Contractors Team Commitment Factors for Post-contract Transaction Minimization in Design-build (db) Projects

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Abstract

The stakeholders in construction industry have always sought 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 (DB) approach is seen to have been initiated within the construction industry. It is without a doubt that the needs of society and demands of clients will not remain stagnant - requiring greater contractor team commitment to transform the way the built environment is designed, built and maintained to generate better value. 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 paper seeks to establish the specific DB contractor team commitment to post-contract transaction costs minimization. 357 G7 contractors were selected through a systematic sampling technique from 4,625 registered G7 contractors in Malaysia. The data was analysed using Principal Factor Analysis (PFA) in SPSS to establish the specific DB contractor team commitment. The questionnaire survey was designed based on a collation of past literature findings and validated using a Delphi study undertaken with DB experts. The findings indicate that all the three commitment factors of DB contractors' team are significant towards minimizing PTCs, even though normative commitment was found to be highly significant with a potential of greater impact on DB project delivery. It is also evident that DB contractor team members that must remain with their current employer are likely to key into the idea of benefits realization by minimizing PTCs during the delivery process, as they seem to be not distracted or influence by other factors. It is proposed that to minimize PTCs, affective, continuance and normative commitment of DB contractor team members need to be given greater emphasis for DB projects to leverage on their full potential.

Keywords: *Design-Build (DB); Commitment; Post-Contract Transaction Costs*

Introduction

The stakeholders in the construction industry have always sought 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 (DB) approach is seen to have been initiated within the construction industry. The construction industry needs to innovate 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 a doubt that the needs of society and demands of clients will not remain stagnant - requiring greater contractor team commitment to transform the way the built environment is designed, built and maintained to generate better value (Raji & Gomez, 2017; Raji, 2017). 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.

The DB procurement method is one of the systems advocated by mainstream construction industry practitioners and researchers to overcome the inadequacies of the traditional procurement method. The basic concept of the DB 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.

DB, 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 (Raji & Gomez, 2017). 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 DB has been used extensively to help deal with the problems associated with the traditional system. They however point out that the implementation of DB is not without its problems, wherein clients and other stakeholders have increasingly shown concerns regarding the benefits of the DB method in actual practice.

In Malaysia, not all D&B projects were successfully delivered as designed and planned. The DB concept has been labelled to be 'designed to fail' by the then Malaysian Second Finance Minister as reported by the New Sunday Times, February 4, 2007. This is because, some of the DB mega projects have failed to effectively deliver benefits as to the client's requirements (Jasri, 2011).

It is noted by Gambo and Gomez (2015); Abdul Rahman *et al.* (2006); Seng & Yusof (2006); Isa *et al.* (2011); and Hashim *et al.* (2006) that clients' expectations in the DB delivery system are not adequately met and the system is not being practised in the manner that is meant to leverage on its potential benefits in the Malaysian construction industry. Abdul Rahman *et al.* (2006) and Gambo & Gomez (2015) identified a lack of management expertise as a contributor to DB project failure.

Another key problem identified is Transaction costs (Rajeh, 2014; Li *et al.,* 2015; Raji, 2017). 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 DB 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.

It is within the framing of the issues related to project performance concerning minimizing post-contract transaction costs (PTCs) of current DB projects that the commitment of the contractors' team is being brought to question concerning whether clients are getting value maximization in DB projects. In this research DB contractors' team-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, this research seeks to establish key contractors team commitment factors that can minimize PTCs in the DB delivery system. Thus, driving benefits realization

by leveraging on team performance, enabled by team commitment that emphasizes performative action through Knowledge-In-Action.

Commitment and Performance

There is a universal prediction that commitment is beneficial to a wide range of organizations in terms of improving employee job performance such as (improved quality of work, completing work in time) as well as organizational performance such as more sales, higher profit, and higher return on investment (Mohyin, 2011). Mathieu and Zajac (1990) affirm that there is some evidence of significant positive links between effective commitment and performance; the correlations are often small to moderate.

The complexity of the relationship between commitment and performance has also been identified and raised by other scholars (Suliman & Iles, 2000). Steers (1977) cited in Mohyin (2011), stated that a possible explanation for the absence of strong evidence of a correlation between commitment and performance suggests that highly committed employees tend to perform well only if: The organization stresses high achievement orientations in tandem with good employee relations; passive commitment (often called loyalty) can be translated into "active" commitment; and employees possess the requisite skills, abilities and fully understand and accept their particular organizational roles (Mohyin, 2011). Without these factors, committed employees may not be able to convert their commitment to performance outcomes.

According to Randall (1990), based on a meta-analysis of 35 studies it is found that high levels of organizational commitment are positively, but weakly, associated with work outcomes including performance. The study revealed that the type of outcomes (of commitment) and the methods used explain only 19% of the variance in the commitment and outcome relationships, with conceptualization decisions having the largest impact. Further, Swailes (2002) argues that the persistent research findings, which provide only a small positive correlation between commitment and performance, may be a result of methodological inadequacies rather than a true finding.

However, recognizing this limitation, many researchers still make efforts to further

investigate the complex relationship between commitment and performance. A few scholars have been able to show a positive relationship between commitment and job performance when organizational commitment constructs are approached in their multifaceted form.

For example, Meyer *et al.* (1989) found that effective commitment correlates positively with job performance, while continuance commitment correlates negatively with job performance. Meanwhile, Becker *et al.* (1996) state that, although overall commitment to organizations appears to be largely unrelated to performance, there may be a relationship between commitment as a multidimensional phenomenon and performance. Hence, they found that employees' overall commitment to supervisors is significantly and positively related to job performance.

Another study involving hotel employees conducted by Gould-Williams (1999) provides evidence that commitment produces desirable employee job performance outcomes such as the willingness to work additional shifts and the willingness to work in whatever capacity is required.

Furthermore, with regards to the relationship between commitment and organizational performance, there are additional findings that reveal the existence of a positive link between the two (Brett *et al.,* 1995; Abdul Rashid *et al.,* 2003).

A study using conventional organizational commitment scales and different variations of a specially designed new commitment scale has shown evidence that employee commitment is significantly related to the financial success of the organization (Benkhoff, 1997). In the UK, Patterson *et al.* (1997) demonstrated the relationship between organizational commitment and company performance. They found that organizational commitment explains the variation between companies concerning change in productivity and profitability (7% and 5% of the variation respectively). This indicates the importance of managing employee commitment to influence business performance.

From the construction management literature, there is strong evidence that effective commitment is the main criterion for construction project success (good performance and high satisfaction) (Leung *et al.,* 2004). This suggests the essential

need for construction organizations to foster employee commitment for the successful delivery of services to their clients. Further, in responding to the changes in the external context such as the competitive business environment and the dynamic global market, it is noted by Mohyin (2011) that construction organizations need to make necessary changes to their internal environments such as the business strategies, financial decisions and HRM practices.

In this research, DB contractors' team commitment is hypothesized to have a positive effect on project performance by minimizing post-contract TCs. Thus, if the relationship is positive, then it will require the commitment of all contractor teams' members to move towards the direction for successful benefits realization in DB projects.

Commitment in Construction Industry

Although many studies of organizational commitment have been undertaken, they generally focus on large firms in manufacturing industries (Manetje & Martins, 2009). The construction industry has been neglected and very few published works exist that are directly concerned with commitment in the industry (Mohyin, 2011, 2012; Ghosh & Swamy, 2014; Raji & Gomez, 2017; Buvik et al., 2016).

It is alleged that this paucity of research into commitment from the construction perspective is caused by the lack of knowledge about the industry on the part of social scientists and a lack of understanding of social science by those in the construction industry (Langford *et al.,* 1995; Mohyin, 2011). The studies of commitment in construction tend to adopt quantitative methods, with organizational commitment measured predominantly using the popular scales developed by Porter *et al.* (1974), Mowday *et al.* (1979) and Allen & Meyer (1990). This also signifies a gap that the present research seeks to address by focusing on individual commitment.

From the review of the extant literature on the existing empirical studies of commitment in the construction industry, it was found that generally little and that no significant studies were done in the context of the Malaysian construction industry, as summarized in Table 2.6. The majority of studies conducted were in Hong Kong

(Rowlinson, 2001; Leung *et al.,* 2004; Leung & Chan, 2007; Liu *et al.,* 2007; Leung *et al.,* 2008), followed by Australia (Lingard & Lin, 2004; Wang & Armstrong, 2004), Thailand (Limsila & Ogunlana, 2008) and the UK (Mohyin, 2011).

The absence of empirical studies of individual commitment in the Malaysian construction industry suggests large gaps in the body of knowledge in this area. It is important to note that cultural differences may influence the attitudes and behaviour of construction project participants (Phua & Rowlinson, 2003). Hence, it can be expected that cultural and management style differences, generally between the countries aforementioned may play a strong role in determining the key issues related to individual commitment such as the meanings of commitment and factors that affect the individual's commitment to an organization.

Most of the aforementioned studies of commitment in construction focus on investigating factors that have an impact on commitment. Several authors focus on mainly single specific factors such as leadership styles (Limsila & Ogunlana, 2008) and work empowerment (Liu *et al.,* 2007; Hua, 2010). Whilst some others do examine the impact of various factors affecting commitment (Leung & Chan, 2007; Lingard & Lin, 2004; Meyer & Maltin, 2010). However, by focusing on the factors affecting commitment without investigating the nature of organizational commitment, these studies neglect to explain what commitment is from the perspective of the construction industry. Thus, this research seeks to close this gap.

Table 1: Previous studies of commitment in construction

Authors	Aim	Method	Findings
Limsila & Ogunlana (2008)	This study examines the influence of leadership styles on subordinates' organizational commitment and work performance.	Quantitative; Questionnaire survey Measured using Porter *et al.* (1974) commitment questionnaire in Thailand.	Transformational leadership style (leaders who encourage subordinates to put in extra effort and inspire their subordinates to raise their capabilities) has a positive association with work performance and the organizational commitment of subordinates more than a transactional style (leaders who focus mainly on the physical and security needs of subordinates).
Liu *et al.* (2007)	This study investigates the perception of work empowerment and determines whether perceived work empowerment is an antecedent of commitment.	Quantitative; Questionnaire survey	Work empowerment is positively related to affective commitment rather than continuance commitment.
Leung *et al.* (2008)	This study investigates the impact of moderate variables on the relationship between commitment, job performance and job satisfaction.	Quantitative; Questionnaire survey	Acceptance, contribution, specific goals and teamwork are moderate variables influencing the relationships between affective commitment and job performance and between job performance and job satisfaction
Leung & Chan (2007)	This paper reports the results the antecedents of commitment among construction professionals in Hong Kong.	Quantitative Questionnaire survey	The main antecedents of (affective and normative) commitment for construction professionals were found to project assignment and acceptance; specific goal achievement; belongingness; and membership maintenance of the organization. Internalization (value congruence) was found to be the antecedent of continuance commitment.
Leung *et al.* (2004)	This study investigates the impact of goal commitment amongst temporary project team members	Quantitative; Questionnaire survey	High effective commitment induces high performance and satisfaction, while continuance commitment generally has a positive relationship with intention to quit the project/company and turnover
Lingard & Lin (2004)	This study examines the relationship between career, family and works environment variables on organizational commitment among women in the Australian construction industry	Quantitative Questionnaire survey	There are various factors affecting commitment that include career choice commitment; satisfaction with career progression; job involvement; supervisory support; and the perception of the organizational diversity climate.
Wang & Armstrong (2004)	The study investigates the relationships between professionals' commitment (PC) and the organizational commitment (OC) of project management professionals in the Australian construction industry.	Quantitative; Questionnaire survey	Project management professionals" PC and OC are positively correlated, and commitment to the profession is significantly higher than to employing organizations.

Rowlinson (2001)	The study investigates the change process in a construction-based professional department of a large public organization and identifies factors affecting the change process.	Quantitative; Questionnaire survey	Low levels of organizational commitment exist in the workgroup and is limited solely to continuance commitment. The mismatch between organizational structure, procedures and organizational culture with the employees" expectations are identified as the cause of the low levels of commitment
Mohyin (2011)	Managing commitment in small construction professional services firms	Quantitative and Qualitative Conducted in UK	Professional employees" commitment is influenced by a complex range of factors. These relate to job design, performance and career management, training and development, reward management and employee involvement.
Hua (2010)	An empirical analysis of project managers competency, empowerment and learning in agent construction management system in China	Quantitative; Questionnaire survey	Empowerment has significant effects on job performance. Empowerment is highly related to job performance which suggests that project managers should be empowered to improve job performance.

Measurement of DB Team-Commitment Construct

The measurement scale of DB contractor team commitment used for this research was established by Mowday *et al.* (1979). Other scholars such as Meyer and Allen (1997) as well as Ghosh and Swamy (2014) later conceptualized organizational commitment in three dimensions namely: affective, continuance and normative commitments. These dimensions describe the different ways of organizational commitment development and the implications for employees' behaviour. Maslić Seršić (2000) carried out an empirical test of Meyer and Allen`s three-dimension model of organizational commitment in a Croatian context. Similarly, Rhoades *et al.* (2001) measured only one-dimension of the organizational commitment, which is the affective commitment towards the contribution of perceived organizational support. In this study, commitment is operationalized concerning previous studies such as that of Ghosh & Swamy 2014; Manetje & Martins 2009; Cohen 2007; Rhoades *et al.,* 2001; Mowday *et al.,* 1979 and Mowday *et al.,* 1982. This study aim is to emphasize the DB-contractor's-team commitment towards benefits realization in DB delivery system.

Hence, to operationalize and measure commitment, this study adopts construct

measures from the above-mentioned scholars. The three commitment variables namely; affective, continuance and normative commitment with thirteen items were developed to assess DB contractor team-commitment towards benefits realization.

A). *Affective Commitment*

The first dimension of organizational commitment in the model is affective commitment, which represents the individual's emotional attachment to the organization. According to Meyer and Allen (1997), affective commitment is "the employee's emotional attachment to, identification with, and involvement in the organization".

However, to operationalize and measure affective commitment, this study adopts construct measures (factors) from Ghosh & Swamy 2014; Manetje & Martins 2009; Cohen 2007; Rhoades *et al.* 2001; Mowday *et al.* 1979; Mowday *et al.* 1982; Meyer & Allen, 1997. Table 2 presents the final 4 items for 'affective commitment. The final four items were thus developed to assess the DB contractor team's affective commitment towards benefits realization. Hence, this study considers commitment as a first-order reflective construct.

Table 2: Items used for measuring affective commitment

	Items
1.	As part of the contractor team we would be generally happy to spend the rest of our career in this organization.
2.	As part of the contractor team we really feel as if this organization's problems are our own.
3.	As part of the contractor team we do not feel emotionally attached to this organization.
4.	As part of the contractor team the organization has a great deal of personal meaning for us.

Source: (Ghosh & Swamy 2014; Manetje & Martins 2009; Cohen 2007; Rhoades *et al.* 2001; Mowday *et al.,* 1979; Mowday *et al.,* 1982).

B). *Continuance Commitment*

The second dimension of the tri-dimensional model of organizational commitment is continuance commitment. Continuance commitment can be regarded as an instrumental attachment to the organization, where the individual's association with the organization is based on an assessment of economic benefits gained (Beck & Wilson, 2000). Meyer and Allen (1997) define continuance commitment as awareness of the costs associated with leaving the organization. It is calculative because of the individual's

perception or weighing of costs and risks associated with leaving the current organization (Meyer and Allen, 1997).

However, to operationalize and measure continuance commitment, this study adopts construct measures from Ghosh & Swamy 2014; Manetje & Martins 2009; Cohen 2007; Mowday *et al.,* 1979; Mowday *et al.,* 1982; Meyer & Allen, 1997. The final four items were developed to assess the DB contractor team's continuance commitment towards benefits realization. Table 3 presents the final 4 items for continuance commitment. Hence, this study considers continuance commitment as a first-order reflective construct.

Table 3: Items used for measuring continuance commitment

	Items
1.	As part of the contractor team it would be very hard for us to leave this organization right now, even if we wanted to.
2.	As part of the contractor team we feel that we have a few options to consider leaving this organization.
3.	As part of the contractor team one of the few negative consequences of leaving this organization would be the scarcity of available alternatives.
4.	As part of the contractor team one of the major reasons we continue to work for this organization is that leaving would require considerable personal sacrifice; another organization may not match the overall benefits we have here.

Source: (Ghosh & Swamy 2014; Manetje & Martins 2009; Cohen 2007; Mowday *et al.,* 1979; Mowday *et al.,* 1982).

C). *Normative Commitment*

The last dimension of the organizational commitment model is normative commitment. This kind of commitment refers to the employee's moral obligation to remain with the organization. Wiener and Vardi (1980) describe normative commitment as "the work behaviour of individuals, guided by a sense of duty, obligation and loyalty towards the organization". Organizational members are committed to an organization based on moral reasons (Iverson & Buttigieg, 1999). Meyer and Allen (1997) define normative commitment as "a feeling of obligation to continue employment". Internalized normative beliefs of duty and obligation make individuals obliged to sustain membership in the organization (Allen & Meyer, 1990).

However, to operationalize and measure continuance commitment, this study adopts construct measures from Ghosh and Swamy 2014; Manetje and Martins 2009; Cohen 2007; Mowday *et al.* 1979; Mowday

et al. 1982; Meyer and Allen, 1997. The final four items were developed to assess the DB contractor team's normative commitment to benefits realization. Table 5 presents the final 4 items for normative commitment. Hence, this study considers normative commitment as a first-order reflective construct.

Table 5: Items used for measuring normative commitment

	Items
1.	As part of the contractor team we do not feel any obligation to remain with our current employer.
2.	As part of the contractor team even if it were to our advantage, we do not feel it would be right to leave this organization now.
3.	As part of the contractor team this organization deserves our loyalty.
4.	As part of the contractor team we would not leave our organization right now beause we have a sense of obligation to the people in it.
5.	As part of the contractor team we owe a great deal to my organization.

Source: (Ghosh & Swamy 2014; Manetje & Martins 2009; Cohen 2007; Mowday *et al.* 1979; Mowday *et al.* 1982).

Commitment and Post Contract Transaction Costs

In this study, commitment is seen as being determined by the behaviour or attitude of the contractors' team (Morrow, 1993). Attitude and behaviour 'commitment' is considered as an antecedent to performance (Mohyin, 2011). Commitment refers to the degree to which an individual is attracted to the goals of, and involved in the work of, a particular organization (Mowday *et al.,* 1979). It denotes a degree of determination to achieve outcomes and stick with the project in the face of obstacles (Locke, 1991). In general, commitment can be classified as affective, continuance and normative (Allen & Meyer 1990; Meyer *et al.,* 2002).

In previous work, the impact of commitment on performance has been investigated within different groups, such as managers (Hunter & Thatcher, 2007), students (Chambel & Curral, 2005), and construction professionals (Leung *et al.,* 2009). It was found that both affective and career commitment have a positive correlation with performance (Allen & Meyer 1996; Hackett *et al.,* 1994; Leung *et al.,* 2004). Leung et al. (2008) also found that greater career commitment increases the intention to remain in the industry and

dedicate oneself to tasks. Further in their findings, shows that normative commitment did not directly predict performance. They conclude that career commitment improves performance. Similarly, it is noted by Hoegl *et al.* (2004) that commitment is likely to influence team members' efforts and has been associated with enhanced team performance. A recent contribution to this knowledge gap is the study of Ehrhardt *et al.* (2013) demonstrating that project commitment significantly predicts team performance in cross-functional product development teams.

Accordingly, in this research, the focus is on DB contractor team-commitment to deliver optimal benefits to the clients based on their requirement and minimize post-contract TCs which is seen as a waste and an impediment in DB benefits realization. Although it is very evident from the above discussion that commitment improves performance, this is to be verified in the specific case of the DB contractor's team-commitment. Hence, it is hypothesized that DB contractors' team-commitment positively influences their ability to minimize post-contract TCs.

Post Contract Transaction Costs

In any construction project, the procurement system adopted or implemented on the project has a significant impact on the TCs associated with the pre-contract and post phase (Dudkin & Valila, 2005; Whittington, 2008; Solino & Gago de Santos, 2010).

Post-contract TCs are commonly associated with monitoring and control, dispute resolution, and implementation activities for projects. Including the cost of contract administration such as administration, conflicts resolution, and decision- making (Li et al., 2013, 2015; Li, Arditi, & Wang, 2014; Rajeh, 2014; Rajeh, Tookey, & Rotimi, 2013). Furthermore, it includes the cost of contract enforcement such as enforcement and verifying compliances cost. Post-contract TCs include the "setup and running costs of the governance structure to which monitoring is assigned and to which disputes are referred and settled: the maladaptation costs that are incurred; the haggling costs that attend adjustments (or the lack thereof); and the bonding costs of effecting secure (credible) commitments" (Williamson 1985).

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. Also, the quality of decision making and uncertainty in the transaction environment

is also considered post-contract TCs. Hence, the aforementioned TCs were grouped into four latent variables that determine TCs (see, Li *et al.,* 2013, 2015); these are the predictability of owner's behaviour, predictability of the contractor's behaviour, project management efficiency and uncertainty in the transaction environment.

Methodology

The population of the study consisted of 4,625 G7 contractors (highest grade of registered contractors, eligible to bid for the value of work above RM10million (USD2.41m) registered with CIDB Malaysia based on the CIDB website directory as of December 2015 (CIDB, 2015). Based on Saunders et al. (2015) sampling table, 357 G7 contractors were selected through a systematic sampling technique with 3% margins of error and a 95% confidence level. A total of 248 questionnaires were returned with 17 considered as invalid. The collected data was tested for missing data and Monotone Response Pattern. The data from the 231 questionnaires were analysed using Principal Components Analysis in SPSS version 21.

Findings

The Principal Components Analysis (PCA) in SPSS was used to extract the 12 specific DB contractor team commitment factors. Before performing PCA, the suitability of the data for factor analysis was assessed. Inspection of the correlation matrix revealed the presence of many coefficients of 0.4 and above. As shown in the KMO and Bartlett's Test in Table 6, the Kaiser-Meyer-Olkin value is 0.864, exceeding the recommended value of 0.6 (Tabachnick & Fidell, 2018; Aldrich, 2019) and Bartlett's Test of Sphericity reaches statistical significance (Sig. value .05 or smaller), supporting the factorability of the correlation matrix (Hair et al., 2018).

Table 6: KMO and Bartlett's Test

Approx. Chi-Square	2027.375
df	66
Sig.	.000

Furthermore, based on the analysis, the Varimax method of orthogonal approach was adopted for the factor rotation. The orthogonal approach indicates that all components are assumed to be uncorrelated (Bordens & Abbott, 2018; Aldrich, 2019). Varimax rotation method is the most commonly used method which attempts to minimise the number of variables that have high loadings on each other (Pallant, 2016). Based on this analysis, rotation converged in 10 iterations. PCA revealed the presence of 3 components with eigenvalues exceeding 1, explaining 75.3% of the total variance. The percentage of variance for each retained component and its eigenvalue are included in Table 6. Retaining components with eigenvalues of 1 or greater is the most commonly used rule. According to Hinton, McMurray, and Brownlow (2014), "an eigenvalue of 1 indicates that the factor can explain as much variability in the data as a single original variable." There is no threshold for the minimum percentage of total variance explained however, Hair et al. (2018) mentioned that 60% is satisfactory. The rotated component matrix table was generated in SPSS and a decision concerning the number of components to be extracted was made. All principles loaded on all 3 components (Refer to Table 7) even though, there were cases of cross loading, in which some were retained (if the difference is <0.2) and those above (if the difference is >0.2) were removed.

Table 7: Result of factor analysis

Components	Eigen value	% of Variance	Name of components[a]	Commitment[b]	Factor loading
1	2.622	65.538	Affective Commitment	AC01	0.760
				AC02	0.830
				AC03	0.806
				AC04	0.828
2	2.870	71.762	Continuance Commitment	CC01	0.904
				CC02	0.795
				CC03	0.806
				CC04	0.876
3	2.922	73.054	Normative Commitment	NC01	0.853
				NC02	0.866
				NC03	0.839
				NC04	0.854

[a] Components were named based on extraction and characteristics of the group
[b] The meaning of AC, CC, NC are presented in the list above, Table 3-5.

A 3-component competency was established based on the Varimax rotation of principal component analysis (see, Table 3). These 3-factor groupings with eigenvalues greater than 1.000 explain 75% of the variance. Each of the commitment items belonged to only one of the groupings, with the value of factor loading exceeding 0.50 (Aksorn & Hadikusumo 2008).

Component 1: *Affective Commitment*
This component, which accounted for 65.53% (see, Table 7) of the total variances between competencies, was less in percentage variance than the other 2 components, even though, it has surpassed the recommended threshold of 60%. It indicated that D&B contractor team in Malaysia consider Affective commitment significant in D&B project delivery process. To enhance the understanding of D&B contractor team, their commitment factors and potential influence need to be established.

Therefore, this component, which relates to commitment, is described as the contractor team being *happy to spend the rest of their career in D&B organization or firm; they also feel as if the organization's problem is their own, and their organization has a great deal of personal meaning to them* as represented by AC01-AC04. The findings are similar to the previous study of Mohyin, (2011); Ghosh & Swamy (2014) and Buvik *et al.* (2016).

Component 2: *Continuance Commitment*
This component, which accounted for 71.76% (see, Table 7) of the total variances between competencies, was considered relatively more significant as shown in percentage variance than the affective commitment component. It indicated that D&B contractor team in Malaysia consider continuance commitment significant in D&B project delivery process.

Key commitment factors such as team members find it very hard to leave their D&B firm or organization even if they wanted to; they have few options to consider leaving the organization; one of the few negative consequences of leaving this organization would be the scarcity of available alternative to what they have at that moment; one of the major reason they continue to work for the D&B firm is that leaving would require considerable personal sacrifice as such another firm may not match the overall benefits they would have at their current firm.

The findings are in line with the previous

study of Mohyin, (2011); Ghosh & Swamy (2014) and Buvik *et al.* (2016).

Component 3: *Normative Commitment*

The third component, account for 73.05% (see, Table 7) of the total variances between competencies, was seen as highly significant based on the analysis, as a percentage variance than all the other components. It indicated that D&B contractor team in Malaysia consider normative commitment significant in D&B project delivery process.

Key commitment factors such as an *obligation to remain with a current employer* can stimulate and motivate team members and interested parties to act in the interest of the project and show efficient and effective *behaviour* whilst, *loyalty*; even if leaving were to their advantage, they do not feel it would be right to disorient the DB firm. The findings are in line with the previous study of Mohyin, (2011); Ghosh & Swamy (2014) and Buvik *et al.* (2016).

Conclusion

Based on the finding of this research it is clear that DB contractor team commitment is seen as a vital driver for minimizing PTCs and enhance project performance. The findings indicated that all three commitment factors of DB contractors' team have a strong and positive significant effect towards minimizing PTCs, even though normative commitment was found to be highly significant with a potential of greater impact on DB project delivery. It is also evident that DB contractor team members that have an obligation to remain with their current employer are likely to key into the idea of benefits realization by minimizing PTCs during the delivery process, as they seem to be not distracted or influence by other factors. It is proposed that to minimize PTCs, affective, continuance and normative commitment of DB contractor team members need to be given greater emphasis for DB projects to leverage on its full potential with respect to permitting a greater interplay of structure and agency.

This research offers new insights for the contractor team of the DB delivery system in the construction industry to reinforce a team-commitment to deliver the objectives of DB delivery system as originally intended. It will also enable key DB contractors to steer their organizations towards a more effective DB delivery system.

The aspect of PTCs is seen as a social waste of wealth and minimizing them can redeem the perception of the DB delivery system as

not being a failing system and consequently the realization of the full potential of utilizing DB method for delivering successful projects in the Malaysian construction industry.

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