Challenges of Implementing Green Procurement in Public Construction Projects in Malaysia

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Abstract. Although the concept of green procurement is increasingly debated as an environmental policy instrument that considers the impact of procurement on the sustainability of project development, however, the concept in Malaysia is still in its infancy and facing various barriers and challenges to make a paradigm shift towards a greener approach. Therefore, this paper tends to determine the challenges that hinder green procurement implementation in building and infrastructure projects. This could pave the road to establish a transformation plan that could gradually overcome the current challenges in order to reach the desired level. The study is based on a survey conducted in the Malaysian construction industry at which 380 corporations were surveyed to determine their perspective on 28 pre-determined challenges and their degree of significance. A number of 142 were valid responses. Results revealed that there is an excellent consistency in the significance of the identified challenges. Reducing the use of natural resources and related waste, minimizing the high cost of eco-products, integrating quality environmental management into planning and operation and achieving the value of money are among the important challenges. Achieving financial, environmental and operational impact of green procurement performance are also significant challenges.

1. Introduction
In construction industry, sustainability is no longer an option but an imperative. It turns to be an essential element for project stakeholders. Indeed, it is debated as an indicator of the advancement of nations. Construction sector is considered one of the major contributors to the environmental degradation. Construction of buildings and infrastructures plays a major role in producing 40% of CO2 emissions, 30% solid wastes and 20% water pollution in the world [1]. The basic idea of sustainable development is to make effort to save energy and resources, promote recycle of materials, reduce the emissions of toxic substances and to enhance the indoor quality of human life whilst maintaining and sustaining the capacity of the ecosystem at both levels locally and globally throughout its life cycle [2].
Recently, the construction industry is no exception whereby there are urgent calls towards sustainable development to minimize the impact on the environment. This relates to social, economic and environmental sustainability which has become one of the topmost agendas on government policies. Green Procurement is defined as “The act of obtaining or disposal and recognition of goods, services, engineering and construction work. It also encompasses the integration and implementation of environmentally friendly practices throughout the processes involved in producing a construction output such as a building or infrastructure” [3].

Malaysia commits to reduce 40% in carbon emissions by 2020 as compared to 2005. However, a few strategies were recognized by the Malaysian government to preserve the environment. One of the strategies, the green procurement which was introduced under the National Green Technology Policy 2009 [4]. Green procurement is relatively new in Malaysia and has not been studied widely [5]. Although Green procurement provides a wide range of benefits for society, the implementation is facing various challenges in developing countries including Malaysia. Green building projects are somehow associated with challenges and interdependencies due to lack of interaction among stakeholders. This is particularly during the planning and design stage which significantly impacts the final product due to the differences in perception and expectations and due to lack of effective measures and relevant indicators [6].

It is stated that effective and precise preliminary planning is an essential requirement for developing a green building due to the challenges and uncertainty measures that are faced by the stakeholders [7]. In practice, no many stakeholders focus on achieving sustainability through the procurement process. In fact, green public procurement may act as an engine for innovation and a crucial instrument to create market entrance opportunities for new green Malaysian products and services. Although green procurement may provide an opportunity to move forward towards sustainable construction, studies on their actual delivery and practicability have not been conducted widely in Malaysia [8]. Based on [9] there are 60 green procurement practices are identified and could help the industry practitioner to plan their green procurement implementation in Malaysia, however, there are various barriers and challenges that hinder the implementation of green procurement practices. The concept faces several obstacles including the level of knowledge and awareness of project stakeholders as well as the fragmented strategies and isolated practices to promote green buildings and infrastructure. This makes the integration of these isolated practices into green procurement as a challenge [3, 9, 10].

Currently, the guidelines for Green Procurement are fragmented, no practical guidelines for stakeholders towards green procurement project [3]. It is stated that research discussion on “Green Public Procurement (GPP) has mostly focused on the specific impacts of GPP implementation, while the discussion on GPP as compared to other environmental policy tools, in terms of efficiency and innovation is still lagging behind” [11]. Moreover, there are no practical guidelines for stakeholders to procure environmental-friendly construction projects which results in isolation between policy formulation and actual project delivery [12]. Higher upfront cost associated with eco-products and services, lack of legislation to introduce mandatory influence for green adoption are also challenges hindering the adoption of green procurement in building and infrastructure projects. The objective of this study is to determine the challenges that hinder the adoption of green procurement. Identifying the challenges is important in order to diagnose the effective measures and the key success factors in the next stage of this study. This will provide a roadmap for implementing green procurement in building and infrastructure projects. This could pave the road for establishing a transformation plan that could gradually overcome the current challenges in order to reach the holistic level.

2. Literature review and the lead of research

It is obvious that the construction activities are rapidly increasing in Malaysia and there are various efforts towards a greener approach. The introduction of green procurement, which is promoted under the Malaysian Government’s MyHijau initiative, is one of the fruitful efforts in this context. If well employed, green procurement is considered one of the effective tools to make a paradigm shift towards a sustainable approach. However, recently, it is reported by Construction Industry Transformation Program (CITP) 2016-2020, that the current market demand for sustainable building
solutions is low which has resulted in a weak ecosystem for sustainability. This causes higher carbon emissions and energy usage of buildings which makes a challenge to meet the 2020 sustainability outcomes of 4 Million ton (Mt) CO2 reduction per annum. Furthermore, achieving the target of 100% of large infrastructure and building projects to exceed sustainability requirements will also be challenging if the issue is not addressed [13].

Therefore, there is a significant need to diagnose the current barriers and challenges in order to propose effective solutions that could enable the implementation of green procurement in public construction projects. In addition, investigating the challenges could pave the road for identifying the key success factors that could enhance the green procurement practices and encourage moving forward to reach higher green performance levels. The outcome of this study provides insights for construction players towards green orientation. Achieving the goal of this study will be in line with Malaysian long-term goals of sustainable development particularly what has been recently emphasized by JKR’s Aspiration known as “Transformasi National 2050” on the Transformed Public Procurement. To the best of the author’s knowledge, there is a limited effort has been undertaken to explore the challenges that hinder the adoption of green procurement in building and infrastructure projects. In addition, there is also a lack of understanding of the current scenario and procurement practices and how to prioritize the current procurement into a greener approach. Therefore, investigating the affecting factors among professionals in the construction industry is the main focus of this study. The research outcome promotes the adoption of green procurement and purchasing green products, materials and services.

3. Research methodology
In this study, a questionnaire survey was initially designed whereby 40 challenges were identified from the literature review. A pilot study was conducted whereby a number of eight interviews were conducted with construction industry practitioners. In the first phase, an initial questionnaire survey was designed and randomly distributed to 48 practitioners to obtain initial findings. In the second phase, the questionnaire was redesigned whereby some factors were rearranged, merged and some factors were omitted due to their irrelevancy. Eventually, a number of 28 challenges were investigated to explore the degree of significance in order to prioritize the effective measures accordingly. This study also explores the participants’ background, the level of their involvement in green projects, the procurement strategies and project profile.

The target was to establish a platform for different construction professionals to express their perspective and point of view about the potential success factors for implementing green procurement all over Malaysia. The questionnaire was distributed to a number of construction professionals participating in the International Construction Transformation Conference 2019 (ICTC 2019) and Eco-Build Exhibition 2019 which was held in conjunction with International Construction Week 2019 during 18-21 March 2019 at MITEC-Kuala Lumpur. In addition, the data were distributed and collected in conjunction with a series of relevant seminars on Sustainable INFRASTAR, MYBIM, MyCREST and QLASSIC2019 which were organized by CIDB Malaysia in Terengganu 26th of June 2019 and in Johor on the 17th of July 2019. Data were also distributed and collected through a seminar on green supply chain management which was organized by SIRIM in Shah Alam 15th -16th of July 2019. In this research, a wide range of respondents participated in this study from various organizations and different backgrounds. This involves public clients, developers, architects, contractors, consultants, quantity surveyors, facility managers and participants from government organizations such as the ministry of works (JKR) and Construction Industry Development Board (CIDB). The conference put greater emphasis on reinventing construction: “how we build the future which emphasis on greening the construction industry beyond 2020”. This helps to develop an empirical understanding and knowledge of the current level of procurement practices and factors enabling stakeholders to implement green procurement practices. Overall, a total number of 380 questionnaires were distributed to construction industry practitioners. 142 responses were collected and validated for further analysis.
4. Data analysis and discussion
Data analysis of respondents’ profile, project features and key success factors are discussed.

4.1. Respondents’ demographic characteristics
Respondents’ characteristics are assessed in terms of their educational qualification, practical experience, designation, position in the project. Besides, the evaluation of respondents on the level of their involvement in green projects. The summary of the respondents’ profile is shown in Table 1.

| Demographic Features                  | Frequency | Percent (%) |
|--------------------------------------|-----------|-------------|
| Designation                          |           |             |
| Executives                           | 34        | 24%         |
| Directors                            | 10        | 7%          |
| Senior Management                    | 45        | 32%         |
| Junior Management                    | 14        | 10%         |
| Engineers                            | 31        | 22%         |
| Academician                          | 8         | 5%          |
| Position in the project              |           |             |
| Consultant                           | 39        | 27%         |
| Public Client / Government Body      | 28        | 20%         |
| Procurement officer                  | 4         | 3%          |
| Developer                            | 16        | 11%         |
| Architect                            | 8         | 6%          |
| Contractor                           | 18        | 13%         |
| Quantity Surveyor                    | 16        | 11%         |
| Facility Manager                     | 2         | 1%          |
| Supplier                             | 11        | 8%          |
| Educational Qualifications           |           |             |
| Diploma                              | 31        | 22%         |
| Bachelor’s degree                    | 79        | 55%         |
| Master’s degree                      | 27        | 19%         |
| PhD                                  | 5         | 4%          |
| Experience in construction industry  |           |             |
| Less than 5 years                    | 38        | 27%         |
| 5 to 10 years                        | 39        | 27%         |
| More than 10 years                   | 65        | 46%         |
| Involvement in green project         |           |             |
| First Project                        | 20        | 14%         |
| More than Project                    | 45        | 32%         |
| None                                 | 77        | 54%         |
| Organization Establishment           |           |             |
| Public                               | 55        | 39%         |
| Private                              | 85        | 60%         |
| NGOs                                 | 2         | 1%          |

4.2. Projects characteristics
Table 2 summarizes the characteristics of the project that is referred to as the respondents in answering this questionnaire about the latest project they were involved in.
Table 2. Projects characteristics.

| Project Features               | Frequency | Percent (%) |
|-------------------------------|-----------|-------------|
| Project location              |           |             |
| Peninsular Malaysia           | 135       | 95%         |
| Sabah                         | 7         | 5%          |
| Sarawak                       | 0         | 0%          |
| Project type                  |           |             |
| Residential Buildings         | 36        | 23%         |
| Commercial Buildings          | 33        | 21%         |
| Industrial buildings          | 16        | 10%         |
| Institutional Building        | 16        | 10%         |
| Healthcare Buildings          | 3         | 2%          |
| Mixed-Development             | 2         | 1%          |
| Infrastructure                | 45        | 29%         |
| Other                         | 6         | 4%          |
| Green recognition             |           |             |
| Platinum certification        | 4         | 3%          |
| Gold certification            | 6         | 4%          |
| Silver certification          | 10        | 7%          |
| Certified certification       | 37        | 26%         |
| Application Stage             | 12        | 9%          |
| None Certified                | 73        | 51%         |
| Contract Strategy             |           |             |
| Traditional Procurement       | 59        | 41%         |
| Design and Build              | 50        | 35%         |
| Project Management Agency     | 25        | 18%         |
| Private Finance Initiative (PFI)| 4       | 3%          |
| N.A                           | 4         | 3%          |
| Project Client                |           |             |
| Federal Government            | 41        | 25%         |
| State Government              | 70        | 42%         |
| Local Authorities             | 15        | 9%          |
| Private Sector/Developer      | 39        | 23%         |
| Other                         | 2         | 1%          |
| Project Size                  |           |             |
| ≤ RM200,000                   | 13        | 9%          |
| ≤ RM500,000                   | 16        | 11%         |
| ≤ RM1 million                 | 15        | 11%         |
| ≤ RM3 million                 | 23        | 16%         |
| ≤ RM5 million                 | 17        | 12%         |
| ≤ RM10 million                | 21        | 15%         |
| ≥ RM10 million                | 27        | 19%         |
| N.A                           | 10        | 7%          |

Projects characteristics (n=142)

4.3. Green procurement challenges in construction
The construction industry in Malaysia is still facing significant challenges for implementing green procurement in building and infrastructure projects. In this study, 28 challenges were observed, recorded and coded as CH01 to CH28. Among the considerable challenges are the higher upfront cost
associated with eco-products and services, gap existence between policy formulation and actual project delivery and lack of legislation to introduce mandatory influence for green adoption. The challenges have been statistically analyzed through descriptive analysis whereby the mean, standard deviation and ranking are shown in Table 3. Basically, 28 factors were explored from literature to define the extent of their significance. This identification could lead to determine the key success factors towards effective adoption. The responses were tested for consistency and result shows an excellent consistency of 0.934 according to Cronbach's Alpha test. The analysis revealed a high mean greater than 3.44 and high slandered deviation greater than 0.63 as shown in Figure 1 and Table 3. This confirms that the identified factors are significant to influence respondent decision for implementing green procurement, however, the factors are spread out over a wider range of values.

Figure 1. Challenges of implementing green procurement.

In this context, the challenges were analyzed through a descriptive analysis where the mean value, standard deviation and ranking of the 28 factors are tabulated in Table 3.

5. Conclusion
The key challenges that hinder the implementation of green procurement in buildings and infrastructure projects were examined. This process of diagnosing acts as a cornerstone towards evaluating the related key success factors and effective measures to drive the implementation. Implanting green procurement in Malaysia is not prioritized yet and the adoption has not reached the desired level. The findings emphasize a strong willingness by governmental bodies and construction players to transform towards a greener approach. The main challenges are to reduce the use of natural resources and related waste as well as to cut the cost for eco-products. Integrating quality environmental management into planning and operation as well as achieving the value of money on a whole life basis are among the important challenges. Achieving financial, environmental and operational impact of green procurement performance are significant challenges. In addition, the reluctance of stakeholders to change behavior towards sustainable practices and the gap that exists between policy formulation and actual project delivery are limiting and preventing the adoption. Creating a new, vibrant local market to boost suppliers’ competitiveness and introducing mandatory influence for green adoption is the backbone to overcome the challenges. The next phase of this study is to examine the measures and key success factors that could gradually overcome the current challenges and encourage shifting towards a greener approach.
Table 3. Challenges of implementing green procurement.

| Code  | Challenge                                                                                           | Mean | Std. Dev | Rank |
|-------|-----------------------------------------------------------------------------------------------------|------|----------|------|
| CH09  | Reducing the use of natural resources and reduce waste.                                             | 4.021| 0.84     | 1    |
| CH14  | Higher cost for Eco-products and services and the influx of foreign products.                       | 4.007| 0.69     | 2    |
| CH01  | Integrating quality environmental management into planning and operation                            | 3.965| 0.71     | 3    |
| CH10  | Achieving value of money on a whole life basis (life cycle costing).                               | 3.951| 0.75     | 4    |
| CH06  | Achieving the financial impact of green procurement performance.                                   | 3.951| 0.69     | 5    |
| CH13  | The separation between the capital and the operating budget.                                       | 3.852| 0.79     | 6    |
| CH15  | Lack of benchmarking of sustainable procurement and green best practices.                          | 3.838| 0.77     | 7    |
| CH04  | Achieving the environmental impact of green procurement performance.                               | 3.831| 0.66     | 8    |
| CH05  | Achieving the operational impact of green procurement performance.                                 | 3.824| 0.67     | 9    |
| CH26  | The reluctance of stakeholders to change behavior towards sustainable practices.                  | 3.817| 0.78     | 10   |
| CH16  | Creating a new, vibrant local market to boost supplier’s competitiveness.                          | 3.754| 0.67     | 11   |
| CH17  | Gap existence between policy formulation and actual project delivery.                              | 3.732| 0.63     | 12   |
| CH22  | Low level of commitment and risk associated with absence of a strategic approach                   | 3.711| 0.86     | 13   |
| CH28  | Low technical competency and capacity to formulate product specifications.                         | 3.704| 0.73     | 14   |
| CH27  | Lack of structured frameworks to assist in sustainable project delivery.                           | 3.683| 0.82     | 15   |
| CH20  | Inadequate consideration of stakeholders’ requirements, expectations and values.                   | 3.676| 0.77     | 16   |
| CH07  | Improve organizational competitiveness and build a business reputation.                            | 3.676| 0.83     | 17   |
| CH02  | Lagging of environmental policy tools for efficiency and innovation.                               | 3.676| 0.76     | 18   |
| CH03  | Inadequate policies, regulations and lack of legislation to enforce the adoption.                  | 3.669| 0.82     | 19   |
| CH11  | Priority conflict, lack of a balanced approach to consider sustainability dimensions.              | 3.634| 0.79     | 20   |
| CH19  | Lack of social drive and lack of client demand.                                                    | 3.620| 0.90     | 21   |
| CH24  | Lack of capacity of small-scale suppliers/contractors to innovate green solutions.                | 3.606| 0.85     | 22   |
| CH08  | Lack of incentives and top management support for green procuring.                                 | 3.606| 0.86     | 23   |
| CH12  | Lack of tendering procedures to guide organizations to select green sources.                       | 3.599| 0.89     | 24   |
| CH21  | Low multi-stakeholder approach and lack of collaboration and engagement.                          | 3.542| 0.87     | 25   |
| CH25  | Unavailability of Eco-products list and materials/products quality concern.                       | 3.514| 0.97     | 26   |
| CH18  | Absence of internal management structures for green procuring.                                     | 3.479| 0.84     | 27   |
| CH23  | Lack of procurement managers skills to formulate product/service specifications.                   | 3.444| 0.88     | 28   |

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