COMPETENCY-DRIVEN BENEFITS REALIZATION MODEL FOR MINIMIZATION OF POST-CONTRACT TRANSACTION COSTS IN DESIGN-BUILD (D&B) DELIVERY SYSTEMS

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To my beloved father and mother

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ABSTRACT

The construction industry has been struggling with the issue of inconsistent performance with respect to cost of projects, completion time and the delivery of a quality product. In an attempt to address this issue the Design-Build (D&B) project delivery system was initiated primarily to overcome the shortcomings of the traditional procurement strategies. Although, traditionally D&B delivery system was aimed to greatly enhance client's benefits, this has not significantly been achieved. It lacks clear benefits realization management process to deliver the planned client's benefits. In particular, the Transaction Costs (TCs) incurred at the post-contract phase (PTCs) through D&B system has been the subject of criticism, wherein it has been unable to achieve the expected resounding success of a total shift away from the issues attributed to the traditional systems. This research aims to establish the importance of leveraging on D&B project team-competency and commitment structured within a strategic Benefits Realization Management framework to optimize client's benefits in terms of minimizing PTCs. The focus is on the aspect of competencies of key project participants and their project team commitment with respect to minimizing TCs that is structured within a Benefits Realization Management (BRM) practice. Questionnaire survey data was obtained from 231 respondents out of 357 administered questionnaires to G7 contractors registered under CIDB Malaysia that was based on a systematic sampling of the existing CIDB contractor database. The partial least squares structural equation modeling (PLS-SEM) technique was used to test the relationships being hypothesized and to validate and confirm the developed Competency Driven Benefits Realization Model (CD-BREM). Exploratory preliminary research findings reveal that post-contract TCs for D&B projects range from 3.5% to 13.5% of the project value. The primary research findings reveal that D&B team commitment has partial mediating effect between team competency and post-contract TCs. Whilst, BRM was found to have a partial mediating effect between team competency and post-contract TCs and no moderating effect as initially hypothesized. In general the research findings indicate that team competency, commitment and BRM have significant positive influences on post-contract TCs. This research provides a multi-dimensional perspective of the D&B project benefits realization concept and has the potential to address the issue of minimizing PTCs, which is seen as a social waste of wealth. Using CD-BREM it is possible to identify key human factors that can contribute to high project performance that also serves as an enabling mechanism for realizing the full potential of the D&B method for delivering successful projects. This research is timely to help reverse the trend of poor performance within the construction industry as a whole. Further work on the implementation of this CD-BREM model on construction projects and the consideration of including additional independent variables in the research theoretical framework can be explored to strengthen the credibility of the outcome of this research which is aimed at minimizing PTCs.

ABSTRAK

Industri pembinaan telah bergelut dengan isu prestasi yang tidak konsisten berkenaan dengan kos projek, masa siap dan penghasilan produk yang berkualiti. Dalam usaha untuk menangani isu ini sistem perolehan Design-Build (D&B) projek telah dimulakan terutamanya untuk mengatasi kelemahan strategi perolehan tradisional. Walaupun, secara tradisinya sistem perolehan D&B bertujuan untuk meningkatkan manfaat pelanggan, ini tidak dicapai dengan begitu ketara. Sistem perolehan D&B tidak mempunyai proses *pengurusan kesedaran manfaat* yang jelas untuk memastikan faedah optimum bagi pelanggan. Khususnya, Kos Transaksi pada fasa pasca-kontrak (PTCs) melalui sistem D&B telah menjadi subjek kritikan, ia tidak dapat mencapai kejayaan yang dibangga-banggakan berbanding dengan sistem tradisional. Kajian ini bertujuan untuk mewujudkan kepentingan kompetensi dan komitmen pasukan projek D&B di dalam rangka kerja Pengurusan Faedah Kesedaran strategik untuk mengoptimumkan manfaat pelanggan dengan mengurangkan PTCs. Tumpuan adalah kepada aspek kecekapan peserta utama projek dan komitmen pasukan projek bagi tujuan meminimumkan TCs yang berstruktur dalam Pengurusan Faedah Kesedaran (BRM). Data soal kaji selidik diperolehi daripada 231 responden daripada 357 soal selidik yang diedarkan kepada kontraktor G7 yang berdaftar di bawah CIDB Malaysia, berdasarkan persampelan sistematik pangkalan data kontraktor CIDB yang sedia ada. Teknik PLS-SEM telah digunakan untuk menguji hubungan yang hipotesis dan untuk mengesahkan dan mengesahkan dibangunkan Kompetensi Faedah Didorong Merealisasikan Model (CD-BREM). Dapatan penyelidikan awal secara penerokaan mendedahkan bahawa PTCs untuk D&B projek terdiri antara julat 3.5% hingga 13.5% nilai projek. Dapatan kajian utama mendedahkan bahawa komitmen pasukan D&B mempunyai kesan perantara separa antara kecekapan pasukan dan PTCs. Sementara itu, BRM didapati mempunyai kesan perantara separa antara kecekapan pasukan dan PTCs dan tiada kesan kesederhanaan seperti dijangkakan pada hipotesis awalan. Secara umum dapatan kajian menunjukkan bahawa kecekapan dan komitmen pasukan serta BRM mempunyai pengaruh positif yang signifikan terhadap PTCs. Kajian ini memberi perspektif pelbagai dimensi bagi konsep kesederaan manfaat D&B projek dan mempunyai potensi untuk menangani isu meminimumkan PTCs, yang dilihat sebagai satu pembaziran kekayaan sosial. Faktor-faktor manusia utama yang boleh menyumbang kepada prestasi projek yang tinggi serta berfungsi sebagai mekanisme yang membolehkan untuk merealisasikan potensi kaedah D&B untuk menghasilkan projek yang berjaya dapat di capai dengan menggunakan CD-BREM. Kajian ini adalah tepat pada masanya untuk membantu meningkatkan prestasi dalam industri pembinaan secara keseluruhan.

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LIST OF SYMBOLS AND ABBREVIATION

TCs	Transaction Costs
PTCs	Post-Contract Transaction Costs
BR	Benefits Realization
BRM	Benefits Realization Management
CD-BREM	Competency-Driven Benefits Realization Model
PLS	Partial Least Square
D&B	Design & Build
SEM	Structural Equation Modeling
TCE	Transaction Costs Economics
TCT	Transaction Costs Theory

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CHAPTER 1

INTRODUCTION

1.1 Overview

The construction industry has been struggling with the issue of inconsistent performance with respect to cost of projects, completion time and the delivery of a quality product. These challenges have been addressed by researchers with some success, however in contrast to other industries the construction industry is still seen to be lagging. One strategy that has evolved amongst construction practitioners and researchers is the adoption and adaptation of ideas and techniques developed within other industries. The major ones being the Manufacturing and the Information and Communication Technology fields.

The concept of Best Value, Value Maximization and Benefits Realization are a few notable concepts adapted from these fellow industries, but as yet to be realized as having a significant impact. This chapter provides an introduction to the main subject of Benefits Realization in the process of procurement of building projects, to start with. The research problem related to low achievement of client satisfaction on construction projects is identified. Within this context of client satisfaction, based on comprehensive literature review, it is clear that mainstream research on construction project performance has neglected the aspect of skills and competencies of key project

participants towards minimizing Transaction Costs (TCs) - a clear gap within the research literature. Viewed from the perspective of client satisfaction (which is represented in this thesis within the context of benefits maximization), the traditional procurement strategies, with respect to this measure for project success, that is achieved through the conventional *requirements capture* process (the precursor to benefits maximization) is presented.

A critical review of the current D&B approach is presented based on the understanding that the Design-Build (D&B) project delivery system was developed primarily as an attempt to overcome the shortcomings of the traditional procurement strategies, in relation to client satisfaction. The proposed research aim of a context-specific D&B contractors' team-competency approach is argued for (and tested) as a driver in order to Maximize Benefits with respect to satisfying clients' needs for D&B projects. In this research, the D&B project environment is viewed as currently being able to provide the most conducive platform for achieving benefits maximization. However, it is evident from previous research that it is failing to achieve the highly acclaimed advantages in comparison to traditional procurement. An outline research methodology is presented along with the roadmap towards achieving the research aim of establishing a contractors' team-competency action framework for benefits maximization in D&B projects. The structure of the thesis is represented in progressive phases based on the research flow, highlighting the actions to be taken to develop, evaluate and conclude the research findings that can contribute to higher efficiency for maximizing benefits. Thus, driving benefits realization by leveraging on team performance, enabled by team commitment that emphasizes on competency development for performative action through Knowledge-In-Action.

1.2 Background of the study

Generally, projects are driven by a need to satisfy a set of benefits for different groups of stakeholders (Winter *et al.*, 2006). As such project initiatives can only be regarded as successful if the intended benefits are realized (McCartney, 2000). Although it is

premised that projects are often to be delivered on time, cost and quality, but yet the expected benefits are not always realized. Recently, benefits realization (and management) has received greater attention in terms of being the "new" practice for private and public sector projects in a number of sectors, including housing development, education facilities and healthcare infrastructure.

Although the word 'benefit' is used widely in everyday life, it is very poorly defined. Benefit can simply be understood as a '*measurable improvement*' (Sapountzis, 2013). Bradley (2010) defines benefit as an outcome of change which is perceived as positive by a stakeholder; and along similar lines of thinking, Ward & Daniel (2006) define it as 'an advantage on behalf of a particular stakeholder or group of stakeholders'. The important point in the definitions is that benefits are owned by individuals or groups who want to obtain *value* from an investment (Glynne, 2007).

Within the above definitions of 'benefit', it is necessary to understand the term benefits realization. Benefits realization could be defined as experiencing the positive impact as a result of a change [or action]. However, by introducing the term 'management' in benefits realization, Bradley (2010) defines it as the *process of organizing and managing*, so that potential benefits arising from investment in change [or action] are actually achieved. Whilst, Turner (2014) defines benefits management as the process for the optimization of benefits from organization change programmes.

From the construction industry perspective, the ideal has always been to seek out procurement strategies and project delivery mechanisms that can achieve and even supersede the planned client's needs and benefits. It is within this context that the Design-Build (D&B) approach is seen to have been initiated within the construction industry. The construction industry needs to innovate in order to keep pace with the changes that the world is constantly facing. In addition to responding to the pressing social, economic and technological challenges affecting all industries today, it cannot be denied that the opportunities and problems facing construction in the future will be very different from those of today. It is without doubt that the needs of society and demands of clients will not remain stagnant - requiring greater competency acquisition, commitment and better benefits realization management (BRM) strategies that will transform the way the built environment is designed, built and maintained to generate

better value. Thus, there is a constant need to seek out new techniques and tools to be able to deliver construction projects within the context of developing a sustainable built environment. This is evident in the growing concern and commitment to be more ecologically productive. It is in this sense that the concept of value is seen to be aligned, with the aim of achieving project success from a sustainability perspective. Additionally, the overarching concept of BRM is seen as being able to address issues within the broad spectrum of sustainable development, focusing on adding value and minimizing waste.

The D&B procurement method is one of the systems advocated by mainstream construction industry practitioners and researchers in order to overcome inadequacies of the traditional procurement method. The basic concept of the D&B approach is the client having the project contracted to a single organization (one stop shop total solution) that would be responsible for design, procurement and engineering as well as commissioning, allowing for integrated project delivery. D&B, as it was intended, appears to be a panacea to many of the problems faced by the clients and other key stakeholders in the construction industry. This delivery system has been used around the globe extensively and its popularity has grown substantially over the years (Emsen & Schexnayder, 2000). It is noted by Chan (2000) and Lam *et al.* (2003) that D&B has been used extensively to help deal with the problems associated with the traditional system. They however point out that the implementation of D&B is not without its problems, wherein clients and other stakeholders have increasingly shown concerns regarding the benefits of the D&B method in actual practice.

In Malaysia, not all the D&B projects were successfully delivered as designed and planned. The D&B concept has been labeled to be ‘designed to fail’ by the then Malaysian Second Finance Minister as reported by the New Sunday Times, February 4, 2007. This is due to the fact that, some of the D&B mega projects have failed to effectively deliver benefits as to client’s requirements (Jasri, 2011). It is noted by Gambo & Gomez (2015); Abdul Rahman *et al.* (2006); Seng & Yusof (2006); Isa *et al.* (2011); and Hashim *et al.* (2006) that clients’ expectations in the D&B delivery system are not adequately met and the system is not being practiced in the manner that is meant to leverage on its potential benefits in the Malaysian construction industry. It is

identified in the literature that a constraint such as lack of management expertise is also a contributor to D&B project failure.

Firstly, the significant problem that tends to impede the development of the D&B procurement approach is the nature of the management structure of the D&B companies in the Malaysian construction industry, wherein a fragmented approach still persists in the industry in spite of the supposedly one stop shop practice. The practice of the D&B delivery system in the Malaysian construction industry is characterized by the D&B organization outsourcing consultants (expertise) to execute their projects (Gambo & Gomez, 2015). This type of management structure is referred to here as the fragmented D&B; it is characterized by the nomination of external design consultants by the contractor to carry out the designs of the project (Masterman, 2002). These external consultants are coordinated by the in-house project managers who manage their activities in order to ensure, what seems to be the client's interest with regards to traditional client briefs and requirements capture. Such management structures are likely to result in various problems during project execution. This is due to the structure's inherent separated feature, which makes the system vulnerable to the problems that have long been associated with the traditional procurement approaches (Masterman, 2002).

It is clear that the development of the D&B concept, referred to as a mode of prime contracting, was well intended to improve coordination and communication in project delivery through a flatter organization structure with less fragmentation. However, this was not realized due to the *dominant product* and *activity-based organization principles* embedded within the industry. It is premised (hypothesized), in terms of situating this research, that the option of resorting to D&B as a total solution for project delivery seems not to have had a resounding success as the D&B benefits realization management strategies and core competencies are not embedded within the project delivery system to match the opportunities for benefits realization of the client's requirements. It is affirmed by Jaafar & Radzi (2012) that contractors in Malaysia are often nominated based on low-bid criteria, with little emphasis on their competencies, therein often leading to the production of a failed product that does not meet the client`s needs. These failed projects have influenced the perception of the society and the industry that D&B will generate more problems rather than provide greater benefits, as

most of these failures are attributed to poor performance by the D&B contractor and the other sub-contractor teams involved. Within this current state of decline in the integrity of the D&B procurement approach, this research aims to reestablish the benefits of D&B project delivery by framing it within a project competency framework that is matched to the D&B contractor's workflow analytical framework.

There are a multitude of measures to assess a construction project's success. However, one that is significant but seldom addressed in a direct sense is that of transaction costs (TCs). *For an industry that is attempting to reduce its fragmentation, obviously one clear measure to gauge its performance is the reduction in transaction costs*, more importantly that of post-contract transaction costs - this being more pertinent in the case of D&B projects. It is clear that the TCs incurred at the pre-contract (procurement) phase for D&B range from 0% to 5.7% with an average of 2.2% (Whittington, 2008), and is often not seen as a major concern. Although, the TCs in the construction phase are much higher than the transaction costs in the procurement phase (Turner & Simister, 2001; Hughes *et al.* 2006; Whittington, 2008), especially for D&B projects this increase should be able to be kept to a relatively much lower difference. The TCs during the construction phase are known as post-contract TCs. These post-contract TCs could be high arising from disputes and litigation, as conflict and disputes are deemed to occur in the construction industries of many countries (including Australia, USA, UK, Hong Kong, New Zealand and Nigeria) and inflict a high cost to the industry both in terms of direct and indirect costs. It is found that the post-contract TCs for D&B range from 3.4% to 14.7% with an average of 9.5% of the overall project value (Rajeh, 2014; Li *et al.,* 2015). In Malaysia, the situation is not different with an average of 7% ranging from 3.5% to 13.5% of the project value based on the pilot study conducted as part of this research.

In the traditional project delivery system, the post-contract TCs incurred range between 8.9% and 14.7% with an average of 12.6% of the total project value (Wittington, 2008; Li *et al.,* 2015). Based on the two delivery systems, there is a 3.1% reduction on average for the D&B procurement approach compared to the traditional delivery system. However, there is a need for further TCs reduction for D&B projects at

the construction phase in order to improve project performance in terms of value, represented in this study as that of minimization of post-contract transaction costs.

In this research, *post-contract TCs include the costs of contract administration, administering claims, change orders, dispute resolution, and relationships with other parties, and payment on time, organizational efficiency, material substitution and quality of communication.* Additionally, in this research, the *quality of decision making and uncertainty in the transaction environment* are also considered as post-contract TCs. According to Williamson (2005b), complexity, uncertainty, frequency and asset specificity are some of the characteristics of TCs that makes the project more costly. He associates these specific characteristics of TCs with bounded rationality and opportunistic behaviors. Here, bounded rationality refers to the *limited competence* of human actors in solving complex problems and processing information (Simon, 1991). On the other hand, opportunistic behavior refers to human actors' behavior with self-seeking guile and applying false threats or promise to take advantage of others if an opportunity to gain more profits arise (Williamson *et al.,* 1975). The phenomena of post-contract TCs is further elaborated in Chapter 2, Section 2.2.1.

It is within the framing of the issues related to project performance with respect to minimizing post-contract transaction costs (PTCs) of current D&B projects, that the competence and commitment of the contractors' team is being brought to question in relation to whether clients are getting value maximization in D&B projects. In this research D&B contractors' team-competencies and commitment are hypothesized as potential operational approaches towards optimizing benefits delivery through the engagement of a competent project team right from the onset of the project. Hence, the issues addressed in this study include: D&B projects currently not performing as expected as a result of hybridization and fragmentation of the concept in practice (Jaafar & Radzi, 2013); and issues related to productivity and performance (Abdul Rahman *et al.,* 2010) from a value perspective. The aim of the research is then to explore the effects of D&B contractors' team-competency and commitment on D&B project performance as a causal link to minimizing PTCs.

There is a predominant deficiency within the construction management literature as compared to general management literature in clearly addressing issues of

productivity from a strategic and operational dimension. Hence, the problem is addressed at two levels – a two-pronged approach. Hence, the approach here is to confirm the necessity for a benefits realization management strategy (strategic) and specific-competencies (operational) to be embedded within the D&B delivery system structured around the concept of team commitment. This is seen as the gap in construction productivity research that this study seeks to bridge through the implementation of a competency action model for minimizing PTCs. In summary, due to the obvious relatively large extent of D&B contractors' team failing to meet the primary needs of clients in D&B projects, this has prompted the need to address the benefits to be gained through D&B contractors' team competency which is considered crucial for delivering maximum benefits in Malaysian D&B projects. The research seeks to empirically examine the impact of bounded rationality (i.e. defined by D&B contractors' limited team-competency, and team-commitment) on the magnitude of transaction costs in Malaysian construction industry.

1.3 Problem statement

The current practice of the D&B procurement system in the Malaysian construction industry, with regards to benefits delivery of the constructed D&B project has continued to be a major source of concern, as most D&B projects that are executed are lacking in terms of quality of the constructed facility (Abdulrashid, 2002; Jaafar & Radzi, 2013; Gambo & Gomez, 2015). Although, traditionally the D&B delivery system was aimed to greatly enhance client's benefits, D&B organizational structures in reality lack a clear benefits realization management process and the adequate competencies embedded within such entities to deliver the planned clients benefits. Hashim *et al.* (2006) noted that the Malaysian government had to retract its decision of adopting D&B procurement system for delivering school projects due to cases of lack of quality, whilst the work of Gambo & Gomez (2015) point clearly to the fact that clients' expectations are not adequately met in D&B projects.

With regards to practice of the D&B delivery system in Malaysia, the following issues have been identified through extensive literature review and triangulated by face-to-face interviews with practitioners:

Firstly, in spite of the various advantages and innovativeness that D&B delivery system offers, the level of adoption and utilization in the Malaysian construction industry is low (Rashid, 2002). This is further attested by Seng & Yusof (2006) that the delivery system is still lagging behind in terms of utilization when compared to the traditional procurement approach and this low utilization covers all aspects of building works adopted in the industry. Whilst Rashid (2002) makes clear reference to the point that the D&B delivery system has failed to effectively satisfy critical client`s expectation`s in terms of cost, time and quality. Hence, it is evident that the D&B delivery system is faced with several challenges which have continued to impede its growth and utilization in the industry. This study is expected to provide a much needed complementary model that can help optimize the benefits of the D&B procurement system as originally intended. It is not surprising then that Ali *et al.* (2009) have identified that the D&B delivery system in Malaysia covers a mere 24% of all works, with the traditional delivery system still having the majority share.

Secondly, there are the issues of hybridization and fragmentation of the D&B concept in practice (Jaafar & Radzi, 2013) and the clear issues related to productivity and performance as noted by Abdul Rahman *et al.* (2010). It is identified by Ing (2009) that a great concern is the level of technical and managerial competence as evident from the practice of the repeat clients who tend to move from one contractor organization to another in search for competent teams to deliver their requirements. From the client`s perspective, this is attributed to the difference in capability between types of contractor organizations specializing in D&B who are supposed by virtue of being design and build to have in-house resources covering all the major disciplines (pure). A great number of the D&B general contractors only have partial in-house expertise (partially integrated); and some tend to be minimum/small builders in consortium with an external design team (fragmented) posing as a D&B contractor. It is within this context of issues that the research is framed and forwards the argument that it is only through the pure D&B project delivery approach that benefits realization can be enabled in a more optimal

sense by having in place the proposed Competency-Driven Benefits Realization Framework.

Lastly, the TCs being still incurred at the post-contract phase (PTCs) whilst attempting to deliver benefits to the clients through D&B system has been the subject of criticism. A clear indication that the D&B delivery system has not had the expected resounding success in terms of a total shift away from the issues attributed to the traditional systems. In Malaysia, based on the pilot study conducted as part of this research, the PTCs were found to range from 3.5% to 13.5% with an average of 7% of the total project value. It is evident that, in any construction project, the procurement system adopted on the project has a significant impact on the TCs associated with the pre-contract and post-contract phase. According to Williamson (1981), the *key contributors of TCs are the economic actors' behavioral assumptions, the lack of competency resulting in bounded rationality and opportunism, and transaction characteristics such as asset specificity, uncertainty, frequency and complexity of the construction projects*.

It is pointed out by Frank *et al*. (2007) that outsourcing project activities could have additional TCs such as negotiating, measuring and monitoring costs because of opportunistic behavior of the actors involved. This is evident in the case of the fragmented Malaysian D&B delivery system. TCs can be seen as a waste of social resources and wealth. As noted by Wenan & Mengiun (2010), TCs are seen as one of the most important factors that affect the construction performance in terms of securing greater value. Viewed from a Lean perspective, Koskela (2000) points out that, TCs in the language of industrial engineering could be seen as one form of waste as recognized by economists. In this research TCs are considered to be substantial extra work and rework, and antagonistic relationships with owners, which end up in dispute and conflict, disagreements, change order and claims which occur in the post-contract phase of D&B projects.

It is clear that extant literature on construction project performance has failed to provide avenues to resolve the issue of PTCs in a significant manner. Hence, it is clear that there needs to be a focus on the means to leverage on improved project delivery systems, and this can be addressed to a great extent based on concepts that emphasize

minimizing TCs at the construction phase (post-contract) in order to maximize project benefits. It is anticipated that the reduction of transaction costs can contribute to improved cost estimation of projects (as TCs are unpredictable costs), which could lead to an improvement of the predictability of the owners' behavior and contractors' behavior, project management efficiency and low level of uncertainty. All of these factors combined can contribute to enhanced project performance in construction.

This study, therefore, seeks to explore the effects of D&B contractors' team-competency and team-commitment on minimizing PTCs in D&B project structured within a strategy for optimizing performance, in the special case of minimizing PTCs. The aspect of transaction cost economics has not been explored fully within the construction industry and the causal links between D&B delivery system and TCs are rather an ambiguous unexplored dynamic within the Malaysian construction industry. In summary, due to the obvious relatively large extent of the D&B contractors' team failing to meet the primary needs of clients and the consistent increase of PTCs in D&B projects, the need to address the benefits to be gained through D&B contractors' team-competency, team-commitment and benefits realization strategies to minimize PTCs can have a great significance to productivity performance. It is proposed that through the developed Competency-driven benefits realization model it can be possible to deliver optimal benefits in Malaysian D&B projects. This research is a unique study related to the Malaysian construction industry that attempts to integrate competencies, commitment and BRM strategies, towards minimizing TCs in the D&B delivery system. Additionally, this research work provides empirical evidence of the necessary antecedents for minimizing TCs of the D&B construction delivery system in the Malaysian construction industry.

1.4 Conceptual framework and hypothesis

In understanding the current state of the construction industry and the emerging opportunities to minimize transaction costs and realize benefits in D&B projects, the following hypotheses were established for this research.

$H_{1:}$ *D&B contractors' team competency acquisition can directly minimize PTCs and enhance D&B project performance.*

$H_{2:}$ *D&B contractors' team competency can positively and directly influence D&B contractors' team commitment to minimize PTCs and enhance D&B project performance.*

$H_{3:}$ *D&B contractors' team commitment can positively and directly minimize PTCs and enhance D&B project performance.*

$H_{4:}$ *D&B contractors' team competency can positively and directly influence benefits realization management strategy to minimize PTCs and enhance D&B project performance.*

$H_{5:}$ *D&B contractors' team benefits realization management strategy can positively and directly minimize PTCs and enhance D&B projects performance.*

$H_{6:}$ *Benefits realization management strategy moderates the relationship between D&B contractors' team competency and PTCs in order to enhance D&B projects performance.*

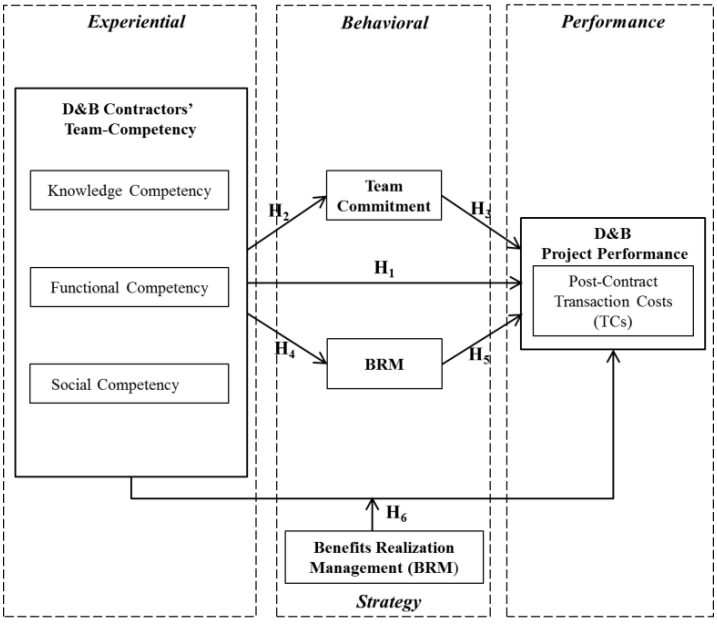

Figure 1.1 Conceptual framework

1.5 Research questions

Based on the above hypothesis, the following research questions were developed:

1. What is the impact of specific contractor team-competencies on team-commitment and post-contract transaction costs in Malaysian D&B projects?
2. Does contractors' team-commitment mediate the relationship between contractor team-competence and post-contract transaction costs in Malaysian D&B projects?
3. Does benefits realization management strategy mediate or moderate the relationship between contractors' team-competency with team commitment and post-contract transaction costs in Malaysian D&B projects?
4. How can post-contract transaction costs (PTCs) be minimized in Malaysian D&B construction projects?

1.6 Research objectives

This study seeks to examine the relationship between contractors' team-competency, team-commitment, benefits realization (BR) strategy and post-contract TCs in the construction industry. Specifically, in line with main research aim, the following detailed objectives are formulated:

1. To examine the impact of specific contractor team-competencies on team-commitment and post-contract transaction costs in Malaysian D&B projects.
2. To investigate the mediating effect of contractors' team-commitment between contractors' team-competency and post-contract transaction costs in Malaysian D&B projects.
3. To investigate the mediating and moderating effect of benefits realization management strategy between contractors' team-competency and post-contract transaction costs in Malaysian D&B projects.
4. To propose a competency-driven benefit realization model that minimizes post-contract transaction costs for optimizing performance of D&B projects.

1.7 Scope of the study

Transaction costs (TCs) exists at the pre and post-contract phases of project procurement. In construction projects, at the pre-contract phase one of the central issues is the cost of information and procurement. However, at the post-contract phase it is the costs of contract administration and enforcement, conflicts and dispute and change orders are the greatest contributors to higher TCs. The emphasis in this research is on TCs incurred at the post-contract phase of D&B projects. This study is focused on the performance of D&B construction projects in terms of minimizing post-contract transaction costs. The population of the study is the construction industry G7 contractors within Peninsula Malaysia and the research hypothesis were tested based on data from the selected major D&B contractors.

The population for this study is construction firms registered as G7 contractors under the Construction Industry Development board (CIDB) Malaysia. Based on the CIDB website, there are 4,625 G7 contractors in Peninsula Malaysia including the Federal Capital Territory (CIDB, 2015). G7 contractors were chosen due to their potential financial capabilities, tender capacity and the tendency to participate in D&B project delivery system. The respondents are stakeholders that are involved in the delivery and management of D&B construction projects in Malaysia with minimum of 3 years working experience, as they are considered to have a comprehensive knowledge about the D&B delivery system (refer to Figure 1.1).

Figure 1.2 Map of Malaysia (Dreamstime, 2015)

1.8 Significance and implications of the research

The role of contractors' team-competence and team-commitment in the achievement of high project performance has not been emphasized in previous research (Liu *et al.*, 2004; Ryan *et al.*, 2009; Leung *et al.*, 2004; Mohyin, 2011). Thus, establishing specific contractors' team-competency and team-commitment are considered as important criteria for achieving optimal benefits realization that the D&B project delivery system (see Chan *et al.*, 2001) ideally offers with respect to minimizing transaction costs (see Williamson, 2010a). This study aims to establish a competency-driven benefits realization model for contractor teams to optimally realize projects benefits. The study contributes to competency research in the construction industry by providing some new

insights into the relationship between D&B contractors' team specific competency and project success, addressing an often neglected area of consideration in project performance - that is the minimization of transaction costs which is an indicator of fragmentation. The contribution of this study consists of three perspectives: theoretical, empirical and practical. From the theoretical perspective, this study enhances the understanding of the contractors' team-competency and team-commitment concept within the context of Malaysian D&B practice in the construction industry. Therefore, this study suggests that transaction costs be minimized in order to attain optimal benefits realization of D&B projects, particularly in terms of minimizing post-contract transaction costs. In addition, it has explored transaction costs economics (TCE) and established the causal link of TCs as an independent variable with the key dependent variables of team-commitment and team-competency within the context D&B delivery system performance in the Malaysian construction industry. This research highlights glaring drawbacks in innovative project delivery systems still having to deal with significant PTCs.

Empirically, this study is considered as the first attempt to study the significance of implementing D&B contractors' team-competence within the Malaysian construction industry. This study further explores whether or not contractors' team-competency and team-commitment contributes to the minimization of PTCs as well as success of D&B projects. By employing quantitative methods to address the research questions in a structured manner with respect to relevant hypothesis, this study provides a comprehensive study on TCs and competency that deals with the problem in a more contextual manner as a form of generative research setting in place actionable outcomes. This approach allows for the utilization of the full strength of the quantitative method to establish the causal and structural relationships between constructs and forwards an enabling dimension. By doing so, the outcomes of this research will provide empirical evidence regarding minimization of TCs and allow for optimal benefits realization with respect to the existing potentialities provided by the D&B project delivery system.

From a practical perspective, this study offers new insights for stakeholders of the D&B delivery system in the Malaysian construction industry to reinforce a team-competency and commitment spirit to deliver the objectives of D&B delivery system as

originally intended. This research will enable key D&B contractors to steer their organizations towards a more effective practice of D&B delivery system and leverage on its potentialities. This approach as a multi-dimensional perspective to D&B project benefits realization and would eventually go a long way in minimizing the existing issue of excessive PTCs which is seen as a social waste of wealth and redeem the perception of the D&B delivery system as not being a failing system. Consequently this will lead to the realization of the full potential of utilizing D&B method for delivering successful projects in the construction industry. Moreover, the study will serve as a platform for D&B clients to identify pure D&B contractors with D&B specific-competency, commitment and benefits realization strategy and leverage on the full potential of the delivery system towards optimal benefits. This will help serve the construction industry as a catalyst towards successful project delivery and orient itself towards achieving high performance. *This study will obviously serve to address the gap identified in this research as the traditional practice of client not being able to achieve maximum benefits; and contractors not being able to optimally deliver benefits alongside requirements capture to the client in D&B projects.* This is considered to be a constraint that has been unresolved due to the lack of an integrative mechanism such as the Benefits Realization Analytical Model that is proposed in this research. However, it is not concluded here as to the role to be accorded to the party that is to undertake Benefits Realization Management, although it is proposed that there needs to be a third party, which ideally could be very much undertaken by the Public Organization involved as in the case of Public Private Partnered D&B projects.

This study is a first in terms of attempting to incorporate three distinct variables, namely: contractors' team-competency, team-commitment and benefits realization strategy in a cohesive framework toward minimizing PTCs in D&B project. It is expected that this approach would go a long way in outlining a more realistic representation of D&B contractors' team-competency and commitment.

1.9 Research methodology

This study is based on a deductive research method that relies on the quantitative research approach for systematic empirical investigation of a social phenomenon using statistical techniques (Nor, 2009). A systematic sampling technique is employed in this study to identify registered contractors under the G7 categories in Peninsula Malaysia including the Federal Capital Territory. G7 contractors were selected because they are considered to have the financial capabilities and more likely to be engaged in D&B projects. A total number of 4,625 G7 contractors were registered with CIDB Malaysia based on the CIDB website directory as at December, 2015. Based on Saunders *et al.* (2012) sampling table, 357 samples were selected through systematic sampling technique, with 3% margins of error and 95% confidence level. Hence, 357 questionnaires were administered online through survey monkey.

With regards to the data analysis, this study employed Structural Equation Modeling (SEM) using SmartPLS (3) for the data analysis. The justification for all these methods and the advantages of SEM is further discussed in the methodology chapter. The general research methodology flow is represented in Figure 1.3.

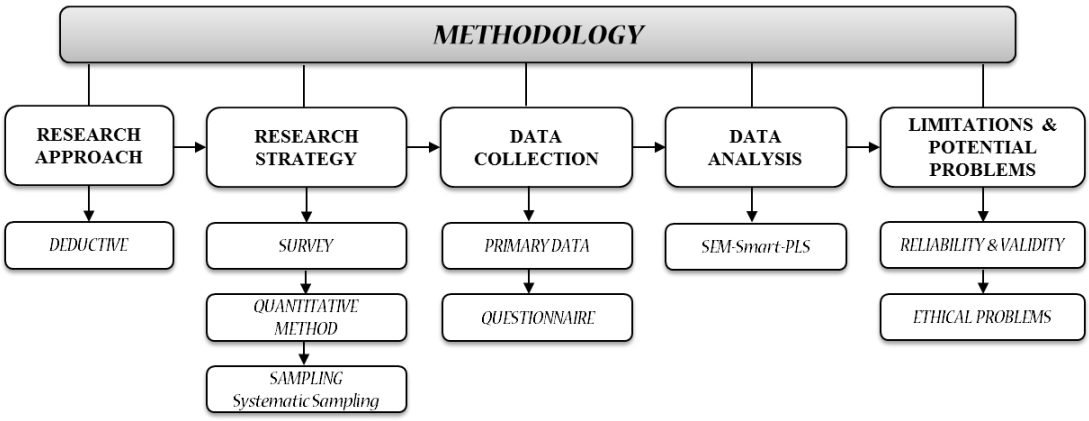

Figure 1.3 Research methodology flow (Biggam, 2015)

1.10 Thesis structure

The remaining part of this thesis is organized into five chapters, structured as follows:

- ***Chapter Two*** – *Literature Review*. This chapter provides a general background of theories employed in this research, particularly transaction cost theory (TCT). The chapter further introduces the factors that influence performance in D&B projects such as contractors' team-competency and team-commitment towards delivering optimal benefits realization for the clients. In the final section, the chapter presents a general background of benefits realization (BR) management strategy in construction.

- ***Chapter Three*** – *Conceptual Framework*. This chapter introduces the conceptual model of the research with a discussion of hypotheses to validate and confirm the proposed model. This chapter has been designed so as to follow on from Chapter 2, wherein selective literature that has a clear bearing on developing the constructs (unobserved variables) and their factors (observed variables) are presented as the basis for arriving at the conceptual model. It further introduces development of measures and their validation based on each construct.

- ***Chapter Four*** – *Research Methodology*. This chapter covers the suitable methodology for this research by discussing research philosophy and research design. In addition, it provides research sample determinations by specifying the target population. It also highlights the unit of analysis and suitable sample size. Additionally, it explains the questionnaire design and the way the final instruments are presented to the respondents along with the way the questionnaires were administered and retrieved from the target respondents. Finally, the chapter presents a discussion on the program of analysis used to analyze the collected data and specifies the way the data is analyzed in this research.

- ***Chapter Five*** – *Analysis and Findings*. This chapter explains how the data is analyzed. The analysis is conducted by using Partial Least Square Structural Equation Modeling (PLS-SEM). PLS-SEM is used to check the convergent and discriminant validity of the data in addition to the reliability and confirmatory factor analysis (CFA). In addition, the data was assessed by using two models which are provided by PLS-SEM, namely the measurement model and the structural model. Consequently, the hypotheses are tested and the results presented ready for interpretation and discussion. Here, the conceptual Competency-Driven Benefits Realization framework is confirmed through findings as the final Competency-Driven Benefits Realization Model.

- ***Chapter Six*** – *Conclusions and Recommendation*. This chapter presents the main findings of the research followed by discussion of the results and recommendations that are laid out in line with the research results.

1.11 Summary

The purpose of the research is to examine the relationship between contractors' team-competency, team-commitment, benefits realization (BR) strategy and post-contract TCs in the construction industry in order to optimize project success in terms of generating better value for the client, in the specific case of D&B projects. This chapter introduces the background to the research problem. It outlines the research objectives and questions. The research scope and significance of the study are also presented and a description of the context in which this research is considered to be significant is provided.

CHAPTER 2

LITERATURE REVIEW

Overview

This chapter provides a review of the relevant research literature and theories applicable to this research. The chapter reviews literature and considers the existing studies and theories in order to clarify the content and purpose of this research. However, to keep this research as explicit and coherent as possible, many sub-areas of theory have been omitted from the discussion because they are not considered directly relevant. In order to address research objectives outlined in chapter one, this chapter delineates and connects key aspects of benefits realization and other theoretical positions from extant literature associated with the emerging theories, namely: Transaction cost theory (TCT), Commitment theory (CMT) and Competency theory (CPT). Additionally, benefits realization management (BRM) is also considered and reviewed in terms of the construction industry's D&B delivery system. These theories and concepts are explored to provide a better and sufficient understanding in order to establish the relevance for improving construction project performance by minimizing post-contract transaction costs through D&B contractor team's competency and commitment in Malaysian D&B practices.

2.1 Transaction cost theory

2.1.1 Origins and development

Ronald Coase was the first scholar to recognize the existence of transaction costs. This recognition led to the emergence of the firm in his seminal paper, "The nature of the firm" (1937). Coase was awarded the Nobel Prize in (1991) for his discovery and clarification of the transaction costs in the institutional structure and functioning of the economy. Contrary to the mainstream belief held by economists that the economic system "works itself" and is coordinated by the price mechanism, or Hayek's "marvel of the market", Coase (1937, p.38) as cited in Pauline (2014) argues that there is a cost associated with using the price mechanism and "the most obvious cost of organizing production through the price mechanism is that of discovering what the relevant prices are". Transaction costs of using the market can include discovering costs, negotiation costs and contracting costs.

Coase (1988, p.19) observes that a firm emerges in the economic system if transactions can be organized internally at a lower cost than if the same transactions are carried out through the market. According to Coase, the choice between the market and the firm can be determined through the comparison of the cost of organizing transactions within the firm (management or bureaucracy costs) and market transaction costs. In addition, Coase associates the concept of transaction costs with the study of the firm and market organization, and explains that the existence of the firm lies in its ability to capture efficiencies of transaction costs during production and exchange; this is known as the 'Transaction cost theory'. TC not only explains the existence of the firm, but also its size and scope; that is, the decision to make-or-buy within the firm.

Despite this important insight, TC has been much cited and little used. The "Nature of the firm" was neglected for more than thirty years (since its publication in 1937) before it experienced a revived interest in the 1970s when a number of economists began to explain business practices in the terms of transaction costs. TC has since come a long way and is now an important part of the study of institutional arrangements (Klein, 2005).

2.1.2 Transaction cost economics

Transaction Cost Economics (TCE) is a microeconomic theory of the firm, which originates from TC. In 1975, Williamson attributed the limited interest in TC theory to the lack of operationalization of the Coasian framework, and has since expanded and advanced the theory. He incorporates the concept of bounded rationality and opportunistic behavior into the study of the nature of the firm, and deals with the problem of hold-up and maladaptation's to disturbances by assigning transactions to governance structures in the most discriminating way (Williamson, 1985a, p.18).

TCE is the inter-relationship between human and environmental factors that should ideally determine the eventual nature and governance structure of the transaction (Greenwood & Yates, 2006; Rajeh *et al.,* 2013). Within the construction industry context, *human factors involve organizations, relationships, roles, responsibilities, and the expectations of the owner and contractor. Whilst environmental factors involve the manner in which the contract and construction are executed.* In other words, the characteristics of the transaction environment and efficiency of project management have a significant impact on transaction costs.

Transaction Cost Economics is a central theory in strategy that addresses a firms' existence, their boundaries, and the way to govern operations. According to TCE, the problem of economic organization is the problem of contracting, and there are alternative ways of accomplishing a task (Williamson, 2005a). Each alternative is associated with precise and understood contractual and administrative mechanisms (Yates, 1999). TCE assumes that choosing among alternative governance structure is determined by comparing the cost of transaction under each structure (Ruester, 2010). Thus, the goal of an organization is to find the most cost efficient governance structure that minimizes the transaction costs. Ronald Coase first introduced the concept of transaction costs in 1937. He investigated the price mechanism and concluded that there is a cost related to searching for relevant prices, negotiating, and making a contract (Coase, 1960). The boundaries of the firm occur at the point where the cost savings from transacting within the firm are just offset by the rigidity costs (e.g. administration cost).

According to Williamson (2005a), TCE is concerned with the allocation of economic activity across alternative modes of organization (markets, firms, bureaus, etc.), employs discrete structural analysis, and delineates the firm as a governance structure with a view to economize on transaction costs. He fundamentally introduced a new concept of TCE by focusing on the economic actors' behavioral assumptions (opportunism and bounded rationality) and transaction characteristics; i.e. asset specificity, uncertainty, frequency, complexity, and contestability (Williamson, 1985b).

A number of researchers concur that economic actor's opportunistic behavior and their bounded rationality coupled with uncertainties in the external environment dominate most contracts. According to Williamson (2005a), For TCE purposes, the key ramification of bounded rationality for the study of contract is that *all complex contracts are unavoidably incomplete*. Thus contracts tend to be incomplete and partially account for possible contingencies, opening the door for increased transaction costs (Rajeh, 2014; Pauline, 2014; Kebede, 2011).

When the external transaction costs are higher than the internal transaction costs, the company will grow through conducting its activities in-house. However, if the external transaction costs are lower than the internal transaction costs the company will be downsized through outsourcing activities, see Figure 2.1. In reality, *market participants have to pay a price for reaching an agreement, developing rules for implementation of that agreement, and establishing suitable systems of management and governance. This 'price of doing businesses is called TCs* (Ruester, 2010). This is evident in fragmented D&B delivery system, where it is expected to perform as a one-stop-shop or in-house. This requirement for prioritizing process efficiency (a key innovative feature of D&B contracting) at the expense of taking advantage of TCE theory is problematic within the construction industry. This can be seen as a form of opportunistic behavior coupled with the inherent bounded rationality of actors that finally contributes to increase in PTCs. Hence, the D&B firms often downsize through outsourcing with the aim of minimizing internal TCs. Thus deviating from the main idea and concept of D&B delivery, renegading from the promise of having in-house design services with a single point of responsibility.

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