urbanization in developing countries such as China has been creating unprecedented opportunities for the adoption of sustainable construction (SC). Owners, as a key driver of urbanization, play an influential role for other stakeholders to undertake SC practices. However, lacking their demands and requirements of owners were regarded as the main barriers for the adoption of SC. Notwithstanding the diversity of previous studies on the barriers to SC, there is a dearth of research from the owner's perspective. This paper presents an empirical study identifying the critical factors impeding the adoption of SC from the owners' point of view. A list of 25 factors was preliminarily identified through extensive literature review and interviews with industry professionals. This was followed by a questionnaire survey to collect owners' opinions on the relative importance of these factors. Using factor analysis, seven most critical factors are identified, namely, economic feasibility, awareness, support from project stakeholders, legislation and regulation, operability of SC, resource risk, and project management model. The research findings show that economic feasibility, awareness, legislation and regulation are the most important factors impeding owners in adopting SC practices. This implied that the government plays a vital role in removing the barriers impeding the greater adoption of SC by building owners in China. This is helpful for a transition to the low carbon urbanization.

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Introduction

It is well acknowledged that developing countries experiencing rapid urbanization have met formidable challenges in producing sufficient housing and infrastructure in a socially and ecologically responsible manner (Plessis, 2007), and adequate and safe housing is still a dream for the majority of the population (Golubchikov & Badyina, 2012). In Southeast Asia, the emphasis of sustainability tends to be on the development for eradication of poverty and provision of basic housing instead of environmental issues (Shafiq, Ali, & Othman, 2006). Despite the urgent need for SC in developing countries, however, owners still regard it as a “nice-to-have” addition to normal practice without bring integrated into decision making and business practices (CIB & UNEP-IETC, 2002). As Shen,

Tam, Tam, and Ji (2010) pointed out, this is also the case in Mainland China, where economic performance is the most important concern in current project feasibility practice, with less attention being paid to environmental and social performance.

Urbanization is closely linked to the construction industry due to its associated developments such as housing and infrastructures (Shi, Ye, Lu, & Hu, 2014). Urban planning and the construction industry intertwined under the context of urbanization which is significantly affected by climate change policies (Kocabas, 2013). Indeed, the construction industry plays a critical role in sustainable urban development in China (Wang, 2014). The construction industry has a significant impact on the environment and society, and is a major sector involved in achieving sustainability (Shi, Zuo, & Zillante, 2012). The shift of the construction industry from the traditional paradigm towards sustainable development has received close global attention in the form of “sustainable construction” (SC) (Shi et al., 2014; Zhang, Skitmore, & Peng, 2014). Basically, SC outlines the creation and management of a healthy built environment based on resource efficient and ecological principles and aims to strike a trade-off between the economic,

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social and environmental (triple bottom line) dimensions of sustainability (Shen et al., 2010).

Adopting sustainable construction involves integrating all of the principles of SC into the construction activities of the project life cycle, with every stakeholder having a responsibility for carrying out sustainability practices (Hill & Bowen, 1997; Matar, Georgy, & Ibrahim, 2008). As Shen, Song, Hao, and Tam (2008) point out, every stakeholder makes specific contributions to improving sustainability, while owners play a critical role in requiring other stakeholders to adopt SC practices (Abidin & Pasquire, 2007; Fadeyi, Jallow, Anumba, & Dulaimi, 2012). Normally, owners are the demanders in the building sector, their willingness and their needs shape the products and process from the very beginning of construction projects (Pitt, Tucker, Riley, & Longden, 2009; Qi, Shen, Zeng, & Jorge, 2010). By incorporating sustainability principles from the start of their projects, the owners' subsequent decision-making and practices are more likely to promote SC (Abidin, 2010). In other words, the real driving force for SC can come from the owners (Shen et al., 2010). Despite owners being regarded as key drivers of SC, lacking their demands and requirements has been considered as the main barriers (Pitt et al., 2009). In Malaysia, for example, although governments have initiated the implementation of SC, owners are not willing to shift from the conventional approach or venture into new realms of technology (Abidin, 2010). Similarly, Häkkinen and Belloni (2011) argue that owners' lacking understanding of SC hinders the supply of sustainable buildings. There is also generally weak support and contribution from owners in environmental management (Shen, Yao, & Alan, 2006).

There are a number of issues associated with the rapid urbanization in China, largely due to the significant amount of resources required and a large number of stakeholders involved. This study places focus on one of these issues, i.e. sustainable construction. Despite the great efforts made in promoting sustainable construction, there is little research concerning the adoption of SC from the owner's perspective. This is compounded by the crucial role owner plays in promoting sustainable development. Therefore, it is important to explore the critical factors impeding SC from this perspective. Addressing this issue can provide useful references for both policymakers and industry practitioners to facilitate the adoption of SC, which in turn promoting sustainable urbanization.

Policy landscape

Sustainable development has been a major strategy in China's development since 1997. As one of measures to deal with environmental issues associated with rapid urbanization, sustainable construction has continually featured on the government's agenda. The Chinese government has developed relatively systematic measures to promote SC, ranging from strategies and regulations, standards and codes, to economic and financial incentives. For example, after the issue of *China's Agenda 21*, the environmental policy framework has been vigorously developed and renewed, resulting in a generally adequate set of environmental policies and regulations (Zhang & Wen, 2008). Related technical standards have also been revised to meet the requirements of SC, such as *The National Design Standard for the Energy Efficiency* for residential buildings and public buildings (DBJ01-602-2004, GB50189-2005) (Sha, Deng, & Cui, 2000). Furthermore, the Chinese government has established the *Green Building Innovation Award* in 2004 and promulgated *Evaluation Standard of Green Building* (GB/T 50378-2006). The *Green Building Action Plan* was released by NDRC and MOHURD in 2013 with an aim of constructing more than 1 million m² newly built green buildings in the following 5 years. However, SC is still in its infancy in China (Mao, Lu, & Li, 2011; Shi, Zuo, Huang, Huang, & Pullen, 2013). For instance, only 4% of the

building stock meet the green building standard (Liu, Low, & He, 2012). Li, Yang, He, and Zhao (2014) also argue that the green building practices in China lagged behind of that in developed countries significantly.

In 2014, the Chinese government issued the *National New-type Urbanization Plan* (2014–2020), because of which approximately 100 million rural people are expected to be formally relocated to urban areas. This has created a massive demand for building and infrastructure. It is estimated that around 30 billion m² of building area will be newly constructed by 2020 to meet the requirements of urbanization (Liu et al., 2012.). Without paying attention to sustainability during this development process, there is likely to be a considerable new burden on the environment, with economic wastefulness and social deficiencies, and taking many years to reduce the ensuing environmental footprint (Golubchikov & Badyina, 2012). Also, the large-scale construction of housing and infrastructure provides a convenient opportunity for innovative construction materials and technologies, and re-evaluation of traditional construction methods, management practices and ethical values (CIB & UNEP-IETC, 2002).

In terms of sustainable construction, this is indeed a challenging task for the Chinese construction industry due to the significant environmental impact and the large scale consumption of natural resources involved (Liu et al., 2012; Shi et al., 2012). Despite measures that have been introduced for promoting SC, their effectiveness is in doubt where action relies on the stakeholders' own initiatives (Qi et al., 2010). Other stakeholders are more likely to invest resources in SC following the owner's requirements (Abidin, 2010; Pitt et al., 2009).

Literature review

The literature related to sustainable construction was critically reviewed in order to develop a list of critical factors for SC adoption from the owners' perspective. This step also serves the basis for the questionnaire design. The papers published in leading academic journals were consulted, from which the critical factors that impede owners' adoption of SC were found to generally fall into five categories – economic, consciousness, resources, process, and policies and regulations. These are summarized in detail in the following sections.

Economic

Economic factors relate to the cost and benefit aspects of construction activities – such as the initial investment, benefit and payback time. Economic factors are normally the highest priority for owners when new norms or technologies are introduced into the construction industry. Compared to traditional construction projects, more initial investment is generally needed for SC (Hwang & Ng, 2013; Zhang, Platten, & Shen, 2011). For instance, as Shen et al. (2006) point out, the application of ISO 14000 and HK-BEAM often increases the capital costs of equipment, staff training, human resources and technology for protecting the environment (such as water treatment) and the application of noise-barrier materials. The benefits of SC are either long-term or intangible, e.g., reduction of operation cost during the building service life, improving environmental performance, enhancement of corporate image, job creation and causing a longer payback time for owners (Yung & Chan, 2012). Higher initial investment coupled with a long payback period present significant barriers to owners and financial institutions in adopting SC. Lack of support from financial institutions directly results in financial constraints, which prevents related organizations in effectively managing their sustainability responsibilities (Elmualim, Valle, & Kwawu, 2012).

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