



## Full length article

## Significant barriers to green procurement in real estate development

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## ARTICLE INFO

## Article history:

Received 13 March 2016

Received in revised form 5 October 2016

Accepted 6 October 2016

## Keyword:

Green procurement  
Real estate developer  
Barriers  
Green building materials  
China

## ABSTRACT

The procurement and use of green building materials are considered effective methods for improving environmental performance of real estate products. However, green procurement is still in its infancy and has not been widely adopted in the real estate industry especially in those developing countries such as China. Barriers that hinder real estate developers from adopting green procurement merit detailed investigation. This study examines the knowledge of real estate developers in adopting green procurement and the barriers encountered in real estate development within the context of the Chinese real estate business. Research data used for analysis are collected through questionnaire surveys to real estate developers in Chongqing of China. The hierarchical cluster analysis technique is employed to conduct a comprehensive analysis for identifying significant barriers. The semi-structured interview is used to verify and interpret the results of hierarchical cluster analysis, and develop suggestions for mitigating those significant barriers in promoting green procurement. The study reveals that real estate developers in Chongqing, China have little understanding of green procurement and green building materials, and few of them have experience in adopting green procurement strategy. The most significant barriers contributing to this include little marketing benefits and lack of incentive policies. The research findings provide valuable reference for assisting relevant government departments and developers to take measures towards mitigating the green procurement barriers in real estate development.

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## 1. Introduction

Business activities of the real estate industry are commonly considered as major contributors to many environmental problems ranging from non-renewable resource consumption, to the smog clouds, and to the global warming (Onat et al., 2014). It was reported that, in the European Union, approximately 40% of the total societal energy consumption comes from the real estate industry (Galante and Pasetti, 2012). Environmental problems of real estate industry are even more prominent in developing countries. De Boeck et al. (2013) pointed out that more than 60% of CO<sub>2</sub> emissions increases in real estate industries comes from developing countries in Asia.

Green procurement (GP) has been identified as an effective method for improving environmental performance of real estate products (Akadiri, 2015; Akadiri and Olomolaiye, 2012). In a typical definition, GP is considered as an integrated set of procurement policies held, actions taken, and relationships formed in response

to concerns associated with the natural environment (Zsidosin and Siferd, 2001). According to the estimation by Balaras et al. (2007), applying green wall materials and high energy-efficient window products can help residential buildings save 33–60% and 14–20% operational energy respectively. Galante and Pasetti (2012) estimated that the residential building industry would save 24.8% energy if existing housings were retrofitted using high energy-efficient wall materials. On the other hand, it is considered financially viable for companies to adopt GP because GP enables companies to increase their brand image and get more business opportunities (Ageron et al., 2012).

Despite various benefits associated with GP practice, the practice is still in its infancy in the real estate industry. Developers and contractors often procure building materials based on the lowest price while giving little attention on environmental performance (Bygballe et al., 2010). Todd et al. (2013) found that, among the green buildings certified by Leadership in Energy and Environmental Design (LEED) in the United States, only 1% and 2% of them reach the credits specified for reuse and renewable materials. The GP practice in real estate development is more immature in developing countries such as China. According to Xu et al. (2013), energy efficiency of building materials applied in the residential buildings in Chongqing of China are lower than that applied in UK. It is

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aligned with previous studies indicating that developers in China have weak environmental consciousness, and few of them have incorporated GP into their business strategies (Li et al., 2014; Tam et al., 2012). It appears that there are a number of significant barriers impeding the implementation of GP between developers in developing countries such as China. Given detrimental effect that real estate activities in developing countries have yielded on the natural environment, there is an imperative need to identify and mitigate these barriers.

Existing studies have given little examination on the barriers impeding GP in the real estate sector. In an early study on GP barriers in building industry, Ofori (2000) explored the potential of integrating GP into the building industry in Singapore. He identified two general obstacles to the implementation of GP, namely, fragmented nature of the building supply chain and lack of knowledge between industry professionals about benefits of GP adoption. McCoy et al. (2012) examined the influence of GBMs attributes on GP adoption with refer to the United States. They found that incompatibility with other building components, higher additional cost, and higher requirements for materials handling in construction stage are major barriers for developers to adopt GP. With reference to green real estate products in China, Zhang et al. (2011) examined the additional cost of applying green building materials (GBMs) to the conventional real estate products, suggesting an increase of 8.5–13.9% of overall project investment. Accordingly, they opined that the increase cost of GBMs is a major inhibition to GP. Shen et al. (2016) conducted an empirical survey in China to investigate key drivers to developers' GP practice, implying that current policies issued by the government of China fail to yield positive impact on promoting GP.

The above literature review identifies a lack of comprehensive analysis of GP barriers in the real estate industry particularly in those developing countries such as China. The aim of this study is to identify the major GP barriers in real estate development with reference to Chongqing of China.

## 2. Literature review on the barriers to green procurement

In pursuing the aim of this study, an extensive literature review is conducted to develop a list of typical barriers to GP in real estate development. The barriers are identified from perspectives of governmental policy, attributes of building materials, business organization, real estate market, and materials supply.

### 2.1. Governmental policy

The effectiveness of promoting green initiatives in real estate development is to a large extent dependent on governmental policies (Zhang et al., 2012). However, the Chinese government does not provide sufficient policy support to attract developers to adopt GP (Shen et al., 2016). This is echoed in the report "Building Materials Industry in 2013 and Outlook" issued by the Ministry of Industry and Information Technology of China (2013), suggesting that there is a lack of public policies promoting the procurement and adoption of GBMs in China. Therefore, insufficient and ineffective governmental policies are considered an inhibition to GP.

### 2.2. Attributes of building materials

Ageron et al. (2012) contended that the increase of cost in using green products is the most significant barrier impeding business organizations to implement GP practices. In real estate industry, procurement of GBMs also incurs additional cost. Zhang et al. (2011) estimated that the use of GBMs in China will increase overall project investment by 8.5–13.9%. The incurred additional cost is even higher for early GP adopters because there is no experience

available in using new materials and implementing new design and construction process (Steven Winter Associates, 2008c). Therefore, developers may be reluctant to adopt GP due to perception that the adoption of GBMs will lead to risks of eroding their financial performance (United Nations Environmental Programme, 2014).

In addition to financial risk, GBMs can present operational risks, such as incompatibility with other building components, and higher requirements for materials handling in construction stage. McCoy et al. (2012) pointed out that these two risks are major barriers to the adoption of a specific GBM Structural Insulated Panel in United States. The Chinese real estate industry also confronts this hurdle, as opined by the report "Building Materials Industry in 2013 and Outlook" stating that there are many technical problems in using the GBMs available in current market.

### 2.3. Business organization

Improving organizational environmental performance through GP imposes higher requirements for industry professional than other green initiatives (Murphy and Bendell, 1998). Nevertheless, it appears that professionals are not prepared to implement GP. Akadiri (2015) found that professionals in Nigerian building industry do not have comprehensive and easy-to-manipulate tools to measure environmental performance of GBMs, which strongly impede GP adoption. Professionals' incapability to apply GBMs can lead to biases in the perception of initial cost of GP. In a report by Steven Winter Associates (2008c), professionals that are not active in green building tend to exaggerate the additional increase of using GBMs. The overestimation prompts developers to adopt conventional procurement practices with low uncertainties (Zhang et al., 2012).

The positive attitude across the organization towards green issues and organizational environmental policies are identified as two major drivers for managerial staff to pursue green initiatives (Bansal and Roth, 2000). It is nevertheless found that the Chinese developers in general ignore or even resist environmental initiatives, and few of them have environmental objectives and policies (Li et al., 2014; Tam et al., 2012). As a result, there is a lack of top management support for adopting GP. Lack of environmental missions and strategies in real estate developer is therefore considered an important inhibition to adopt GP.

GP is considered an interdisciplinary issue involving professionals from design department, cost control management department, and purchasing department, thus the efficiency of GP practices cannot be achieved by actions from individual departments in isolation (Zsidiisin and Siferd, 2001). In this light, a developer needs to properly assign environmental responsibilities among individual departments in order to increase the coordination between departments when dealing with environmental issues. Misalignment on environmental responsibilities between various departments will inhibit GP practice (Rao and Brownhill, 2001).

Furthermore, low environmental awareness between managerial staff can act as an inhibition of GP adoption (Bansal and Roth, 2000). According to Steven Winter Associates (2008a), the professionals' low environmental awareness significantly slow the application of GBMs and the development of green residential buildings in Canada.

It is pointed out that bad experience of using GBMs can impede developers from adopting GP. McCoy et al. (2012) found that some developers in United States are refused to use GBMs after first trial due to the low performance of the materials in both cost advantage and compatibility. GBMs are even less in China, which could leave unsatisfied experience and significantly discourage the business from GP.

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