

PROJECT CHARACTERISTICS FOR DESIGN AND BUILD PROCUREMENT IN MALAYSIAN CONSTRUCTION INDUSTRY

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ABSTRACT

Design & Build procurement approach is one of the procurement methods which is known to be widely gaining popularity in order to serve the modern day construction clients desire of having a constructed facility. To effectively service the market-driven expansion of this project delivery strategy in the construction community, a fundamental understanding of the characteristics of the Design & Build procurement approach is necessary. This study is aimed at appraising the Design & Build procurement approach in the Malaysian construction industry based on current practice through identifying the characteristics of the procurement approach. For this purpose, a detailed literature review of the Design & Build characteristics was conducted and data was collected from a two round Delphi questionnaire survey conducted with experienced professionals that have vast experience in the Design & Build procurement practice. The relative importance of these characteristics were quantified by the relative importance index method demonstrating their level of priority. The key findings in the study showed that the practice of the procurement approach in Malaysia is most importantly characterized by the fact that it is most suitable for projects that are complex in nature, while 'effective client representation' is the least important characteristic of the Design & Build procurement approach with regard to the Malaysian construction industry. It is expected that with the consideration of these characteristics of the D&B procurement approach, it will consequently result in the overall improvement in the performance of the Malaysian construction industry in relation to project delivery.

KEYWORDS: *Client; construction; design and build; Delphi survey, Malaysia*

1.0 INTRODUCTION

Design & Build (D&B) can be described as a procurement method where one entity or consortium is contractually responsible for both the design and construction of a project (Ndekugri & Turner, 1994; Akintoye, 1994; Akintoye & Fitzgerald, 1995; Griffith, Knight & King, 2003); while according to Hale & Shrestha, (2009), "D&B could be described as a project delivery method in which the owner provides requirements for the specified project and awards a contract to one company who will both design and build the project".

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The D&B procurement approach had been identified to be rapidly growing and patronized in the global construction industry. This is due to the several benefits that the procurement approach provides over the other procurement approaches, most notably the traditional procurement option, which is characterized by inherent fragmentation which leads to time and cost overruns. D&B procurement approach is different from other procurement approaches; this is due to its advantages of offering single point responsibility, inherent build ability, and also risk allocation (Gransberg, Koch & Molenaar 2006; Seng & Yousof, 2006). With respect to the Malaysian construction industry, D&B procurement approach is also gaining increased popularity; this could be attributed to the inability of the traditional approach to cope with the growing complexities of today's projects (Seng & Yousof, 2006). But then, even with this known increased adoption of the D&B procurement approach in the industry most especially with respect to the public sector projects because of the known advantages that it offers, the procurement approach is still lagging behind in terms of utilization when compared to the traditional procurement approach, and this low utilization covers all aspect of building works adopted in the industry. As Ali, Kamaruzzaman & Salleh (2009) identified, D&B procurement approach covers a mere 25% of all works, with the traditional procurement approach having the majority share, and also as further attested by Abdulrashid, (2002), where he described the utilization of the D&B procurement approach in the Malaysian construction industry to be low, and moreover the procurement approach has failed to effectively satisfy such critical client's expectations in terms of cost, time and also quality (Hashim *et al.*, 2006; Isa, Isnin & Sapeciay 2011). Thereby these identified issues facing the practice of the D&B procurement approach in the Malaysian construction industry could be related to not having a clear understanding of the features that do distinguishes the D&B procurement approach from the other known procurement approaches.

Currently, there is no clear and defined method of selecting appropriate D&B projects in the Malaysian construction industry. Therefore clients and other construction project stakeholders do not have the information necessary to determine which projects are best suited for D&B. This paper suggests that there are certain characteristics that do play important roles toward guiding clients in adopting D&B as their procurement approach of choice towards achieving their need of having a built facility. Thereby, the need to identify and rank such characteristics is generally evident towards giving these project stakeholders a clear understanding of the characteristics inherent in the D&B procurement approach in the Malaysian construction industry.

In view of this, this study is aimed at identifying the characteristics of the D&B procurement approach in the Malaysian construction industry, with a view of providing a clear insight into the specific characteristics that the procurement approach possesses in the order of their importance. By which it is being expected that the improved understanding of these D&B project characteristics in the industry will go a long way in enabling the D&B project stakeholders with an underlying decision strategy with regards to the adoption of the procurement approach for their delivery of construction projects. Thereby resulting to the optimum utilization of the D&B procurement approach in the industry and consequently the overall improvement of the construction industry in Malaysia.

2.0 RELATED RESEARCH ON D&B

As Ling & Liu (2004) noted, the clear identification of the features of the D&B procurement approach is very important towards ensuring the effective execution of a D&B project, the lack of which had been a major factor towards the under utilization of the procurement approach in the Malaysian construction industry, and also the inability of the D&B procurement approach to effectively achieve the client's expectations with regards to time, cost and quality. Therefore it is expected that when the parties to the D&B project clearly understand its characteristics, it is very likely to result to an improved utilization of the procurement approach and moreover be able to achieve the client's expectations in terms of time, cost and produce a D&B project that is of high quality. Several major studies have been conducted on various aspects that contribute to the achievement of effective D&B projects. Some of these studies includes that of Lam, Chan & Chan (2008), where they explored the success factors that enables the delivery of effective D&B projects. Whilst, a comprehensive studies were conducted which investigated the risks involved in the D&B form of project delivery (Ng & Skitmore 2006; Nielsen 1997). However, Xia & Chan (2010) in their survey research, identified the key competencies required for clients involved in D&B.

With respect to the Malaysian practice of D&B, Ramanathan, Narayanan & Idrus (2011) studied on the risk factors that influences time and cost overrun in D&B projects, whereas Isa *et al.*, (2011) evaluated the management of defects in hospital D&B projects. One other study assessed management of contractual disputes in the Malaysian practice of D&B projects (Jasri, 2011). However, given the fact that the effective understanding of the inherent project characteristics in D&B plays an important role in the effective delivery of projects using the procurement approach, this study was initiated as a result of the paucity of any prior studies which looked into the characteristics that serves as the valid criteria to determine the adoption of the D&B procurement approach for the delivery of construction projects in Malaysia. With this study, it is expected to enable the improved utilization of the D&B procurement approach and consequently the effective satisfaction of the client's expectations with regards to the built facility.

3.0 RESEARCH METHODS

As earlier noted, this study analyzes the characteristics of the D&B procurement approach in the Malaysian construction industry. The methodology developed to study this issue includes:

- (1) A comprehensive literature review to derive the list of the characteristics of the D&B procurement approach, and;
- (2) Two rounds of Delphi questionnaire survey were undertaken with experts to assess these characteristics and then to prioritize them in order of their level of agreement in the five point Likert scale.

In this study, the data collection focused on identifying the characteristics of the D&B procurement approach and determining their associated priority rankings with respect to the Malaysian practice of D&B. An exhaustive literature search produced seven D&B features for consideration. These characteristics with regards to the D&B procurement

approach are illustrated in Table 1. To maintain the effectiveness of the literature searching process, an on-line search was undertaken for the past 12 years, and also reputable and effective search engines that were adopted for the search were American Society of Civil Engineers (ASCE), Science Direct, Springer and Emerald and the keywords used includes project characteristics, D&B, and construction. Furthermore, manual search was also conducted to capture other articles and materials that are considered relevant to the development of the literature review.

Table 1: Summary of characteristics of D&B procurement approach from previous literature

Characteristics of D&B procurement approach	Authors
Single point responsibility	Seng & Yousof , (2006); Skitmore & Ng, (2002)
Compressed delivery schedule	Abdulrashid, (2002); Oztas & Okmen, (2004)
Risk allocation	Hassim <i>et., al.</i> (2008); Muhammad, (2005); Beard <i>et., al.</i> (2001)
Complexity	Abdulrashid, (2002); Chan & Yu (2005)
Communication	Chan <i>et., al.</i> (2001); Levy, (2006)
Effective client representation	Lam <i>et., al.</i> (2004); Peterson & Murpheree, (2004)
Facilitates use of latest innovative technologies	Ling, Chong & Ee (2004); Abdulrashid, (2002)

With regards to the data collection technique adopted in the study, the Delphi survey is described as a structured group communication method for soliciting expert opinion about problems or ideas, through the use of a series of questionnaires and controlled feedback (Day & Bobeva, 2005). It is a group process which involves interaction between the researcher and the group of identified respondents who are being considered as experts in the research topic. The interaction between the researcher and these experts is in the form of questionnaires which are administered in the form of rounds, and the technique is useful where the opinions, views and judgments of experts and practitioners are necessary (Youssuf, 2007). Considering the immaturity of D&B as a procurement approach in Malaysia, the Delphi technique will serve as an appropriate consensus reaching method for the research topic in this paper.

3.1 Selection of Panel for the Delphi Survey

Selecting the most appropriate panel for the Delphi survey is considered as an important factor in the survey. This is because the quality and validity of the feedback and the study in general directly depends on the nature of the respondents that constitute the panel (Stone & Busby, 1996). Therefore in this study, as what was practised in previous researches using Delphi survey such as in Xia & Chan, (2010) and Chan *et al.* (2001), the criteria that were used to select the respondents that formed the panel for the Delphi survey includes;

- Sufficient working experience or knowledge regarding the D&B procurement approach in the Malaysian construction industry;
- Cognate experience in relevant organizations that have a direct relationship with the Malaysian construction industry, and lastly;
- Holding senior managerial positions in their respective organizations.

In the Delphi survey, fifteen (15) letters of invitation for the respondents to participate in the first round Delphi survey were distributed, but only 11 respondents agreed to participate. The selected experts represent a wide spectrum of construction industry professionals in Malaysia as they have showed to have an established knowledge of the Malaysian construction industry; this is aimed at giving the Delphi survey a high level of credibility. These construction industry professionals involved in the Delphi survey includes property developers, construction contractors, design consultants, supervisors from the government public works department and academic researchers who all have vast knowledge of the D&B procurement practice in Malaysia.

Out of the eleven respondents that participated in the survey, six belonged to the public sector, while the remaining five are employees of private sector all involved in the adoption of the D&B procurement approach in the delivery of construction projects. Additionally and importantly, these respondents all were identified as having extensive knowledge and experience of the D&B procurement approach as practiced in the Malaysian construction industry as the respondents all have a minimum of five years experience in the implementation of D&B in the construction industry and occupy upper middle or senior management positions in their respective organizations.

4.0 RESULTS AND ANALYSIS

In the Delphi survey conducted in this study, the respondents were asked in the Delphi first round to rate the level of their agreement to the characteristics of D&B on a five point Likert scaling, ranging from 5 = strongly agree and 1 = strongly disagree. Then in the second round Delphi, the results obtained from the first round were presented and the respondents were further asked to confirm or reconsider their ratings. In the second round Delphi, only seven respondents agreed to participate, as against eleven in the Delphi first round, thereby indicating a drop of four respondents. However, this drop in the number of the respondents does not in any way affect the validity of the survey as the number of the respondents is still within the acceptable range of 7-12 as suggested by Phillips (2000). Table 2 shows the responses provided by the experts in the two

rounds of the Delphi surveys with respect to identifying the characteristics of D&B procurement approach in the Malaysian construction industry.

Table 2: Frequency of expert’s response to Delphi surveys

Frequency Of Experts Response						
Delphi Rounds	Characteristics Of D&B Approach	Strongly Agree	Agree	Unsure/ Uncertain	Disagree	Strongly Disagree
Round 1	Single point responsibility	6	4	1	0	0
Round 2	Single point responsibility	6	1	0	0	0
Round 1	Compressed delivery schedule	1	9	0	1	0
Round 2	Compressed delivery schedule	1	6	0	0	0
Round 1	Fair allocation of risk	3	8	0	0	0
Round 2	Fair allocation of risk	1	6	0	0	0
Round 1	Suitable for complex projects	10	0	0	1	0
Round 2	Suitable for complex projects	7	0	0	0	0
Round 1	Enhanced communication	1	7	3	0	0
Round 2	Enhanced communication	2	5	0	0	0
Round 1	Facilitates use of latest innovative technologies	11	0	0	0	0
Round 2	Facilitates use of latest innovative technologies	6	0	1	0	0
Round 1	Effective client representation	4	7	0	0	0
Round 2	Effective client representation	1	5	1	0	0

4.1 Ranking of the Characteristics of D&B Procurement Approach

The ratings that were provided by the Delphi respondents in the round two of the survey using the five point Likert scale were analyzed and presented in form of relative importance indices for each of the characteristics, by adopting the relative importance index (RII) ranking technique using equation 1. Table 3 below displays the ranking of the characteristics of the D&B procurement approach.

$$RII = \sum W / (A * N) \tag{1}$$

where:

W = Summation of the weighting to each characteristic

A = Highest ranking (5)

N = Total number of respondents for that characteristic

Table 3: Ranking of the characteristics of D&B procurement approach

Characteristics of D&B procurement approach	Relative Importance Index (RII)	Ranking
Suitable for complex projects	1.00	1
Single point responsibility	0.97	2
Facilitates use of latest innovative technologies	0.94	3
Enhanced communication	0.86	4
Fair allocation of risk	0.83	5
Compressed delivery schedule	0.83	5
Effective client representation	0.80	6

Table 3 shows that the characteristic of the D&B procurement approach ‘Suitable for complex projects’ has the highest RII and consequently the first in ranking. This ranking is a clear attestation to the fact identified by Abdulrashid, (2002), where he relates the growing adoption of D&B as a project delivery approach in the Malaysian construction industry to the nature of today’s construction projects, which are becoming complex in nature and also the concern of clients to have project delivery methods that attends to their complex needs and requirements.

In the second position, there is the characteristic ‘single point responsibility’. This ranking as attested by the respondents is consistent with the underlying principle which the D&B procurement approach is based on, which makes the contractor to be liable for both the design and construction responsibilities of the project. With this, it enables the client to have a single point of responsibility and liability against the contractor, consequently making the D&B contractor completely liable for the performance of the completed project (Seng *et al.*, 2006). This feature of the D&B offers more advantage to the client than in the traditional forms of contract where the client enters into separate construction and design agreements for the delivery of the project.

‘Facilitates the use of latest innovative technologies’ was rated as the third most important characteristic of the D&B. This finding as it pertains to the characteristics of D&B relates to one of the main advantages that the D&B procurement approach offers, that is with regards to constructability and innovation. The D&B procurement approach encourages the adoption of latest building techniques which enables faster delivery of projects. Such latest technological processes that are commonly adopted in the D&B

project delivery includes the use of industrialized building systems and latest project management techniques (Songer & Molenaar 1997).

Furthermore according to the table, 'enhanced communication' was rated as the fourth in ranking; whilst 'fair allocation of risk' and 'compressed delivery schedule' are both tied in the fifth position. Then the last ranking characteristic is 'effective client representation' which occupies the sixth position, consequently regarding this feature as the least prominent characteristic of the D&B procurement approach in the Malaysian construction industry.

5.0 CONCLUSION

In this study, seven characteristics of the D&B procurement approach in the Malaysian construction industry were identified, where these characteristics were further ranked by the use of the RII. The rankings showed that '*suitability for complex projects*' is considered the most important, while '*effective client representation*' the least important characteristic of the D&B procurement approach with regard to the Malaysian construction industry. From the findings indicated in the study, it could be deduced that construction clients in Malaysia are majorly adopting the D&B over the conventional traditional procurement approach as a result of the growing complex nature of today's construction projects. And moreover, the findings indicates that the clients do not consider the D&B characteristic '*effective client representation*' as an important factor in their choice of the D&B to deliver their construction projects.

These findings as identified in the rankings is expected to enable D&B clients, contractors and other stakeholders to have a clear idea of the features that characterizes the D&B procurement approach in the Malaysian construction industry. Thereby offering the clients and contractors a clear rationale for adopting a more robust D&B as their procurement approach of choice for delivering their construction projects. Moreover, these findings would enhance the achievement of successful construction projects based on the knowledge that certain characteristics that are key to the D&B procurement practice are currently not achieving their advantage as compared to the traditional or other procurement practices. However, with respect to these findings arising from the studies, it is recommended that these stakeholders involved in the Malaysian practice of D&B align their respective resources and skills along these identified rankings of the D&B characteristics, as this will ensure the improved delivery of projects through the D&B procurement approach.

Furthermore in this regard, suggestions could be made on how this study could be improved as it pertains to the D&B procurement approach. With respect to this, a further study that comprises of a larger Delphi panel would be appropriate. Within such Delphi survey comprising of a larger panel, additionally more insightful views and opinions could be obtained with regards to the characteristics of the D&B procurement approach. Furthermore, another suggestion for further studies could be conducting a similar study on D&B characteristics in other geographical locations in order to determine their differences and similarities with regards to the characteristics of the D&B procurement approach for comparisons. Such study would go a long way in enhancing the use of the D&B procurement approach in the construction industry globally.

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