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Criteria For Selection Of Design And Build Procurement Method

Abstract

One of the causes of poor project performance (PP) is the use of inappropriate procurement method (PM). Whilst employing an appropriate method is considered to result in project success, limited research has so far been conducted to empirically explore this relationship. Although, a lot of studies have been done with a view to develop models/tools for aiding the selection process, there are very less work which research investigated the influence of procurement methods on project performance. This paper presents a conceptual framework that demonstrates the existence of this influence. The framework is developed based on an extensive review of literature. The review was carried out to determine the main criteria for selecting Design and Build procurement method (DB) and project performance measurements. Thirteen (13) DB procurement selection criteria commonly cited in the literature were identified. A review of how each of these criterion suits the use of DB method was also carried out. The latter review was to facilitate ranking of each of the criterion on a rating scale for purposes of predicting the actual level of influence a particular procurement method exerts on performance of a project. Besides offering a deeper understanding of PM relationships with PP, the proposed conceptual framework forms a basis for the development of the quantitative model at subsequent stages of the on-going study.

Keywords: *Construction procurement methods, Design and build procurement method, Procurement selection criteria, Project performance*

INTRODUCTION

Many researchers including for example Love *et al.* (2012) and Francom *et al.* (2014) indicated that, the term ‘construction procurement method’ has been given different definitions in the literature. For instance, Chan (2007) defined it as the system that represents the organizational structure adopted by clients for the implementation of project processes and eventual operation of the project. On the other hand, Molenaar *et al.* (2009) defined procurement method as a comprehensive process by which designers, constructors and various consultants provide services for design and construction to deliver a complete project to the client. As this definition suggests, a wide range of processes are involved in a procurement strategy. These processes are often interrelated and sequential in nature and their effectiveness and efficiency have considerable impact on the success or failure of projects.

Not only are modern construction and engineering projects characterized by high complexity and uncertainties (Gidado, 1996; Wardani *et al.*, 2006), they are also increasingly subjected to stringent project performance requirements by clients. Such demands typically call for projects to be delivered under limited resources, at low cost, in short duration and to a high level of quality and safety standard (Love *et al.*, 1998). These requirements have often been difficult to meet in most projects with the results being, significant project delays, cost overruns, loss of reputation, extensive disputes and litigation between parties. The traditional approach to procuring projects, commonly known as Design-Bid-Build (DBB), has often been blamed for such unfortunate consequences (Love *et al.*, 1998; Rwelamila and Edries, 2007), largely due to its inability to meet changing clients’ needs and increased complexity of the interactions in technical, economic and multi-organizational participation at play in modern project execution (Mohsini *et al.*, 1995). The need to deal with this problem has resulted in a wide variety of procurement methods (Love *et al.*, 2012), with the most common types including Design and Build, Management Contracting, Construction Management, Project Finance Initiative and Partnering. These types of procurement methods differ from each other in terms of allocation of responsibilities, activities sequencing, process and procedure, and organizational approach in project delivery (Abdul Rashid *et al.*, 2006; Alhazmi and McCaffer, 2000). The complex nature of procurement selection and their subsequent management, therefore pose great difficulties to clients and any failure to rise up to this challenge has often resulted in poor project performance. Such consequences have long been recognized by a number of researchers (Mohsini and Davidson, 1991; Molenaar *et al.*, 2009). Various attempts have thus been made by researchers over the years towards addressing these procurement issues.

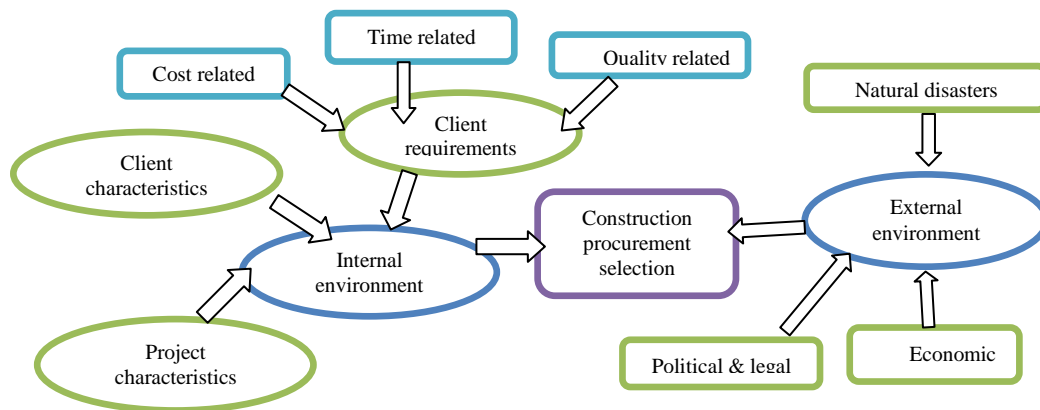
The studies done so far can be put into three categories. The first category involves studies that compare existing procurement methods in a bid to find out their efficiencies as used in practice (see for e.g. Mohsini, *et al.*, 1995; wardani, *et al.*, 2006). The second category involves research carried out to identify the criteria or factors that determine the right procurement method to use (for e.g. Alhazimi and McCaffer, 2000, Luu *et al.*, 2003 and Hashim *et al.*, 2008). The third category of the studies, focus on using these criteria to develop models by which clients can employ to select the most suitable procurement method. For instance, Chan (2007) developed a procurement selection model called fuzzy procurement selection model. It is a mathematical rank

model that is adaptable to local circumstances. Alhazmi and McCaffer (2000) proposed a model called Project Procurement System Selection Model (PPSSM) for assisting government agencies in Saudi Arabia to select the most appropriate procurement method. The model consists of four screening levels to be followed in selection process: feasibility ranking, evaluation by comparison, weighted evaluation and analytic hierarchy processes. Based on a Delphi study, a multi-attribute decision analysis was used to develop a procurement selection model by Chan *et al.* (2001). Luu *et al.* (2003) developed a procurement selection model based on case-based reasoning (CBR) approach. The suitability of CBR approaches was subsequently examined in a study by Luu *et al.* (2005), who indicated that the approach has the potential to ensure high quality decisions on procurement selection. The approach was also found to deal effectively with variability in the characteristics of the clients, project and extreme environment.

However, there seems to be very less research reported in the literature which has looked at the influence of procurement selection criteria on project performance, although such criteria are known to contribute to project success. Such information will be of invaluable benefit to the clients, that is, helping them to understand the aspects of procurement methods or the criteria they need to concentrate on to improve project performance. As a contribution in this direction, this paper reports a conceptual framework developed as a part of a wider on-going study aimed at developing a model on the relationship between the criteria of selection of DB procurement method and project performance criteria (time, cost and quality). The framework developed, based on the extensive review of literature, not only seeks to establish the basis of the relationship between these criteria, but also aims to serve as the basis for developing a quantitative model (at later stage of the study) for establishing the exact nature and level of the influence PMs exerts on PP.

CONSTRUCTION PROCUREMENT SELECTION

As highlighted in the previous section, the numerous PMs available, coupled with their individual unique features, have made clients' decisions to choose the appropriate method for any given project, a complex task to grapple with. Such challenges have largely resulted in the need to conduct a selection process in a disciplined and systematic manner. Various factors have to be taken into consideration before any informed decision can be made on the right choice of PM. The factors can be classified into external and internal factors (Love *et al.*, 1998; Luu, and Chen, 2005), as presented in *Fig. 1* (Ratnasabapathy *et al.*, 2006). The figure shows how the factors relate and interrelate with each other. It explains how the task involved in selecting the right PM can be extremely complex and difficult to unravel. The nature of the selection process therefore calls for the employment of sound systematic procedures by clients. Such an approach is likely to yield the best procurement method that best meets the needs of a particular type of work (Ali *et al.*, 2011).



Source : Ratnasabapathy *et al.*, 2006

Figure 1 : Factor Effecting Selection Of A Procurement Method

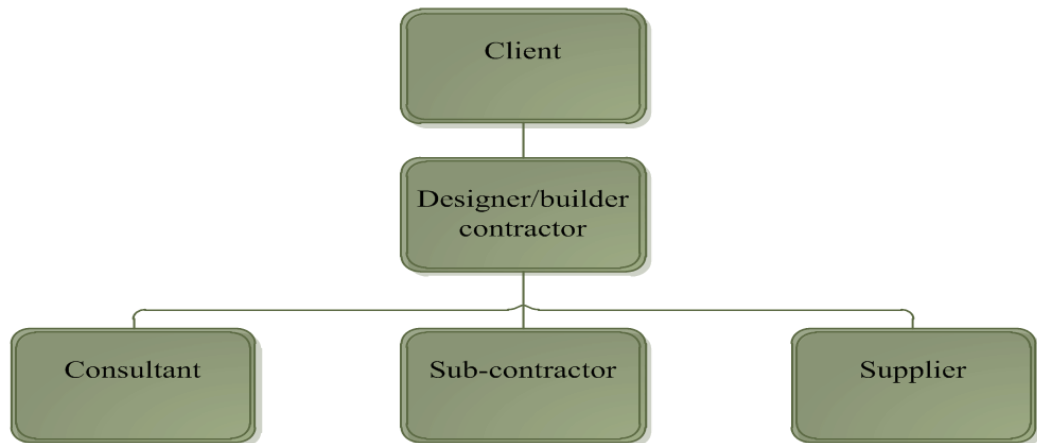
Choosing an appropriate PM entails identifying the right selection criteria, which are informed by these factors, and then assessing their level of compatibility with the features or characteristics of the project to be delivered (Love *et al.*, 1998; Rwelamila and Edries, 2007). According to Love *et al.* (2008), the selection process can be narrowed down into two main components: (i) analysing and establishing priorities for project objectives and client attitudes to risk; and (ii) considering possible options, evaluating them and finally selecting the most appropriate option. The accuracy and clarity of the client's requirements and needs are crucial ingredients here. Hence, selecting a PM involves a key set of decisions which must be planned for and which require the participation of high-level decision makers. The nature of the selection process therefore calls for employment of sound systematic procedures by clients. This approach involves relying on a number of existing PM selection techniques/models (Alkhalil, 2002; Chan, 2007; Chan, *et al.*, 2001) to arrive at the best PM that meets the needs of the particular project (Ali, *et al.*, 2011).

Since there are a wide range of factors that could count as a criteria for selecting a PM, it was deemed appropriate for this study to identify the most common criteria reported in the literature from past research studies, through an extensive literature review. Critical review of the literature suggests total 13 criteria which are commonly cited (refer *Table 1*) and are suitable for selecting Design and Build procurement method. Many of the past studies, including those listed in *Table 1*, have highlighted the importance of relying on these criteria to rightly select the most appropriate PM, if increased satisfaction with PP is to be ensured. These criteria thus represent the most current criteria that are of relevance to Design and Build procurement selection and for which the researchers are involved in further development of the selection process.

DB Procurement Method

DB method of procurement has been used in the industry throughout the world extensively for many years (Minchin *et al.*, 2013; Turina *et al.*, 2008; Seng and Yusof, 2006). It is considered as one of the most favored project delivery methods in the engineering construction industry (Minchin *et al.*, 2013; Ibbs *et al.*, 2003). It has gained its popularity from its time and cost saving reputation, reduced conflicts and enhanced communication between project participants (Minchin *et al.*, 2013). DB is classified as one of the integrated forms of procurement methods, whereby the client provides his/her requirements and needs for the specified project and signs contract with

only one organization, namely the contractor. This organization is responsible for the design, supervision and construction services of the project as *Fig. 2* below depicts (Seng and Yusof, 2006).



Source: Seng and Yusof (2006)

Figure 2 : Project Organisation Structure For DB Method

The circumstances in which this method is generally considered appropriate include the following is:

- The client not familiar with the construction process.
- The project is technically complex.
- There is a low likelihood of variations to the project.
- The client desires a single point of responsibility.
- The employer desires a quick start to work on site.
- The client desires to prioritize either – time, quality, price or value for money etc.
- The client desires an opportunity for effective direct communication/interaction with contractors.
- The client desires an integration of the design and construction process.

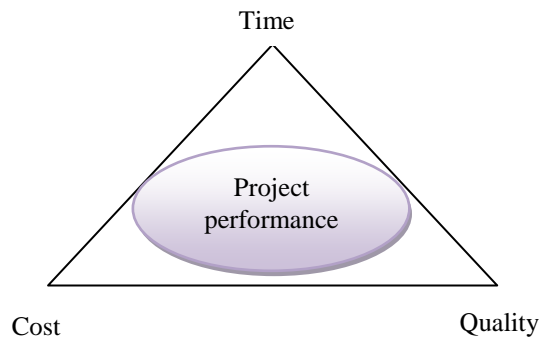
Table 1 : Criteria For Selecting DB Procurement Method

DB procurement criteria	Quick delivery of construction process	Quick project commencement	Effective communication between project parties	Flexibility in design and construction changes	Single point of responsibility	Less conflicts amongst project parties	Complexity of design	Transfer of risks to the contractor	Desiring reduced project cost	Desiring reduced project time	Level of competence and experienced contractor	Collaborative working relationship between project team	Desiring efficient project plan
Authors													
Hashim <i>et al.</i> , 2008								✓	✓	✓			
Seng and Yusof, 2006	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Al Khalil, 2002					✓								
Cheung <i>et al.</i> , 2001	✓				✓			✓					
Edmond <i>et al.</i> , 2008													
Chan <i>et al.</i> , 2001					✓		✓	✓			✓		
Alhazmi and McCaffer, 2000													
Abdul Rashid <i>et al.</i> , 2006					✓								
Mohsini and Davidson, 1991			✓										
Pramen <i>et al.</i> , 2012	✓	✓					✓				✓		
Adnan <i>et al.</i> , 2012	✓				✓		✓				✓		
Natkin, 1994			✓			✓							
Park <i>et al.</i> , 2009			✓			✓	✓						
Gould, 2005			✓										
Lee, 2007						✓	✓						
Mante <i>et al.</i> , 2012						✓							
Ola <i>et al.</i> , 2006								✓					
Koncher and Sanvido, 1998							✓						
Ndekkugri and Turner, 1994						✓							
Palaneeswaran and Kumaraswamy, 2000				✓	✓	✓			✓	✓			
Songer and Molenaar, 1997							✓						

Kamal and Hindle, 2000							✓							
Turina <i>et al.</i> , 2008			✓	✓					✓			✓		
Albert, 2000									✓	✓		✓		
Tooky <i>et al.</i> , 2001					✓				✓					
Parkins, 2009				✓					✓	✓				
Darren <i>et al.</i> 2009														
Eriksson and Westerberg, 2011									✓					
Mahdi and Alreshaid, 2005														
Thomas <i>et al.</i> , 2002	✓			✓										
Skimore and Marsden, 1988	✓				✓			✓						
Eriksson and Westerberg, 2012		✓							✓	✓				
Murdoch and Hugh, 2008		✓												
Shapiro, 2013		✓			✓				✓	✓				
Pinto and Slevin, 1998			✓									✓		
Songer and Molenaar, 2011									✓	✓				
Molenaar and Songer, 1998									✓					
Ness, 2012							✓							
Guld, 2005			✓											
Albert, 2000	✓				✓									
Gehrig, 2009					✓	✓					✓			
Terril, 1998					✓				✓					
Ola <i>et al.</i> , 2006									✓					
Gibson and Walewski, 2001		✓												
Total	7	6	8	5	13	9	9	8	12	9	5	3	1	

PROJECT PERFORMANCE CRITERIA

Traditionally, a project is considered to have achieved a high level of performance if it is delivered at the right time, right price and good quality level. It should also provide the client with a high level of satisfaction. Bryde and Brown (2004) concluded that the traditional distinction between good and at poor project performance focused on the meeting of cost, time and product quality-related criteria. These criteria have been described as the iron triangle of project performance. *Fig. 3* shows the iron triangle as adopted by Atkinson (1999).



Source: Atkinson, 1999

Figure 3 : Project Performance Criteria Trade-Off Triangle

The project success is usually measured differently from the perspectives of different parties. Jing *et al.* (2010) compared success criteria as measured by contractors and clients and found out that clients put more emphasis on satisfying the needs of other stakeholders, while contractors emphasize on minimizing project cost and duration. They also found that all project stakeholders put products satisfying owner's needs as the first criteria.

In last decades, several researchers within the multidimensional construct of project performance have proposed different criteria or indicators based on empirical research. While some focused on using these measures as strategic weapons, others emphasized the proper delineation of the measures and groupings into classes that will make tracking and management reasonable. Most of the studies (for example, Bassioni *et al.*, 2004; Jin *et al.*, 2007; Cheung *et al.*, 2004) agree that project performance can be measured and evaluated using a large number of performance indicators or criteria but time, cost and quality appear to be the three commonly preferred performance evaluation dimensions.

A CONCEPTUAL FRAMEWORK

The premise underlying this study is based on the principle espoused in literature that the best procurement method chosen for a project, based on the right procurement selection criteria, would result in successful project performance (Molenaar *et al.*, 1998; Thomas *et al.*, 2002). In other words, the level of project success to be expected depends on how suitable the procurement method used for that project was (Molenaar *et al.*, 1998). It thus follows from this hypothesis that a relationship exists between the extent to which the selection criteria of a given procurement method are compatible or suitable (for the characteristics and requirements of a project) and the performance outcomes of that project. Establishing such relationship in detail

would thus offer vital insights into procurement method selection, such as, knowledge of which selection criterion contributes significantly to improved project performance and for that matter deserves more attention during the selection process. As an initial step towards exploring this relationship, a conceptual framework (Fig. 4) was first established to demonstrate the relationship between the research variables involved.

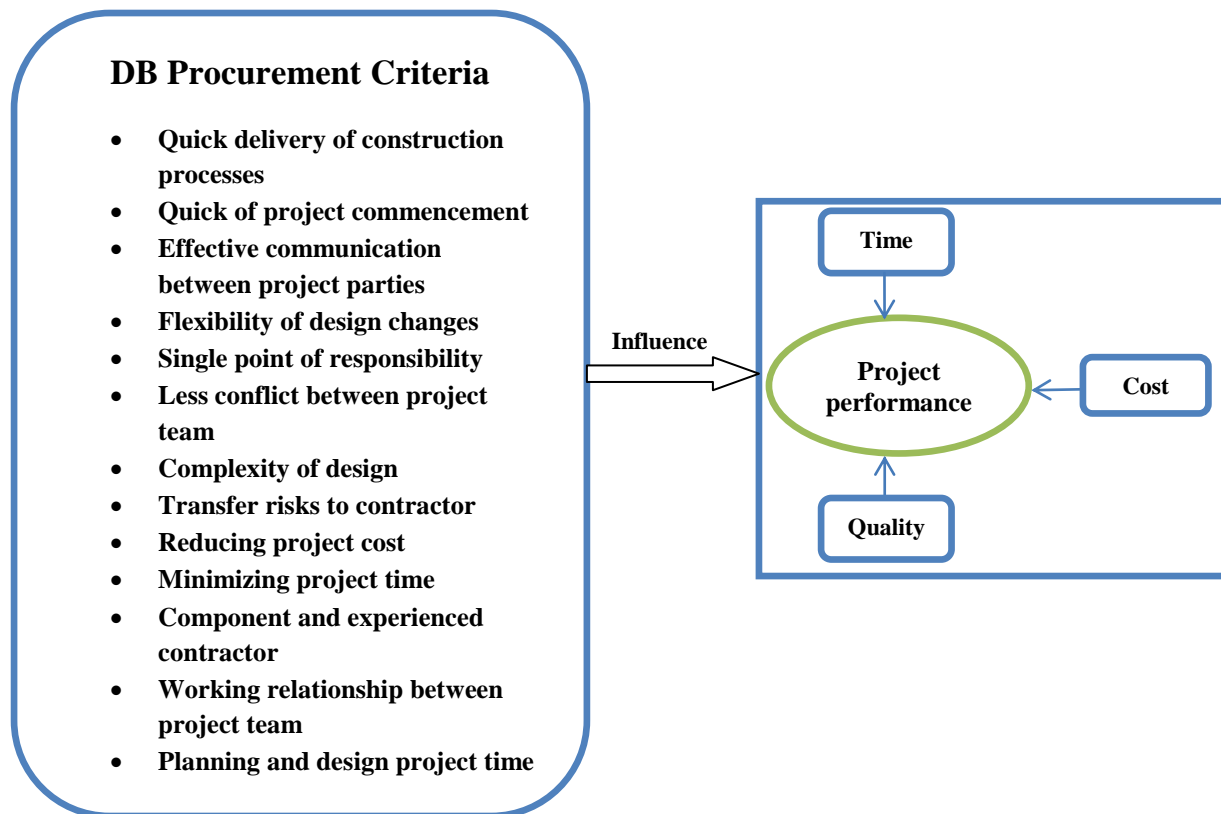


Figure 4 : Conceptual Framework Of Construction Procurement Influence On Project Performance

As indicated in Fig. 4, the independent variables of the study are represented by DB procurement selection criteria, whilst project performance outcomes (time, cost and quality) form the dependent variables. Review of the literature suggests that all selection criteria emanate from two main groups of factors, external and internal environmental factors as highlighted in Section 2 (Refer Fig.1).

It was noted previously that an important step in the selection of an appropriate PM involves defining and prioritizing client’s requirements and project objectives. This is followed by setting out selection criteria that will be used to determine the right PM. These criteria are defined as “the set of project specific requirements that weigh high in level of suitability when measured against procurement methods” (Thanh *et al.*, 2003).

Following the identification of the most commented upon criteria for selection of DB procurement method in the literature, the next important review that followed relates to a discussion (based on critical review of the literature) on what these selection criteria entails. The

aim of this discussion is to specifically establish the theoretical relationship that exists between DB selection criteria and PP, and to also identify the variables that could be used to operationalise or conceptualize these criteria. The criteria for selecting DB methods have been discussed as follows:

Quick Delivery Of Construction Process

This refers to the need to complete a project more quickly than other projects of similar circumstances.. One of the most common project demands of clients is to fast-track the project delivery process through overlapping design and construction processes in order to avoid any delays (Bogus *et al.*, 2005). This criterion can thus be defined as the speed of the construction process needed to complete the project within the planned time or before (Albert, 2000; Chan, 2001; Seng and Yusof, 2006; Thomas *et al.*, 2002). This criterion has been confirmed by many authors as being a significant factor for selecting DB method (Rowlinson and McDermott, 1999; Skitmore and Marsden, 1988). Holt *et al.* (1998) also concluded that DB procurement method is often used when there is a pressure for early completion of the project. One of the main reasons is that DB involves only one single procurement phase for carrying out design and construction work, which in itself creates substantial time savings for projects.

Therefore, that the first hypothesis is:

H1: Quick delivery of construction process has a positive effect on the performance of the project.

Quick Project Commencement

In some circumstances, clients prefer projects to start early for obvious economic, business or political reasons. This can be achieved by relying on DB procurement method, as this approach allows for construction to start before the design is completed, which increases the possibility of achieving good performance in terms of time (Edmond *et al.*, 2008; Love *et al.*, 1998). Quick project commencement is thus one of the defining features of DB project delivery and it has always been a key reason for selecting DB method (Song and Yusof, 2006). This criterion therefore represents the extent to which the actual construction work of the project is able to begin whilst the design plans and specifications are still developing and incomplete (Eriksson and Westerberg, 2011; Gibson and Walewski, 2001; Molenaar and Songer, 1998; Seng and Yusof, 2006). It was thus operationalized based on the extent to which the client preferred early commencement of the project.

Therefore, we hypothesize that:

H2: Quick project commencement has a positive effect on the performance of the project.

Effective Communication Between Project Parties

Effective cooperation and communication amongst project parties contributes positively to project success, and has thus been regarded as one of the major criteria for selecting DB method (Mohsini and Davidson 1991; Seng and Yusof, 2006). This criterion was operationalized on the basis of the extent to which project parties' members (client, contractor and consultant)

communicate effectively during the design and construction stages of the project (Edmond *et al.*, 2008; Mohsini and Davidson 1991; Seng and Yusof, 2006). Using DB procurement method to deliver projects enables a design and construction process to overlap, which normally facilitates communication between the client and contractor, through, for example, the direct and close interrelationship that must be exhibited by the parties (Gould, 2005; Pinto and Slevin, 1998).

Therefore, we hypothesize that:

H3. Effective communication between project parties has a positive effect on the performance of the project.

Flexibility In Design And Construction Changes

Flexibility in design and construction changes is particularly necessary for large and complex projects wherein their exact requirements are often difficult to establish carefully before tendering (Thomas *et al.*, 2002). This criterion represents the ability to accommodate changes during both design and construction stages. Changes (or variations) are amongst the main factors that negatively impact on PP (Hanna *et al.*, 1999; Ratnasabapathy *et al.*, 2006). The extent of impact is a function of how flexible the changes could be effected or accommodated, which mainly depends on stage of the project, size and complexity of the project (Thomas *et al.*, 2002). For instance, changes implemented during construction are often more costly than those executed during design stages (Perkins, 2009). As DB method integrates design and construction phases with no clear separation between them, it tends to offer more flexibility to changes than other procurement methods such as traditional procurement method (DBB) (Thomas *et al.*, 2002).

Therefore, we hypothesize that:

H4: Flexibility in design and construction changes has a positive effect on the performance of the project.

Single Point Of Reasonability

This criterion has a great impact on PP (Seng and Yousf, 2006), and is considered to be a significant determinant of DB selection (Adnan *et al.*, 2012). This characteristic feature of the DB method allows the project to be carried out without any mediating consultants, leaving the central contractual relation as one between the client and the contractor (Abdul Rashid *et al.*, 2006; Chan *et al.*, 2001; Cheung *et al.*, 2001; Seng and Yusof, 2006). This criterion thus represents the extent to which a single organization is able to assume the required responsibility of both project design and construction duties. According to Gehrig (2009), an important driving force behind this criterion in DB selection lies in the fact that the overall project delivery responsibility rests with a single organization, which avoids the inconveniences clients tend to suffer for being in contract with many organizations. By virtue of such arrangement, clients are able to not only draft contracts that guarantee performance from contractor, but also to resolve disputes relatively easier than would otherwise have been the case involving many parties (Gehrig, 2009). Further, DB method provides incentive to the contractor to keep the client's

costs to minimum in the event of unforeseen circumstances (Abdul Rashid *et al.*, 2006; Seng and Yusof, 2006).

Therefore, we hypothesize that:

H5: Single point of responsibility has a positive effect on the performance of the project.

Less Conflict Amongst Project Team

Reducing the level of conflicts amongst project team is a key factor responsible for project success (Mante *et al.*, 2012; Natkin, 1994; Park *et al.*, 2009; Seng and Yusof, 2006). Conflicts can be defined as a state of opposition between project participants' interests and ideas (Ness, 2012). Construction projects are often undertaken by parties of different disciplines and organizations, with different project priorities. Each has their own expertise and interests, yet their inputs are interdependent, which therefore produces conflicting views between project participants (Ness, 2012). A significant feature of DB method is its ability to reduce the level of such conflicts (Mante *et al.*, 2012; Ndekugri and Turner, 1994; Seng and Yusof, 2006). One of the main reasons for this is the fact that DB method integrates design and construction processes, whereby the different teams involved are able to work in the spirit of teamwork. This arrangement enhances effective communication, coordination and collaboration amongst project team members, which are all critical to reduce the conflicts and disputes (Seng and Yusof, 2006).

Therefore, we hypothesize that:

H6: Less conflicts amongst project team has a positive effect on the performance of the project.

Complexity Of Design

Project design is often characterized by complex processes, creating uncertainties and therefore difficulties in achieving good project performance (Naoum and Mustapha, 1994). A key feature of complexity is high interdependency between project activities, which require among others, a central coordinating unit for dealing with the issues involved (Mohsini *et al.*, 1995). This criterion thus represents the ability of the procurement method to facilitate complex design projects (Molenaar and Songer, 1998; Park *et al.*, 2009; Thomas *et al.*, 2002). It is often considered while selecting DB. For instance, according to Konchar and Sanvido (1998) and Seng and Yusof (2006) projects with greater complexity may call for the use of DB method as the DB method is relatively appropriate for dealing with large and complex projects in terms of design due to its ability to facilitate early collaboration between design and construction disciplines. This collaboration minimizes design errors, which are a major source of change to the construction contract (Perkins, 2009) and hence a source of poor project performance.

Therefore, we hypothesize that:

H7: Complexity of design has a positive effect on the performance of the project.

Transfer Of Risks To The Contractor

This criterion represents the degree to which the project risks transferred to the contractor were fairly allocated by the contract (Thomas *et al.*, 2002). According to a number of studies (e.g., Seng and Yusof, 2006; Cheung *et al.*, 2001; Ola *et al.*, 2006), the DB method offers

opportunities for clients to transfer most of the project risks to the contractor than any other construction procurement. Therefore, the ability to transfer risks to the contractor remains one of the significant reasons for clients to choose DB method. As the DB method offers single point of responsibility, project risks (within both design and construction) are easily transferable to the contractor.

Therefore, we hypothesize that:

H8. Transfer of risks to the contractor has a positive effect on the performance of the project.

Desiring Reduced Project Cost

DB is often used because it provides better value for money (Eriksson and Westerberg, 2011; Molenaar and Songer, 1998), reducing project cost by overlapping the design and construction processes (Seng and Yusof, 2006; Tooky *et al.*, 2001; Turina *et al.*, 2008), which explains why this criterion is often considered when selecting the DB procurement. This criterion was operationalized as the extent to which clients were keen to ensure the reduction in the project cost. The design team typically works closely with the construction team, which increases the level of cooperation and communication, thereby allowing for quick identification and correction of any errors in the design and/or construction.

Therefore, we hypothesis that:

H9: Desiring reduced project cost has a positive effect on the performance of the project.

Desiring Reduced Project Duration

Reducing the duration of a project has a significant positive influence on PP (Gehrig, 2009; Tooky *et al.*, 2001). Saving project time is one of the major client priorities and thus is an often considered factor in PM selection. This criterion was operationalized on the basis of the extent to which a client desires to finish the project by an earlier completion date or in shorter project duration. According to Seng and Yusof (2006), the DB approach is a project delivery strategy that is famous for reducing project duration. This desirable feature of the DB method largely results from the integration of the design and construction process, which helps the contractor to manage, organise and accelerate construction work to finish the project early (Eriksson and Westerberg, 2011; Songer and Molenaar, 2011).

Therefore, we hypothesize that:

H10: Desiring reduced project duration has a positive effect on the performance of the project

Level Of Competence And Experience Of Contractor

Contractors' level of experience and skills determine how accurately they interpret and implement designs during construction (Pinto and Slevin, 1998; Seng and Yusof, 2006). According to Pramen *et al.* (2012), such skills and experience form a significant factor considered in the selection of DB method. This can be explained by the fact that DB procurement strategy often requires contractors who are highly experienced and efficient in

managing the design and construction processes effectively. This criterion thus represents the level of skills and experience of contractors required to manage and control projects efficiently (Adnan *et al.*, 2012; Pinto and Slevin, 1998; Seng and Yusof, 2006).

Therefore, we hypothesize that:

H11: The level of competence has a positive effect on the performance of the project.

Collaborative Working Relationship Between Project Teams

Integration of the design and construction works through DB method helps to improve the communication and collaboration among the project team members (Turina *et al.*, 2008). This criterion represents the extent to which the team members are able to collaborate with each other on work execution (Seng and Yusof, 2006; Turina *et al.*, 2008). According to Seng and Yusof (2006) and Albert (2000), good relationships among project team members are nurtured as a result of this arrangement, making this criterion an important factor in DB selection.

Therefore, we hypothesize that:

H12: Desiring reduced project cost has a positive effect on the performance of the project.

Desiring Efficient Project Planning

Various studies suggest that client' objectives in construction projects can be better achieved through improving the efficiency of the construction planning process (Faniran *et al.*, 1994, Naoum *et al.*, 2004; Gidado, 2004). Earlier studies have established that construction planning efforts are influenced by organisational characteristics of construction firms (Kabasakal *et al.*, 1989; Gidado, 2004). These organisational features are directly influenced by the procurement methods used, with DB likely to promote more efficient construction planning being a more collaborative arrangements for planning, design and construction works (Edmond *et al.*, 2008; Eriksson and Westerberg, 2011). This criterion thus represents the extent to which the client is desirous of ensuring that the effective planning is achieved (Asley, 1994; Pinto and Slevin 1998). Past studies on procurement showed that DB is likely to result in more efficient construction planning due to its collaborative working style, wherein the designer and the contractor can work closely together to meet the construction plan (Edmond *et al.*, 2008; Eriksson and Westerberg, 2011).

Therefore, we hypothesize that:

H13: Desiring efficient project planning has a positive effect on the performance of the project.

The thirteen criteria reviewed so far will represent the main variables (independent) in the model to be developed in future by the ongoing wider study. In this further work, each criterion will first be assigned weightage based on its suitability in the selection of a particular PM, and then aggregated (using regression or other relevant tool, as appropriate) to indicate which of these criteria makes a significant contribution to the optimum selection of a PM, and hence project performance.

CONCLUSION

This paper is part of an on-going research aimed at investigating the relationship between the procurement selection criteria and the key project performance outcomes (Time, Cost and Quality). It highlights the development of a conceptual framework to identify how the criteria for the selection of DB method influences project performance, which seeks to offer a deeper understanding of this subject matter. Such a framework has potential benefits to clients, as it could guide them to identify the selection criteria that have relationship with project performance, and hence employ the criteria in their DB method selection process, if project success is to be achieved. The aspect of the study reported here explores the influence that Design and Build procurement selection criteria has on project performance outcomes. The framework was developed based on an intensive literature review, which was used to identify various procurement selection criteria and the suitability of Design and Build method as far as each criterion is concerned. From the literature, thirteen (13) procurement selection criteria were identified as the most commonly cited criteria. The ways in which each of these criteria are adapted for Design and Build have been explored and the ratings facilitated by a scale to predict the actual level of influence a particular PM exerts on the performance of a project were described.

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