



Facilitating effective green procurement in construction projects: An empirical study of the enablers



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ABSTRACT

Given the urgent need to enhance industry practices in a green, safe, and economical manner, facilitating the wider adoption of green procurement in building developments has been a major concern of the construction industry. This paper aims to provide insight into the factors that are important in enhancing green procurement in the construction process and to suggest recommendations for the effective adoption of green procurement through a questionnaire survey and expert interviews. The top three most significant factors identified are mandatory environmental regulations by the government, client requirements in tendering, and government and non-governmental organization requirements. The results of a factor analysis of 35 variables identify 10 underlying grouped factors for facilitating effective green procurement in Hong Kong's construction industry. The factor group "Regulations and standards of green procurement by the government" is the most significant, followed by "Life-cycle considerations and green construction technology" and "Executive management's commitments and requirements." Efforts or initiatives undertaken by the community and the government on green procurement, such as competitions/awards, incentive schemes, and executives' green procurement commitments and requirements, are considered important in the green procurement process. The experts interviewed indicated that the government should take a proactive role in pushing green procurement adoption. Advanced construction IT (e.g., BIM) should be employed to stimulate the construction process to incorporate a green design approach and reduce waste. In addition, the establishment of a fully functioning green material market would help to promote the concept of green procurement and gradually lower material costs. Active engagement of suppliers to provide the performance details of construction materials is also necessary.

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1. Introduction

With global warming reaching alarming levels (Abanda et al., 2010), the urgent call for conserving scarce resources and maintaining a sustainable environment has driven governments and many corporations throughout the world to introduce environmentally friendly practices and products (Salam, 2008). With its consumption of huge amounts of non-renewable resources and materials, especially in new construction, the construction industry has significant effects on the environment (Wong et al., 2013; Dimoudi and Tompa, 2008; Mohammad and Amato, 2006)

because construction activities, which include the manufacture and transport of building materials, consume vast quantities of energy, which creates emissions of large amounts of greenhouse gases (GHG) (Yan et al., 2010). It is thus no surprise that the construction industry plays a key role in the realization of a low-carbon society.

Hong Kong is identified as having the world's second highest carbon footprint (a per-capita footprint of 29 tons per year). Buildings account for approximately 70% of GHG emissions in Hong Kong (WBCSD, 2008), an alarming level. Over the past few years, the Hong Kong government has introduced various policy measures to achieve sustainable development and low-carbon living. One such important measure that is relevant to the construction industry is a green procurement policy, which requires various official departments to consider environmental concerns in procuring goods and services (Environmental Protection Department, 2011). The government has appealed to industry sectors to adopt comprehensive clean production and green procurement methods

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in their operation. A local survey of perceptions of green procurement in construction indicates that the concept is considered to be highly important in achieving the sustainable development of the industry (Green Council, 2010). Despite these efforts, however, the construction industry has been prosecuted more than any other industry for violating environmental legislation. Contractors often encounter impediments to enhancing environmental performance in construction projects. To assist practitioners in incorporating environmental initiatives and green procurement policies, this paper aims to identify the factors that are important for enabling green procurement implementation in the construction sector and to make recommendations for effective green procurement adoption in Hong Kong to minimize the costs and adverse environmental effects in the construction process. The conceptual model, together with the identified green procurement factors and recommendations identified in this study, extends the theoretical development of green procurement implementation and practices in the construction sector in Hong Kong and in other similar cities.

2. Literature review

2.1. Green procurement: definition and obstacles

As defined by the Green Council (2010), green procurement is the purchase of “products or services which minimize or provide positive environmental impacts” through the factoring of “environmental concerns into major purchasing strategies, policies and directives.” Since the 1990s, green procurement has been regarded as an effective way to lower environmental burdens in product production and consumption (Green Council, 2010). The process integrates environmental preferences into the purchase of products, work, and services (Günther and Scheibe, 2006), and is necessary for an organization to assess the full costs and environmental effects of a product at its lifecycle stages, which include the purchase of raw materials and the manufacture, transport, storage, handling, consumption, and disposal of the products (Salam, 2008). In the construction sector, green procurement takes into account all lifecycle stages, from raw material extraction, material transportation, manufacturing, product packaging, storage, and handling to the product’s use and disposal (or recycling) (Ofori, 1999). Srinivas (2014) stated that selecting contractors and setting the environmental requirements in the contract are also important parts of green procurement. Environmental considerations must be placed in tender assessments, and the evaluation criteria must be taken into account in the procurement process (Preuss, 2002), which includes the preliminary design or architectural competition stage, tendering for a construction contract, and tendering for building services (ICLEI European Secretariat, 2007). This process can help clients find building products with less energy consumption, less waste production, and smaller carbon footprints, minimizing the damage to the environment (Lee et al., 2009).

It is widely accepted that the primary merit of green procurement in construction is that it improves both the environmental and the financial performance of the building and construction process (Green Council, 2010; Varnäs et al., 2009). Therefore, the benefits of implementing green procurement can be divided into two main aspects: i) environmental benefits obtained by minimizing the negative effects on the surrounding humans and the environment and ii) corporate benefits obtained by bringing business benefits to the company itself (Varnäs et al., 2009). In the environmental aspect, for example, the use of eco-labelled products with ISO Type 1 labels can work in parallel with the application of green purchasing within the framework of ISO 14000 environmental management guidance to help construction firms prevent

pollution from the source and educate all stakeholders to engage in green practices. The use of such products can also promote the use of clean technology and fuels to improve energy, water, and resource conservation by maximizing efficiency, minimizing waste, and reducing toxic emissions during construction (Environmental Protection Department, 2011; Green Council, 2010; Hutchison, 1998; Salam, 2008).

In the corporate aspect, reducing pollution and improving reusable content improve environmental performance and reduce the associated environmental handling costs (Green Council, 2010; Hutchison, 1998; Salam, 2008; Varnäs et al., 2009). The implementation of green procurement can also raise staff awareness of green practices and related green policies and can improve corporate market competitiveness through promoting the company’s positive public image of corporate social responsibility (CSR), which can lead to business opportunities with international investors (Green Council, 2010). Green procurement can also bring potential enhancements to supply chain networks, reducing transaction costs, emissions, and risks (Cruz and Wakolbinger, 2008; European Commission, 2011; Green Council, 2010; Hutchison, 1998; Salam, 2008).

Despite the increasing need for and awareness of a greener construction procurement process, some clients and developers have been hesitant to adopt green practices because of the lack of legal enforcement by the government (Ojo et al., 2014). In the case of Hong Kong, the adoption of green procurement is not yet mandatory, and thus some developers have not yet recognized the value of adopting green procurement in their projects. The Environmental Impact Assessment Ordinance in Hong Kong only provides a macro-level control on development projects with the aim of minimizing the adverse environmental effects of development (Chan, 2000). The mindset of the current bureaucracy toward solving environmental problems has resulted in a lack of incentives to adopt green procurement in construction (Gluch et al., 2007; Varnäs et al., 2009).

Inadequate market supply of green products and services for comparison and selection also restricts the choice of project teams (Green Council, 2010; Ojo et al., 2014). Insufficient information sharing between the construction firms and the suppliers and poor market demand for recyclable construction materials also hampers green procurement development (Ojo et al., 2014). The societal barriers, which include poor public awareness and insufficient cooperation with academia and environmental organizations, further limit the development of green procurement (Ojo et al., 2014; Varnäs et al., 2009). At the corporate level, the lack of sustainable practices in an organization’s vision and mission and corresponding poor commitment by its top management are key obstacles in the adoption of green procurement (Ojo et al., 2014; Varnäs et al., 2009). This includes a lack of internal corporate incentive in terms of financial allocation and formal and sustained commitment from top management. Poor in-house knowledge or experience in identifying green products or services and difficulty in integrating green procurement policy elements into the existing corporate policy further hinder the adoption of green procurement in many construction companies (Green Council, 2010). As stated by Gluch et al. (2007) and Varnäs et al. (2009), no increase in green expenditure can guarantee significant improvement in the overall environmental performance; this deters investment in green procurement. Many private developers do not see evidence “clearly stating or proving the business benefits” of their investment in green procurement (Five Winds International, 2003). The traditional golden triangle of cost, time, and quality, rather than the environmental aspects, is considered the benchmark of project performance, a view that hinders the development of green procurement (Varnäs et al., 2009).

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