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A Cypriot perspective of the impact of procurement on disputes

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Abstract

No attempts have been made to resolve or analyse the key factors that cause disputes in the Cypriot construction sector and how these causes differ across procurement options. This informed a study to investigate the frequency and factors that cause disputes in Cyprus when the traditional and 'Design & Build' (D&B) procurement options are used. The study used a deductive, quantitative approach and a questionnaire survey to collect primary data from 40 construction professionals. The key causes of disputes in Cyprus were identified following the use of inferential statistics to analyse the primary data obtained. The causes of disputes were similar between the two procurement options; however 'Incomplete Design' showed a statistically significant difference between the median responses of the respondents. Also, the grouped responses of the frequency of disputes showed a difference between the two types of procurement. Most respondents agreed that there was a high level of difficulty in addressing disputes in D&B in relative comparison to traditional procurement. The need to minimise disputes was highlighted as many of its causes make their probability of occurrence to be quite high.

Keywords

Procurement, Disputes, Comparative analysis, Construction projects, Construction in Cyprus.

1. Introduction

Disputes occur between contractors and clients in the course of construction contracts and some of these can be intricate and complex (Dangrochiya et al., 2015; Gunduz & Yahya, 2018). Disputes can undermine project success if not curtailed or managed well. Some attributes concerning the causes of disputes and project success can be mapped, as in Figure 1.

Construction procurement is a functional and contractual framework for connecting and organizing project members all through the construction procedure in a precise extraordinary structure (Tiwari, Chan & Mubarak, 2018). Procurement includes the procedure of creating, managing, and satisfying contracts (International Organization for Standardization (ISO), 2010). It facilitates project risk allocation and management because the option used influences the allocation of responsibilities to the key parties and by extension the cost consequences to them (Osipova & Eriksson, 2011). There are many types of procurement which include the Traditional method, Design & Build (D&B), Management Contracting (Greenhalgh & Squires, 2011), Construction Management (Donohoe & Brooks, 2007), Integrated Project Insurance Procurement (IPI) (Pittard & Sell, 2017; Connaughton & Collinge, 2021), On-Call Contracting (Walker & Hampson 2002), Partnering (Ruparathna & Hewage, 2015) and Public-Private Partnerships (Oyegoke et al., 2009. Procurement can be Cost-led (Cabinet Office, 2014), Two-Stage Open Book (Pittard & Sell, 2017) or Measured-term method (Griffith, 1992).

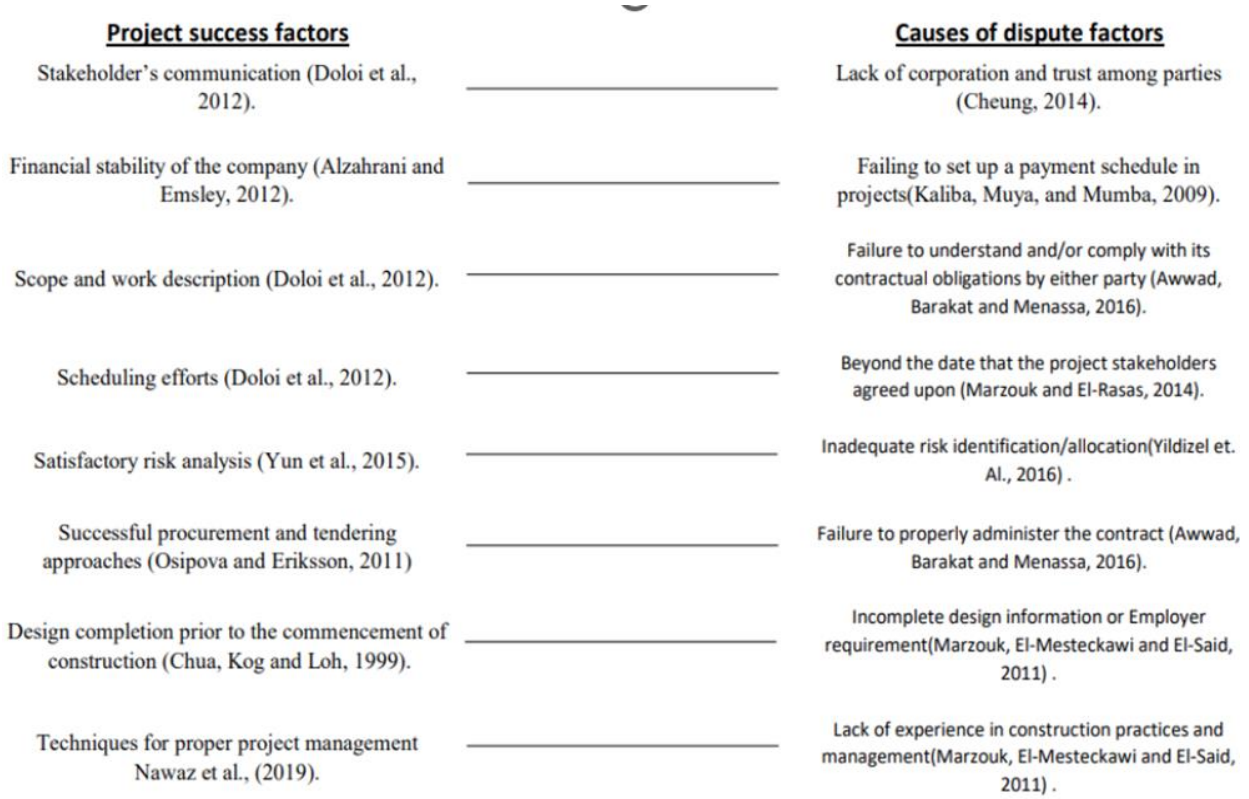

Figure 1. Correlation between factors of project success and factors of causes of dispute.

The D&B and traditional procurement options appear to be used more frequently in construction projects. Meanwhile, there is ambiguity in the frequency of disputes and factors contributing to disputes under these two procurement options. No attempts have been made to study these aspects in the construction industry of Cyprus where the traditional and D&B procurement options are predominantly used. This research gap led to the formulation of our Problem Statement:

- What key factors cause disputes between clients and contractors in Cyprus, and how do these causes vary between the traditional and D&B forms of procurement?

A study was carried out to research this problem.

Aim and Objectives

The aim of the study was to investigate the prevalence of factors that cause disputes within the traditional and D&B forms of procurement in Cyprus. The objectives included:

- To investigate the factors that cause disputes in projects procured by the traditional and D&B methods in Cyprus.
- To investigate the prevalence of the causes of disputes in both traditional and D&B procurements in Cyprus construction.
- To explore how to eliminate or reduce the causes of disputes in Cypriot construction.

The next section will provide a literature review, after which the methodology employed will be explained. The results obtained will then be presented and discussed before the conclusions are made.

2. Literature Review

2.1 The Traditional Procurement Method

In traditional procurement, the design precedes construction. This approach is less risky to the employer due to its inherent assurance about design and project time and cost prior to construction (Ruparathna & Hewage, 2015). Also, the roles and responsibilities are well comprehended and offer high-quality control opportunity (Love et al., 1998). Competitive tendering in this approach further drives down price (Morledge & Smith, 2013).

The approach is however sequential in nature and thus delays the start of construction (Brook, 2017). The contractor's expertise is not utilised in the design process (Hoppe et al., 2013). While a typical lump sum tender may yield the lowest tender price, it may not yield the lowest final construction cost (El-Sawalhi & El Agha, 2017).

2.2 The Design and Build Procurement Method

D&B is an approach where the contractor is responsible for both the design and construction in the project (Brook, 2017). In this approach, there could be novation of design in the process (Walker & Hampson, 2002). There is also a single point of responsibility, which reduces the administrative work of the client (Rahmani et al., 2017). Akintoye and Fitzgerald (1995) and Saaidin et al. (2016), indicated that D&B allows the employer and contractor to communicate more frequently than in traditional procurement. Fitzgerald (1995) showed that D&B projects tend to continue more smoothly because the design and construction teams will be working together and thus there will be less likelihood of conflict. According to Chan (2000), disputes attributable to discrepancies in project documents, as well as project postponement begin to fade away because the D&B contractor has no one but itself to blame for the flaws.

In D&B, contractors can pay lesser attention to the quality of work and life-cycle costs (Walker & Hampson, 2002). The cost of the project is much more imprecise and hence difficult to assess in D&B especially at the earlier stages (Molenaar & Gransberg, 2001). The parties should ensure that the disadvantages do not outweigh the advantages (Anumba & Evbuomwan, 1997).

2.3 Disputes in Construction Procurement

Disputes occur frequently in the construction industry. However, these may occur only once in a project (Levin, 2016). Figure 2 demonstrates the anatomy of construction disputes. Figure 2 indicates different types, and by extension different sources, of disputes.

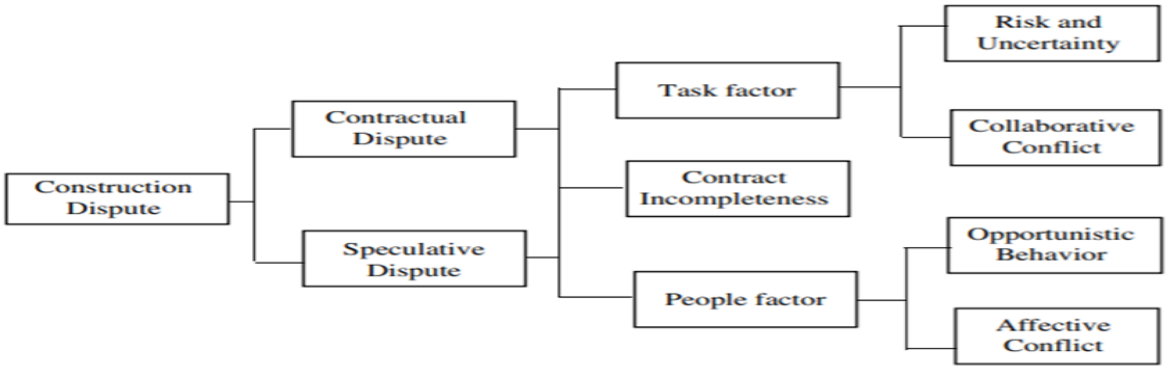

Figure 2: The anatomy of construction disputes (sources: Zhu & Cheung, 2020).

2.4 Causes of Construction Disputes

As stated by Meadow et al. (2018), when there is a variety of experts involved, irregularities among design and construction, project delivery system, and site conditions that encompass the construction industry it frequently leads to conflicts and disputes on the legal obligations and the rights of parties included. Numerous project factors were recognized by Mante et al. (2012) as reasons for disputes in construction, principally not providing the client's purposes in accordance with the cost, time and quality. It is also supported by Zhu and Cheung (2020), that project disputes arise from unbalancing risk, poor quality, timetable delays, power patterns, and a problem with the cost.

According to Arcadis (2018), the infrastructure and public-sector projects are the most contentious, owing to their complexity. Also, changes in circumstances, time, delays, bidding problems, and lack of communication are primary causes of disputes in the construction industry (Jahren & Dammeier, 1990). Nonetheless, Arcadis (2016) determined six causes of disputes: inability to administer the contract, claims that are inadequately deficient and unconfirmed, mistakes and oversights in the contract, fragmentation of design data, parties neglecting to comprehend or conform to their commitments and an inability to proceed with interim payment on augmentation of time and pay.

According to Ismail et al., (2010), there is a high frequency of disputes in the construction industry due to the lack of risk allocation and management. As maintained by Al-Momani (2000), disputes stem from assertions that work was performed outside of the scope of the contract. It is very critical to maintain constancy in the contract, as it minimizes subsequent interpretation disputes (Ismail et al., 2010). Awwad et al., (2016) divided the reasons for disputes into three categories: managerial factors, contractual factors, and civil factors. Illankoon et al., (2019) on their part divided the reasons for disputes into administrative aspects, external aspects, and individual aspects.

Problem Identification/Statement

The above sections were based on evidence from various countries, but data from Cyprus was not found by the researchers. Hence, the main research question formulated was: ***how frequent do disputes materialise in Cyprus and what are the different factors causing these in traditional and D&B procurement?***

3. Methodology

Some of our research objectives were value-neutral and others value-laden. These philosophical opinions informed the adoption of the deductive approach; hence the study involved quantitative data collection and analysis. The survey strategy is regularly used in a deductive approach (Fellows & Liu, 2015) and was thus adopted in our study where a questionnaire was used as instrument. Its benefits include the wider reach of participants (Saunders et al., 2009) and flexibility (Karjalian, 2020). The unit of study was the construction industry of Cyprus, which has an expanding number of new, complicated, and expensive projects, and employs cutting-edge expertise and procedures to deliver creative buildings (Emilianides, 2021). The researchers were granted ethical approval by the School of Architecture and Built Environment of the University of Wolverhampton.

Non-probability sampling was used where 250 questionnaires were sent out by email and 40 responses were obtained, representing a response rate of 16%. The demographic questions obtained nominal categorical data while the rest of the questionnaire collected ordinal data. The Chi-Squared test of independence was adopted as a statistical hypothesis test to determine whether two categorical or nominal variables were likely related or not (Hittner, 2012). The Wilcoxon Signed Rank test and logistic Regression were further used to determine 'if samples came from the same distribution' (McKight & Najab, 2010).

The respondents consisted of 35 males and 5 females; 11 civil engineers, 10 quantity surveyors, 5 architects, 3 land surveyors, 2 contractors, 2 electrical engineers and 7 from other disciplines. Thirty seven of the respondents had a degree qualification. On face value, the respondents can answer the questions adequately and provide valid responses.

4. Results

Disputes develop often in both the traditional and D&B procurements. The respondents rated the frequency of these disputes as: very frequently (17.5%), frequently (35%), occasionally (40%) and rarely (7.5%). These ratings were exactly the same for both procurements. The respondents ranked the underlying causes of disputes as follows:

1. Lack of Interpersonal Relationship Among Professionals
2. Incomplete Design Information
3. Lack of Corporation and Trust Amongst Parties
4. Failing to Setup a Payment Schedule in Projects
5. Failure to Properly Administer the Contract
6. Inadequate Risk Identification
7. Lack of Experience in Construction Management
8. Lack of Client Satisfaction
9. Beyond the Date that Project Stakeholders Agree Upon
10. Inadequate Stakeholders Agree Upon

This ranking was statistically the same for both the traditional and D&B procurement methods.

4.1 Modelling Dispute

Since the dependent variable was nominal, in nature, then the most appropriate model to use was the logistic regression model. However, the simple logistic model can only have a binary variable as its dependent variable. Therefore, the four responses to the question on how frequently disputes arise where split into two groups; the first group contained the people who thought that disputes arose frequently or very frequently, and the second group contained the people who felt that disputes arose occasionally or rarely.

Since the dependent variable, for both methods of procurement, has been converted to a binary variable then the model could be stated as (following Wooldridge, 2015)):

$$P(y_i = 1|\boldsymbol{x}) = G(\beta_0 + \beta_1 x_1 + \cdots + \beta_k x_k) \\ = G(\beta_0 + \boldsymbol{x\beta})$$

Where G is function taking value strictly between zero and one: 0<G(z)<1, ∀ real numbers z. This function is the logistic function which takes the form:

$$G(z) = \frac{e^z}{(1 + e^z)}$$

Combining these two equations would restate the logistic regression model as:

$$P(y_i = 1|\boldsymbol{x}) = \frac{e^{(\beta_0 + \beta_1 x_1 + \cdots + \beta_k x_k)}}{1 + e^{(\beta_0 + \beta_1 x_1 + \cdots + \beta_k x_k)}}$$

Where:

- P(y=1|x) is the probability that the respondent will state that disputes rise frequently given different factors.
- e is the exponential function and β_i for i = 1, 2, …, k are parameters to be estimated.

This equation facilitates the modelling of the probability of respondent *i* moving from one category to another; in our case from frequently observing disputes in a procurement method by considering specific factors.

The estimation of this last equation was done using both a backward and a forward stepwise procedure since the number of independent variables was large. This is because there were five demographic variables (control variables) and ten independent variables. Stepwise regression is a procedure where the inclusion (forward) or exclusion (backward) of an explanatory variable is based on a specific criterion. In this analysis, a p-value of 15% was the criterion for both models.

Based on the regression results, the only factor that was statistically significant regarding the frequency of disputes arising in the traditional method of procurement was 'the failure to properly administer the contract'. The estimated coefficient was 1 with a standard error of 0.460 and a p-value of less than 5%. This means that for every unit increase in the response of the constructor to the question "Failure to Properly Administer the Contract", the log odds of choosing "Frequently" increased by 1. For example, moving from strongly disagree (1) to disagree, (2) regarding the aspect of "Failure to Properly Administer the Contract" increased the odds ratio of choosing "Frequently" by 2.717. Similarly, according to the model, the estimated coefficient for Age was negative and statistically significant at the 5% confidence level. The implication is that the log odds of choosing "Frequently" as a response to the question "how frequently do disputes arise in Design and Build methods of procurement" decreased the older the individual was.

Furthermore, for the D&B model, the factor of "Lack of Interpersonal Relationship Among Professionals" was statistically important at the 1% confidence level. The estimated coefficient for this factor was 1.599, which suggests that for every 1 unit increase in the variable, that is moving from e.g. strongly disagree (1) to disagree, 2) the odds ratio of choosing "Frequently" as a response to the question "how frequently do disputes arise in Design and Build methods of procurement" increased by 4.9481.

$$Probability = \frac{odds\ ratio}{1 + odds\ ratio}$$

Further, the estimated probability for "Lack of Interpersonal Relationship Among Professionals" was 0.831 (or 83.1%). That is, when a respondent moved from strongly disagree (1) to disagree, (2) the probability of choosing "Frequently" as a response to the question "how frequently do disputes arise in Design and Build methods of procurement" increased by 83.1%. Similar arguments can be made for the rest of the attributes and their estimated coefficients.

5. Discussion of results

5.1 Factors that cause dispute in project procured by the traditional and D&B methods

Literature identifies several causes of disputes, e.g.:

- Failure to meet the client's needs in terms of cost, time, and quality (Mante et al., 2012).
- Unbalanced risk, poor quality, timetable delays, power patterns, and a cost problem (Zhu & Cheung, 2020),
- Inability to administrate the contract, claims that are inadequately deficient and unconfirmed, mistakes and oversights in the contract, fragmentation of design data, parties neglecting to comprehend or conform to their commitments and inability to proceed with interim payment on augmentation of time and pay (Arcadis, 2016).
- Irregularities in design specifications, incomplete design data and bad quality of design (Abdallah et al., 2019; Meadow et al., 2018).

Our findings align with the views in literature, particularly that 'Incomplete Design Information' is a key cause of disputes in construction (Abdallah et al., 2019; Meadow et al., 2018).

5.2 The frequency of the causes of dispute in Cyprus.

The majority of the respondents' answers agree with literature that unprofessional conducts by contracting parties, irregularities in design and construction, poor delivery of project systems and site conditions are frequent causes of disputes (Meadow et al., 2018). Ismail et al., 2010) reinforces the prevalence of disputes in the construction industry.

However, the respondents who had a higher degree, i.e. Master's (60% of the sample) or Doctorate (5%), indicated that disputes occurred more frequently in D&B than in the traditional method of procurement. This finding contrasts with Mante et al.'s (2012) view that the traditional procurement procedure has a higher number of disputes than D&B owing to inadequate communication, price competition, and fragmentation. This may be the peculiarity of Cyprus and

our notable finding: that disputes occur more in D&B in Cyprus whereas they occur more in the traditional method of procurement in other countries.

There are plausible reasons why disputes could arise in D&B projects e.g. incomplete or vaguely stated requirements by clients can mislead a contractor to deliver what is not wanted. Section 5.3 below alludes to this reason. Further, a change in the requirements of a client mid-way through a project can cause dispute regarding the contractor's associated demand for extra time and or cost. On the other hand, a client's requirements may be clear upfront, but a contractor can opt to deliver a functional (effective) building product but use materials or apply finishing standards that are not top-class. There could be other possibilities, but our research did not investigate further into the specific reasons why disputes in D&B in Cyprus are relatively higher. The two-fold reasons why we could not proceed further in this direction were: 1) time constrained us, and 2) we did not expect to discover more disputes in D&B and did not expatiate the study instrument to cover this aspect. We take this **notable finding** as a pointer to further research which we will bear in mind in our future endeavours.

5.3 Elimination or reduction of the causes of dispute.

Disputes in the construction industry are nearly always unavoidable (Blake, 2016). The majority of respondents in our study agreed that the causes of disputes in both the traditional and D&B procurement methods can be reduced. The findings suggest that this reduction can be achieved more in Cyprus in the D&B design method, because of the prevalence of disputes experienced in it. One attribute which the respondents agreed could help reduce disputes is 'clear contract specifications'; Meadow et al. (2018) agree with this opinion.

6. Conclusions

The study found that disputes occur in construction projects in Cyprus, as in other countries. The frequency of occurrence of these disputes tends to be on the high/higher side in Cyprus for both the traditional and D&B procurement. The respondents in the study that had a higher degree of Master's and PhD felt that disputes occurred more frequently in D&B than in the traditional method of procurement. Notwithstanding, 'Incomplete Design Information' was particularly noted by all respondents as a major cause of disputes in Cyprus.

The study established that addressing disputes is difficult, and relatively more difficult in D&B than the traditional mode of procurement. However, the majority of respondents agreed that the causes of disputes in both traditional and D&B procurements can be reduced in the Cypriot construction industry. The majority of respondents indicated that the gravity of disputes outweighs their frequency of occurrence.

The hope raised by the findings is that disputes can be minimised. We therefore recommend that further studies and quests should be carried out to explore strategies and tactics to minimise or avoid disputes in construction projects in especially Cyprus. We particularly recommend that a future study should explore why more disputes occur in D&B projects in Cyprus.

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