Exploratory Research as the way forward towards a green procurement practices for the construction industry; Research Methodology

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Abstract. Green construction is a way forward for the construction industry in Malaysia, towards an environmentally responsible industry. One of the important tools to accelerate green construction is the construction procurement. Thus, the concept of a green-oriented procurement has been introduced to integrate green practices into project procurement delivery. However, green procurement is the least discussed and the concept is still very new in the Malaysian construction industry. Thus, this paper describes a proposed strategy of exploring the potential of green procurement for the construction industry. This is based on an on-going research project whose primary objective is to pave a way forward for the key stakeholders who are involved in green building projects.

1. Introduction on the key concepts
Throughout its life cycle, the building industry is related to global environmental issues such as GHG emissions, air pollution and improper waste management. The adverse impact of the construction sector on the natural environment has triggered a growing awareness to embark on towards the greener path. The green construction concept has been introduced as an environmentally friendly approach as it uses sustainable principles in its building techniques and procedures. Underlined in the concept of sustainable development in the Brundtland Report [1], the construction procurement has been pointed as an effective tool to manage adverse environmental issues in construction.

The term procurement refers to product purchasing activities, however, the definition of the term procurement of construction differs slightly from those of products. Construction procurement is explained as “a process of acquiring goods and services for realising a constructed facility according to predefined requirements” [2]. Thus, construction procurement is important because of its influence in the overall project delivery [3]. The term “green procurement” or GP is introduced in the construction industry to fulfil the environmental objective of an organisation [4]. Green procurement builds on the current procurement practices, but it extends through the adoption of sustainability principle.

GP involves the minimisation of the environmental impact throughout the lifecycle of a building from inception until the demolition of the building. Various literatures have highlighted the wider benefits of GP, which include minimising environmental impact, meeting sustainability goals, increasing financial efficiency; reducing the risk of non-compliance with legislation, enhancing organisational reputation and encouraging innovation. GP concerns are with the performance of the construction delivery, the way the project is being delivered as well as the materials used in construction. GP requires active participation and support from the project stakeholders and thus, the awareness among stakeholders on GP is very crucial. Project stakeholders are urged to identify the key green practices that are important for their construction procurement.

Adetunji, Price & Fleming (2008) [5] have revealed the fact that green procurement practices have not managed to capture the interest and attention of construction sector practitioners. Lack of familiarity, knowledge and interest among stakeholders in green procurement pertaining to construction could be the flaws that could lead to low support of the sustainability agenda [6]. It has also been suggested that there must be an established standardised procedures and guidelines for GP to be a framework for the practitioners which currently lacking knowledge and familiarity (refer figure 2).
Thus, this research is conducted with the aim to provide an exploratory study on the potential of GP for building projects. Exploration encompasses three main objectives: the first is to identify the current state of readiness of the stakeholders, the challenges and the success factors, the second is to determine the extent of GP practices in green certified and non-green certified construction projects, and the third objective is to determine the important practices of GP for construction projects.

This paper discusses the progress to date of an ongoing research project that is aimed at exploring the potential of green procurement for the construction industry, and specifically it aims to discuss the research methodology undertaken to ensure the reliability of the research. This involves the selection of suitable research philosophy, approach and strategy. The research methodology of this research will be the pathway towards accomplishing the objectives that are underlined in this research.

2. Methodology
2.1 Understanding research methodology choices for this research

There are two well referred research methodology frameworks available in the built environment; they are the nested method and the research onion [7]. Keraminiyage, (2013) [7] further explains [7] a comprehensive range of possible approaches through a modified model that is based on Saunder’s Research Onion and Kagioglou’s Nested Approach (Refer Figure 1).

![Figure 1. The modified model, Source: [7]](image)

After a thorough review on the choices of research methodology that are available, Table 1 shows the proposed research approach of this research as suggested by [7] in order to achieve the research objectives.

| Research Philosophy | Pragmatism          |
|---------------------|---------------------|
| Research strategy   | Survey              |
| Research choices    | Mixed-method        |
| Time Horizons       | Cross sectional     |
| Technique           | FGD and Questionnaire|

2.2 Research philosophy

[8] has mentioned a few views of research paradigms that have been used in the field of modern social science research that can be applied when undertaking research. The research philosophy acts as a guide
to the general approach or strategy that is used to conduct research. Some research uses the postpositivist view (inductive, developed theory and qualitative), some use the positivist (deductive, quantitative data collection and interpretation), and some researchers combine both systems (mixed method), which is called a pragmatic worldview [8], [9]. Pragmatism highlights the research problem to be at the central position where the researcher applies all available methods to coin the problem and the possible way out [8]. This research is carried out to deliver a possible solution to a practical problem, namely, to improve the current procurement system for a green project within the Malaysian construction industry. As pragmatism places “the research problem” at the central position, this research would be considered as a pragmatic research (refer figure 2). The pragmatic researcher will use multiple methods of data collection to meet the research objective such as the quantitative and qualitative data collection that can be integrated with the data at different stages [8].

Figure 2 Addressing the research problem

2.3 Research strategy and choices
Considering the various research strategy and choices that are proposed in the literature, the research for this paper is decided based on its’ research objectives and aim [8]. This research uses surveys as a data collection technique whereby the approach includes questionnaires, interviews, content analysis, and observations [9]. The surveys adopt quantitative and qualitative approaches and focus on questions such as what, who, where, how much or how many [8], [9]. A mixed method research refers to the mixture of both qualitative and quantitative research methods. This method provides better solutions to the drawbacks of the qualitative and quantitative approaches by the strengths of the other complement rather than contending one with the other. Based on Creswell [8], one of the ways in connecting the data is by connecting the data. The literature review will be the basis to form research direction and the way forward. The qualitative approach will be carried out and then it will be followed by the quantitative phase. Thus, this research involves questionnaires and focus group discussion.
2.4 Research technique and procedure

To accomplish the research objectives and aim, this research will be conducted in three phases and undertakes the following activities (refer Appendix 1). Two main techniques of data collection will be adopted based on specific procedures: expert discussion through FGD and the questionnaire.

2.4.1 Focus group discussion (FGD)

A focus group discussion (FGD) approach will be conducted to collect qualitative data for this research. Accordingly, preliminary interviews are necessary to help the researcher to confirm, refine and rephrase the research problem and the factors that are derived from the literature. Creswell [8] proposed that “…qualitative research is best suited to address a research problem in which the researcher does not know what the variables are and needs to explore the topic more widely”. To gain local context in-depth understanding, the qualitative investigation will be conducted with experienced practitioners and subject matter expert who are policy makers and researchers [10]. The implementation diverges between one context to another to suit local needs.

The key selection criteria for FGD participants are their credential in green construction in Malaysia. The researcher has gathered information from various sources, such as available public information, internet searches, and personal contact with the project’s key person. Findings at this stage will reveal nothing conclusive but it may help in defining the problem and can be used to improve the questionnaires being used in the main data collection. The FGD discussion will be recorded and transcribed by the researchers. The written transcripts will be proofread to confirm the validity and reliability. If the discussion uses a local language, in this case the Malay language, the discussion needs to be back-translated to ensure the accuracy of the translation [11]. Data will be analysed using the available qualitative software in the market.

2.4.2 Questionnaire

Term questionnaire refers to “… the documents that include a series of open and closed questions, to which the respondent is invited to provide answers” [12]. Questionnaires offer an objective means of collecting information about people’s knowledge, beliefs, attitudes and behaviour [12]. There are three kinds of research: profiling and descriptive research, predictive and analytical research and lastly, developing and testing measurement scales [12]. This research aims to generate a profile of the samples to examine the key factors of green-oriented procurement for building projects by posing some questions, around what they do and what they think. Questions have been formulated based on findings that are derived from the previous stages, the literature review and preliminary interview. In this research, a questionnaire will be developed through three stages- the pre-drafting process, piloting stage and finalising stage. To ensure that the questions will be clearly understood and that there is no ambiguity among them, a pre-test must be conducted (refer figure 3). The survey is a cross-sectional survey since it has taken place at a single point in time.

The questionnaire will be self-administered and distributed to the respondents randomly to their office address. Before sending the questionnaire, phone calls are made to identify the actual potential respondents and to seek their agreement. As the world is approaching the 4th Industrial Revolution, the online survey is the most used survey method. The online surveys offer a wider access to potential respondents in various locations and saves resources in term of cost and time. Thus, this research will adopt an online survey to facilitate the data collection process. The sample will be drawn based on a purposive sampling method where the respondents are chosen based on the purpose of the survey. Creswell [8] has stated that “purposive sampling does not produce a sample that is representative of a larger population, but it can be exactly what is needed for certain cases - study of an organisation, community, or some other clearly defined and relatively limited group”. Data will be analysed using statistical analysis software such as the IBM SPSS Statistics.
2.5 Research process
The attached Figure 4 as appendix 1 of this paper shows the proposed three stages of the research process that will be undertaken by this research in order to meet the research aim. Stage 1 is where the information that has been gathered is used to carry out and to establish the theoretical and conceptual framework of the research. The FGD will be conducted to gather first-hand information based on local context from experts and experienced practitioners. Stage 2 will be conducted based on the outcome form stage 1 and the main data collection will be carried out. At this stage, the survey using questionnaire will be employed to reach a larger number of potential respondents. Stage 3 is where the outcome from stage 2 is being analysed and discussed in the analysis and recommendation will be made.

3. Preliminary findings from literature review
This section discussed briefly finding from Stage 1 (information gathering) of the research. The outcome from this stage will be further validated through the methodology proposed under sub-section 2 (research methodology) of this paper.

There are ten (10) possible challenges identified through the literature. The possible challenges are
- Lack of knowledge
- Lack of practical tools and information
- Lack of training for procurement officers
- Lack of awareness on the green procurement concept
- Lack of enforcement by government to implement green procurement
- Insufficient policies and regulation promoting green procurement
- Insufficient research and development on green procurement
- Lack of incentive for companies to implement green procurement
- High cost of green product and services
- Limited supply for green product

Five (5) strategies has been identified based on literature analysis. The possible strategies are
- The availability of policy and guideline on green procurement
- Enhancing awareness among all project stakeholder
- Carrot and stick approach
- Client and top management commitment
- Enhancing capacity building among construction players

![Figure 3. Questionnaire development process](image-url)
In order to enhance the implementation of environmental management in the procurement process, there are four main categories of practices identified.

**Table 2. Green procurement practices**

| Improved process for the green-oriented procurement |
|-----------------------------------------------------|
| 1. Green policies and guidelines                     |
| • Determine common goals in term of green performance |
| • Establish the scope and interpretation of green policies that encourage green adoption |
| 2. Green products and process                        |
| • Selecting materials based on project’s green indicators (incorporate into contract) |
| • Promote waste management                           |
| 3. Environmental evaluation                          |
| • Develop evaluation plan;                           |
| • Integrating monitoring and reporting throughout    |
| 4. Stakeholder values, development capacity and competence |
| • Project briefing, training, Implement and inculcate environmental values, knowledge sharing |

4. Conclusion

Green procurement is an important driver for green projects. Past research has highlighted the need for green procurement to accelerate the production of greener construction and the output. Based on an established approach in research methodology, the way forward for this research has been determined in order to meet the research objectives of this research. The research philosophy will lead to the selection of research strategy and research technique. There will be further investigation in the next phases of this research, which is the conceptual validation through FGD and main data collection using questionnaires. This paper reports on the on-going research project pertaining to the exploration of green procurement potential in the Malaysian construction industry and still at the early stage of the research. Thus, it is hoped that in the future this research, which implements a correct scientific investigative methodology, will be able to generate reliable research outcomes, and thus spearhead the GP practices for construction projects and enhance more research pertaining to GP, under different conditions and contexts.

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Appendix 1

**Figure 4 Research process**

- **Stage 1 Information gathering**
  - Research problem
  - Literature Review
  - Focus Group Discussion (FGD)

- **Stage 2 Main data Collection**
  - Research aim, questions and objectives
  - Research objective 1
    - To identify the current state of readiness of the stakeholders, the challenges and the success factors
  - Develop and pre-test questionnaire
  - Refine and pilot survey
  - Full Scale Data collection

- **Stage 3 Data Analysis and validation**
  - Research objective 2
    - To determine the extent of GP practices in green certified and non-green certified construction projects
  - Research objective 3
    - To determine the important practices of GP for construction projects.