

# Developing Green Procurement Framework for Construction Projects in Malaysia

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## Abstract

With the current emerging development pattern in Malaysia, Malaysian government has enthusiastically promoted green procurement approach that will help the construction project being green. Previous studies highlighted that the concept of green procurement is still very new to the Malaysian construction industry, and this increases the needs for further research in this area. This paper addresses the needs of guidelines for stakeholders to procure environmentally-friendly construction. Currently, there is a limited practical guideline for stakeholders to procure green projects. This paper discusses the progress to date of a research project aimed at developing a green procurement framework for construction projects in the Malaysian construction industry. This framework will guide the stakeholders to plan the green procurement implementation to procure a construction projects. Through literature and expert opinion, this paper explores the list of green practices within procurement practices which becomes the basis to develop a survey instrument that will be used in the later part of this study. The paper will shed useful information for construction researchers and practitioners in exploring the green procurement concept for construction industry in Malaysia.

**Keywords:** green procurement, green practices, Malaysia construction Industry, preliminary framework.

## Introduction

The world's population has increased more than doubled since 1950 and this significant growth has called for a greater demand for physical developments to provide shelter for social and business purposes such as education, housing, retail and manufacturing. According to UNEP (2003), world infrastructure needs are estimated at US\$ two trillion over the next decade. Most development has taken place in developing and underdeveloped countries compared to developed countries. In fact, developing countries account for 23 percent of global construction activities and the figure is more intensive in underdeveloped countries (UNEP, 2003).

In Malaysia, the total population has increased from 8.6 million since 1960s to about 30 million currently. With the current expansion trend of population in Malaysia, it is expected that more physical developments are required to cater for the expansion of population. Government of Malaysia has allocated in about RM230 billion for development fund in

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which 60% or RM138 billion will be spent on building physical development and RM20 billion facilitation fund are to be undertaken directly by the construction sector as stated in the Tenth Malaysian Plan (10MP) (EPU, 2010).

The expansion pattern of physical development in Malaysia and beyond has also triggered the concern on the environmental problems such as pollution, degradation of natural resources and carbon footprint. Malaysia commits to reduce 40% in carbon footprint emissions by the year 2020 compared to 2005. This was announced by the Prime Minister during Climate Change Conference (COP 15) in Copenhagen. A few strategies were recognised by Malaysian government to preserve the environment.

One of the strategies, the green procurement was introduced under the National Green Technology Policy 2009 (Kahlenborn, Mansor, and Adham (2013). Green procurement is introduced as effective tools to manage environmental problems. Practising green procurement means organisation should commit to minimise environmental consequences of the construction activities throughout the construction stages.

Despite its importance, green procurement is relatively new in Malaysia and has not been studied widely (Adham and Siwar, 2012; Musa et al., 2013). This paper discusses the progress to date of an ongoing research project aimed at formulating green procurement framework for construction projects in Malaysia. Specifically this paper aims to identify a comprehensive list of green practices for construction procurement that will be used in the later part of this study

## **Green procurement**

Procurement in its basic definition refers to buying activities; however, procurement of construction differs from those of products. Construction procurement is the process of acquiring goods and services for realizing a constructed facility according to predefined requirements (Ruparathna and Hewage, 2015a). Procurement is important for any infrastructure development because it will influence the overall project performance (Love, Skitmore, and Earl, 1998).

Referring to the sustainable development concept in the Bruntland Report (WCED, 1987), many agree that construction procurement is a vital tool to manage the environmental issues in construction projects (United Nations, 2008; Zhu, Geng, and Sarkis, 2013). Procurement that concerns with environmental impacts is referred as green procurement. The term “green” in this paper refers to the recognition, integration and implementation of environmental practices or initiatives or systems designed to minimise environmental impacts during their lifecycle (Albino, Balice, and Dangelico, 2009). For construction projects, practising green procurement means organisation should commit to minimise environmental consequences from the activities throughout projects stages.

It is widely acknowledged that the concepts of green and sustainability are interpreted differently by different organisation (Shelbourn et al., 2006). Mosgaard (2015), Fischer (2010) and Suliman and Omran (2009) all agreed that these terms have been used interchangeably and have been promoted under different terminologies such as ‘energy-efficient’ and ‘low carbon’. Nevertheless, regardless of the terms used, the aims are still the same which are to create environmentally friendly products and services.

Highlighted by Marcelino-Sádaba, González-Jaen and Pérez-Ezcurdia (2015), there is a need to define the term based on specific situation. In the construction context, Hes (2008) suggested that the most important aspect is to have an agreed definition of “green” by the project client and teams. Different stakeholders have different educational and training

backgrounds thus have different views and priorities. For example, architects tend to look at the aesthetic values while the quantity surveyors focus more on the cost impact. The lack of mutual agreement on the terms and well-defined set of green practices is the technical barriers to deliver a green project (Boswell, 2005).

Although green procurement may provide an opportunity to move forward towards sustainable construction, but studies on their actual delivery and practicability have not been conducted widely in Malaysia. The stakeholders must also ensure the initial guideline or policy of the project being translated into real actions or implementation (Russel, 1998). One key issue being highlighted is that most stakeholders face difficulties in initiating sustainable concepts in their work (Chong et al., 2009). This may result from the low level of awareness and knowledge among the stakeholders. Low level of knowledge could be the barriers to the successful implementation (Samari et.al, 2013). Currently, the guidelines are fragmented as they are being developed individually by different bodies with different purposes (Arts and Faith-Ell, 2012).

Marcelino-Sádaba et al. (2015) and Matar, Georgy, and Ibrahim (2008) suggested that there must be a well-developed framework for sustainable practices in construction to guide the stakeholders in delivering green projects includes identify the most critical or affected practices for a sustainable project. Identifying critical green practices could potentially guide the construction stakeholders in setting up the project's environmental goals and direction. A number of existing studies has listed down a few green practices; however, they differ in terms of locality, participants and industry (Wu, Yan and Huang 2012; Pun, 2006; Robichaud & Anantatmula, 2011; Sterner, 2002). For instance, Pun (2006) on pointed out the determinants for environmentally responsible operations (ERO) for the manufacturing industry. Pun has categorised the green factors, which have been recognised by a few established researches as well as this research as grouping for green practices, into three groups: policy, products, and, process and evaluations. Robichaud and Anantatmula (2011) proposed a comprehensive list of green practices by comparing it to the conventional approach. Similar to what have been proposed by Wu, Yan and Huang, (2012) and Sterner (2002), green practices shall cover all stages starting from feasibility.

## **Green procurement in Malaysia**

The government of Malaysia urged the industry to adopt green procurement to procure any product or services (Adham et al., 2012; Kahlenborn et al., 2013). Ministry of Energy, Green Technology and Water (MEGTW) and Ministry of Finance of Malaysia are responsible for planning the mechanism of green procurement adoption in Malaysia. Green procurement has been outlined in the Tenth Malaysian Plan (Musa et al., 2013) and will be part of the blueprint for the upcoming Eleventh Malaysian Plan (Chua and Oh, 2011).

The definition of green procurement is introduced by Ministry of Energy, Green Technology and Water (KeTTHA) and known as government green procurement (GGP). GGP defines as, “*The acquisition of products, services and work in the public sector that takes into account environmental criteria and standards to conserve the natural environment and resources, which minimises and reduces the negative impacts of human activities (KeTTHA, 2012)*”. Based on the definition given, green procurement in Malaysia currently focuses more on environmental impacts.

Specifically, there is no specific definition of green procurement for Malaysian construction industry. There are previous publications discussing green procurement in Malaysia. However, most of the publication does not focus on the construction industry.

Research by Hassan (2014) and Wahid (2014) discussing on drivers and promotion factor to promote green procurement for the construction industry in Malaysia. Despite the importance of green procurement of construction projects, this research area is still in its infancy and enhanced the needs for further research in this area.

## Research methods

In search of these practices of green procurements in Malaysia, this research conducts a review of current literatures and existing guidelines which have been applied in the built environment in Malaysia and abroad. It should be noted that the review does not seek to develop or argue the validity of current practices, but to identify and compile the current practices so as to create a general list of green procurement practices in Malaysia. It is also important to highlight that although a number of existing studies has listed down a few green practices, they differ in terms of locality, participants and industry

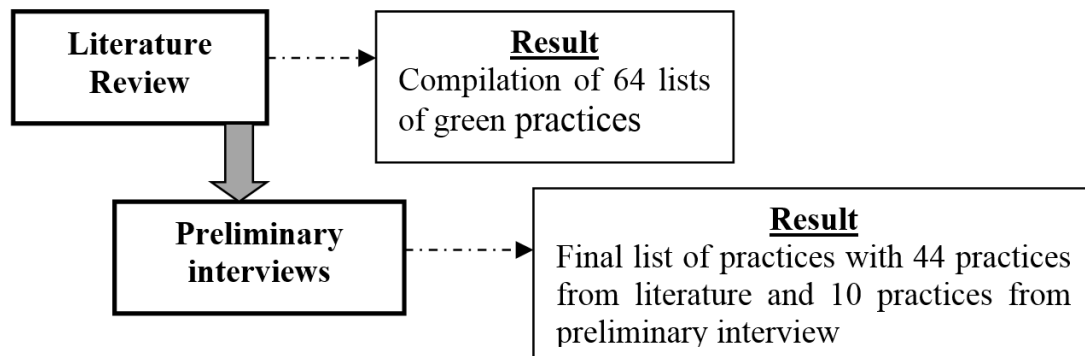


Figure 1. Compilation of green practices

Figure 1 shows the research process of green practices complication. A comprehensive literature review was first undertaken to identify and comply the list of green practices that pave the way for further investigation. Based on rigorous discussion from literature review, 64 green practices and four main constructs were identified. The four constructs are the policy and guideline, green practices, environment and assessment, project stakeholder's value (see Figure 2).

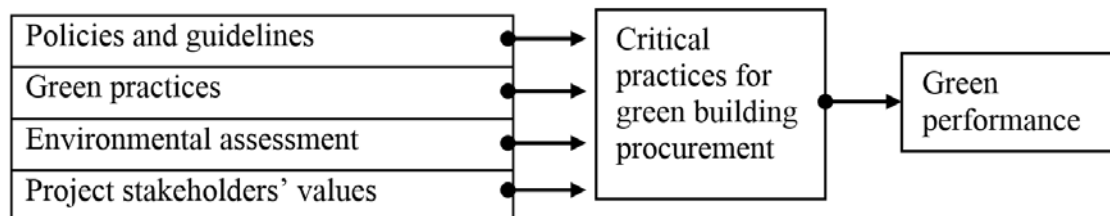


Figure 2. Preliminary framework

To grasp a better understanding of current practices and phenomena in the Malaysia construction industry, four face to face interviews were then conducted with experienced practitioners in delivering green projects to confirm the variables found in the literature and identify the green practices within the Malaysian context that have not been covered in

literature review. The profiles of interviewees are shown in Table 1. The interviewees include one from government department and another three from the industry. The selection of the participants is based on their experience in dealing with green construction projects. The collective of experts from various backgrounds could give balanced insight and views on the research topic. The interviews were conducted from 16 June 2014 until 29 June 2014. The list of questions was sent at least one day before the interview, to allow the expert to think about their responses. The interview lasted from 30 to 40 minutes for each session. For better clarity, follow-up questions were e-mailed to interviewees to help clarify and define terminology that was used.

Table 1. Interviewees Details

No	Interviewees position	Stakeholder Type/Role	Sector
R1	Government	Policy maker	Government
R2	Project Manager	Contractor	Private
R3	Architect / Green consultant	Consultant	Private
R4	Quantity Surveyor	Consultant	Private

The interviews have resulted in the reduction of the list of green practices derived from the literature because of irrelevance and redundancy. Another 10 new lists of practices have been also proposed by the interviewees. These practices were combined with the factors found through the literature review. The new factors derived from the interview include the needs for a project policy on incentives both by the government, the Industrialised Building System, the Building Information Management, the Green Building Index (GBI) rating and also Uniform Building By-Laws Code of Practice MS1525:2014 MS1525.

The findings from the literature review and preliminary interviews are the basis to form survey questions that will be used to finalise the framework of green procurement framework for construction projects in Malaysian construction industry.

## List of Green Practices

Under the four main constructs of the preliminary framework, 54 green practices were identified as shown in Table 2. For the first construct of policies and guidelines, 14 green practices have been identified. Many researchers agreed that availability of policies and guidelines by government, industry standard and the project itself are important practices for green procurement (Hassan, 2014; Pun, 2006). As explained by Bakir (2013) and Ruparathna and Hewage (2015b), government plays a role in ensuring that green concepts are adopted in procurement through the provision of environmental standard and regulatory framework. A few studies revealed that industry standard such as Environment Management System (EMS), International organisation for standardization (ISO) 14001 certification, eco-labelling as industry guideline play active roles in ensuring the green practices adoption (Bratt, 2011; Testa et. al, 2012)

The second construct refers to green practices with 16 lists of practices. The literature suggests that green practices must be implemented throughout all the project phases. It includes common procurement activities such as design, selection of construction materials, site management and waste management (Bakir, 2013; Pun, 2006; Sterner, 2002). The decision to adopt green practices must be formulated at the pre-planning stage and inform

the decision-making process in the planning and tender stages ( Wu, Yan and Huang (2012) and Sterner (2002).

The third construct is the environmental assessment which used to ensure compliance (Pun, 2006) at various procurement stages such as design, tender, construction and completion. A number of tools can be used for assessing the project; for example, the lifecycle analysis technique is used to check the environmental impact of products, and green specification and eco-labelling are used as benchmarks in selecting products and services. The most common indicators used in the industry are environmental rating tools such as the Green Building Index in Malaysia, the Leadership in Energy and Environmental Design certification in the US and the Building Research Establishment Environmental Assessment Methodology in the UK. Under this construct, 13 practices have been identified.

This preliminary framework also includes the values of the project stakeholders as the fourth construct with 11 lists of practices. Project stakeholders, as enablers, are one of the crucial factors that influence project performance (Hassan, 2014). The stakeholder values such as early involvement, commitment and technical capabilities in the green construction area as important factors in the procurement of green projects. Continuous training will help nurture the relevant skills among the stakeholders. Identification of new practices involves skill or a routine which can be done through learning and guidance from the higher level management. Continual training is essential throughout project delivery to ensure the green project goals accomplishment (Robichaud and Anantatmula, 2011). The training module mentioned by Robichaud includes project briefing, kick-off meeting, monthly meeting, periodical training and educational session. It is another means to help create the awareness and capabilities of the stakeholders.

## Conclusion

A study to develop a green procurement framework for the construction industry in Malaysia is being carried out in order to provide guidelines for construction stakeholders in Malaysia to procure green projects. As revealed by past researches, there is a lacking of guideline currently, specifically at project levels. Policies and general guidelines will drive the demand but there is also a need to provide guidelines at the project levels. The outcome of this research will help to shed some lights for future research and action by industry stakeholders in order to improve green project delivery in Malaysia. This paper aims to provide some insights on the current research by highlighting the preliminary findings in order to create a general list of green practices for building procurement in Malaysia. The list gathered will later be used to develop a survey instrument in the next phase of this research.

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Table 2. List of green practices for construction procurement

<b>Policies and guidelines</b>	<b>Green Practices</b>	<b>Environmental Assessment</b>	<b>Stakeholder values</b>
<ul style="list-style-type: none"> <li>• Government legislative requirements Government green incentives e.g. tax exemption.</li> <li>• Enforcement of Environmental Impact Assessment (EIA)</li> <li>• Enforcement of Uniform Building By-Laws Code of Practice MS1525:2014 (2nd revision)</li> <li>• Obtaining a Green Building Index rating</li> <li>• Policy that encourages participation certified ISO 14001:2004 organisation</li> <li>• Policy that encourages participation certified Environmental Management Systems (EMS) organisation</li> <li>• National Strategic Plan for Solid Waste Management policy</li> <li>• Having an agreed definition of “green” by project team</li> <li>• Availability of a green project needs statement</li> <li>• Availability of policy at project level urging environmental awareness</li> <li>• Availability of appropriate reward/incentives at project level on green achievement</li> <li>• Availability of eco-labelling program</li> <li>• Adopting other completed green project mechanisms</li> </ul>	<ul style="list-style-type: none"> <li>• Compliance to MS1525 guideline</li> <li>• Designing building based on project’s green specification</li> <li>• Designing building based on GBI guidelines</li> <li>• Selecting materials based on eco-labelling guideline</li> <li>• Selecting materials based on project’s basic environmental requirement (technical)</li> <li>• Conducting preliminary study on environmental impact</li> <li>• Conducting a value management</li> <li>• Adopting the Industrialised Building system (IBS)</li> <li>• Information Technology e.g., managing project</li> <li>• Using Building Integrated Management (BIM)</li> <li>• Using E-tendering</li> <li>• Providing waste management plan</li> <li>• Recycling waste</li> <li>• Using alternative for material packaging</li> <li>• Using On-site systematic waste management e.g. separate hazardous waste with general waste</li> <li>• Giving priority to suppliers with long term policy which promote efficient waste management</li> </ul>	<ul style="list-style-type: none"> <li>• Government approval at early stage to incorporate green practices</li> <li>• Conducting Life cycle Analysis (LCA)</li> <li>• Providing Life cycle Report</li> <li>• Product benchmarking using eco-labelling</li> <li>• Using external environmental rating tools</li> <li>• Environmental requirements in technical specifications</li> <li>• Mandatory environmental requirement criteria for tender assessment</li> <li>• Project’s green compliance mechanisms</li> <li>• Tender evaluation based on price preference e.g. Willing to pay extra for green products</li> <li>• Tender evaluation based on set-asides e.g. specific minimum targets for green purchasing</li> <li>• Benchmarking with previous projects</li> <li>• Public reporting on green performance</li> <li>• Considering public feedback</li> <li>• Mandatory legislative report submission e.g. Environmental Monitoring Report (EMP)</li> </ul>	<ul style="list-style-type: none"> <li>• Project client commitment</li> <li>• Project stakeholder commitment</li> <li>• Getting support from supplier</li> <li>• Project stakeholder competencies (technical)</li> <li>• Stakeholder ability to understand bigger picture of green construction</li> <li>• Pre-qualification based on past credentials in terms of knowledge green construction</li> <li>• Pre-qualification based on past experience in green construction</li> <li>• Conducting In-house training/briefing</li> <li>• Acquiring external collaboration or training</li> <li>• Appointing green specialised consultant/trainer</li> <li>• Sharing experience among stakeholders in project</li> </ul>