



EVALUATION OF PERFORMANCE AGAINST CONTRACTORS' TENDER POSITION ON SELECTED PUBLIC CONSTRUCTION PROJECTS

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ABSTRACT

Previous studies have investigated tendering of construction projects and project performance in silos. This study examines project performance of contractors, based on their tender positions as perceived by clients. Quality and speed of delivery of construction projects formed the study remit. A questionnaire was administered to selected public clients (Federal Ministries and Departments). Responses received were analyzed with aid of simple means and percentages. The analysis showed that 76.92% of tenders submitted were below the mean tender sum. Similarly, 23.08% of the tenders were above the mean Tender sum. Further examination revealed that 23.08% of projects were completed at costs significantly higher than the original contract price. Accordingly, 80.77% of the contractors delivered their projects within the contract price. Inadvertently, clients' rating of the performance of contractors showed that their projects were delivered within budget at final accounts, with performances below average as Clients disapproved the quality and speed of delivery by such contractors. On the other hand, contractors whose projects overran their budgets were rated above average in terms of performance and delivery quality. The mean tender sum was recommended as the most important benchmark for clients in early projects decision at tender.

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1.0 Introduction

Many sensitive decisions are taken at tender without due considerations for their overall effects on construction projects outcomes (Grega *et al.*, 2019; Idiake, *et al.*, 2015b). Since activities in the construction industry are regarded as important indicators for an economy (National Construction Policy, 1991), the demand and supply side of the industry should showcase the effect of these activities in the method of procurement adopted for each project development. By so doing the industry can provide useful services of organising and managing materials and other components that are combined to form projects. The Nigerian Public Procurement Act (PPA, 2007) as amended, recommends that construction projects should be procured through competitive or selective bidding process. Whichever method is adopted, the winning bid may not always be the lowest, but the most responsive. However, the bid evaluation process involves participation of professionals in the client's organisation as well as the commissioning of external cost advisers (consultants). These advisers among other things prepare pre-tender estimates for clients before tenders are invited (Brook, 2017). The underlying assumption is that the construction firms that submit the lowest most responsive evaluated tender price should be awarded the contract (Xia *et al.*, 2013; Dikko, 1999). The subsisting practice entices contractors to lower costs through cost savings techniques and managerial innovations. The savings are assumed to be subsequently transferred to clients through the competitive process (Alien, 2001; Hale *et al.*, 2009; Nguyen, Lines and Tran, 2018; Tao *et al.*, 2019). According to Morledge and Smith (2013), concerns have been expressed over the degree of reliability that clients attach to the selected contract sum, as most public sector clients rely heavily on the tender sum of the preferred contractor as an indicator of performance. Bustani (2004) observed that unrealistic cost estimate by construction contractors, account for a significant

level of poor performance by the contractors. There is therefore, the need to examine the contractor's tender position against the performance of the construction projects they handle.

1.1 Performance-based Tender Evaluation

In Nurshikin *et al.* (2016), the importance of performance-based tender evaluation as indicators for enhanced contractor performance was supported, as tender sum were observed to have a significant relationship with performance. Mohammed *et al.* (2019) also identified significant factors responsible for poor construction project performance for which the cost factor ranked highest. It is therefore pertinent, to assess public-sector construction procurement practice in Nigeria in order to reveal a good basis for formulating effective public sector procurement policy in respect of tender sums.

Since the extent to which a contractor wins a job and the adequacy of the tender sum are the main attributes of performance (Mohammed *et al.*, 2019), clients are still mostly disposed to awarding projects to the lowest bidders, whose tenders fall within $\pm 10\%$ of the consultant/in-house estimate. Such considerations encourage contractors to submit figures that fall within the range of the consultants' estimate and an established percentage range. This, the contractors do to increase their chances of winning the contract (Setiawan, *et al.*, 2015). With the practice of choosing the lowest evaluated tender as leverage for strategic bargaining, contractors often lower their prices by a considerable amount, in order to secure the job (Bustani and Anigbogu, 2004). Depending on the state of the economy and the construction industry, contractor's decision on mark-up in difficult times are normally close to break-even or, worse, below cost (Vassailo, 2001). A contractor winning a job below cost would then have to adopt a strategy during the project, whereby more money is made on claims and variations (Morledge and Smith, 2013). Counterintuitively, most public clients base their decision at the time of award of contract on agreed cost, with the expectations that all contractual conditions are in place to safeguard their interest against any future claims. As concurred in previous research (Alien, 2001; Hale *et al.*, 2009; Minchin *et al.*, 2013; Nguyen *et al.*, 2018; Park *et al.*, 2015), the subsisting rationale is responsible for the frequent award of contracts to contractors with the least appreciation of the project complexity or the greatest risk or a contractor with the lowest current workload. It therefore shows that there is, perhaps the need to examine contractor's positions in bid against the project performance.

Construction procurement has been defined as the methods employed in the industry in respect of contractual options to be deployed by a client for the purpose of minimizing moral hazards attendant to the project development process (Arain *et al.*, 2014; Eriksson and Lind, 2016; Oo and Yan, 2018). Turner (1990) averred that construction procurement entails all possible ways in which members of the construction team are assembled to provide or produce a facility (the end product). The procurement of construction products is achieved through a number of routes. Hence, clients choose the route with the highest obvious potentials under the prevailing circumstances. The procurement route normally precedes the preparation of the project brief (Palaneeswaran and Kumaraswamy, 2000). The grouping of members of the construction team according to functions of design, management and construction is known as procurement paths (Dada, 2012). Each discrete path exhibits particular characteristics and therefore provide the necessary service(s) in meeting clients' needs (Chen *et al.*, 2018; Olanrewaju *et al.*, 2016). Some authors (Alves *et al.*, 2016; Neuman *et al.*, 2015) have noted that construction products could be acquired either through purchase, lease/rent or design and construction. The later process is normally complex and involves the commissioning of project team members, where each party brings into the process, its organisation expertise (Ashworth and Perera, 2015; Hommen and Rolfstam, 2009). Ahmed *et al.* (2016) concurred that project objectives, as defined by the clients, always form the basis for any procurement decision. These objectives become the project requirements and constraints, as gauged by cost/time limits, aesthetic function and quality standard.

2. Procurement Systems

Many procurement routes are recognized in literature for construction projects delivery. However, the commonest route in practice is the traditional procurement route also known as the design-bid-build (DBB), in spite of it being design-led and prone to budget, simply because it is better recognized by the Nigerian public procurement regulatory framework.

2.1 Traditional Procurement System (Design-Bid-Build)

The traditional system owes its prominence to the fact that many construction clients initially sought for someone with the capability of translating their briefs into a design. The designer in this case becomes the

leader of the construction process (Carpenter and Bausman, 2016; Minchin *et al.*, 2013). This system also provided useful datum for the consideration of other systems. The system is characterised by sequential design-bid-build process (Nguyen *et al.*, 2018). In the traditional system, the client appoints consultants for design. Upon the completion of the design, a contractor is appointed to carry out the construction work (Hughes *et al.*, 2015; Idiako *et al.*, 2015a, Lingard, *et al.*, 1998). In building projects, architects take the client's brief and transforms it to an architectural form. Other professionals, such as the structural engineer, come in for the structural design and detailing, while the building services engineer takes care of mechanical and electrical details to a point where the various elements of the structure can be taken off and worked up into a Bill of Quantities by the Quantity Surveyor (Rajeh, *et al.*, 2015; Doloi, 2012; Ramsey *et al.*, 2016).

As supported in many studies (Ballesteros-pérez *et al.*, 2015; Oo and Yan 2018; Zavadskas *et al.*, 2008), one feature of the system is the competitiveness in the selection process of the right contractor. This is buttressed in Dorée and Holmen (2004) and Papadonikolaki (2018) as the system is known for its fragmentation and the separation of design and construction of the product. According to Frank (1998), competitive tenders as a system ensures that the client obtains the benefits of the lowest cost, with drawings and priced Bills of Quantities facilitating measurement and valuation of variation during progress of works. The design is normally fully developed at tender stage. Variations in the systems are adapted by an accelerated and parallel activities of design overlapping with construction (Ramsey *et al.*, 2016; Walker, 2015). The criticism of the system is that it minimizes the overlap in the period of design and construction, which requires that design have to be completed before construction (Ramsey *et al.*, 2016). In the same way, invitation for tenders after design, before construction start, may require longer period when compared to other system like 'design and build' or 'management' procurement option (Alien, 2001; Ling *et al.*, 2004; Park *et al.*, 2015). Walker (2015) reports that when using the traditional procurement approach, inter-team working relationships fails in creating an environment where the construction team can best contribute its expertise in achieving a quicker construction period and isolate the client's representatives from the management of the construction process. Aina and Yakeen (2011) posit that in Nigeria, both the public and the organized private sectors usually procure construction projects using the traditional contracting method. The practice has been attributed to the fact Nigeria is a colony of Britain where the traditional construction method was developed and widely used (Ojo and Gbadebo, 2012).

2.2 The Design and Build Procurement System

The design and build procurement method has been described by as "a single financial transaction under which one organisation designs and builds a facility on behalf of a client" (Nguyen *et al.*, 2018). Under the design and build approach, the client enters into one contract with a Design and Build firm responsible for project development and construction. Xia *et al.* (2013) indicated that the method is the simplest of all the procurement methods because there is only one contract and one line of communication for the client. As pointed out in previous studies (Xia *et al.*, 2014), the main feature of the system is that the responsibility for both design and construction lies with only one organisation, with contract signed most often before full documentation. Design in this case is not fully completed before construction commences, and Bill of Quantities is not normally prepared, so variations are priced to a schedule. The consequences of this is that the variations have to be paid by the client either on a pro-rata basis or even at higher rates due to cost overrun. Ajanlekoko (1992) claimed that the method helps clients to meet their objectives through a single financial transaction, on a pre-agreed price and possibly on a final scale not otherwise achievable without considerable risk. The range of services offered by the Design and Build varies considerably. In some cases, the design and build contractor will find the project site, arrange mortgage, sale-and-lease back and similar facilities. In addition to designing and constructing, to meet the clients requirements (Ireland, 1984). The approach involves direct negotiation between the client and the contractor (or several contractors where the client seeks competitive tenders). Basically, the client states his requirements and the contractor prepares design and cost proposals to meet these requirements. The process entails contractors submitting an initial proposal to demonstrate the 'package' to the client and the design is only fully developed when both parties have reached an agreement regarding specifications and price.

The most common types of the design and build system include:

i. **Direct**

In this case, no competition is obtained in tenders. Some appraisal of possible competitors may be made before tendering but only one tender is obtained.

ii. Competitive

Competitive design and build is the most usual procedure with tenders being obtained from documents that are prepared to enable several contractors to offer competition in designs and in prices.

iii. Develop and construct

Consultants design to a partial stage often called a 'scope design', then obtain competitive tenders from contractors that develop and complete the design and then execute the project.

Some alternatives abound in the body of knowledge on construction procurement which include the package deal, Management Procurement System.

Four types of management system can be distinguished in the construction industry. These include management contracting, construction management, design and manage, as well as design, manage and construct.

2.3 Contractor Selection Methods in the Construction Industry

One of the most important tasks facing a client when embarking on a scheme of construction work is the correct choice of a contractor for the project (Araújo *et al.*, 2015; Erdogan *et al.*, 2017; Idiako *et al.*, 2015a, 2015b; Watt *et al.*, 2010). Irrespective of the final contractual arrangements chosen by the client, the methods of selecting the contractor must first be established. The two basic methods are: by competition or by negotiation

2.3.1 Contractor Selection by Competition

This is the practice of selecting a contractor based on the submitted price for a proposed project (Hughes *et al.*, 2015; Watt *et al.*, 2010). The basic principle behind competition in contractor selection is to ensure that prices obtained from contractors, all competing genuinely with each other for a project, give the best value for money and is the lowest possible price for the job. Other variables are also determined and clearly stated in the tender documents. In some cases, the client may be faced with situations where such factors as time, are more crucial than the project cost. In such cases, competition on the bases of time precedes. The decision to award construction contract on competitive basis may result in the client choosing one of the two options, that is, the open or the selective approach to obtaining competitive tenders from contractors (Shah *et al.*, 2012).

2.3.2 Contractor Selection by Negotiation

In this method of contractor selection, the client approaches only one contractor who is considered to be the most suitable and capable under the prevailing circumstances. The client negotiates the project cost and timing with the contractor (Olaniran 2015; Stanford and Molenaar, 2016; Watt *et al.*, 2010). According to Liu *et al.* (2014), the main reasons for contractor selection by negotiation are either because the project under consideration is to be completed as early as possible, with no delay, which is characteristic of normal tendering procedure with respect to the preparation and despatch of documents and selection of a contractor, or the work to be carried out is of complex nature that includes complex detailing, billing and costing. Another reason why client may go into negotiation is reliability of the contractor, which the client is aware based on past experienced. One of the three methods below is used as a basis for determining the project cost under this arrangement.

2.4 Tendering Process as a Contractor Selection Tool

Tendering is the purchasing procedure whereby potential suppliers are invited to make a firm offer the price and terms, which, on acceptance, shall be the basis of the subsequent contract. Such contract can be between a client and contractor, a client and consultant or a contractor and a sub-contractor, and so on. Prior to the start of a tendering process, a decision has to be made on the contractual arrangement or procurement option that would have to be entered into on acceptance of a tender. Thai (2001; 2009) report that competition in tendering is an age long method for establishing the fair value of a product or service, the efficacy of which is evidenced in the various forms in which it is employed.

2.4.1 The Open Tendering

Under the open tendering method, prospective contractors are invited to compete for a contract advertised in the press. This is done through application of tender documents (usually obtained on payment of non-refundable deposits). By allowing all possible tenders, the client can gain the biggest possible response to his advertisement and therefore, maximum possible competition. In this way, the lowest possible price for the project can be achieved. The lowest reasonable bidder will be assumed to be the successful contractor. However, in some cases, the advertisers state that they are not bound to accept the lowest tender. Similarly, restricted open tender also exist, where prospective contractors are invited to compete for a contract through the advertisement that is restricted to appropriate technical journals or local newspapers.

2.4.2 Selective Tendering

In selective tendering, tenders are invited from contractors on an approved list and who have been “vetted” with respect to their competence and financial standing. Usman (1991) asserts that the competence of such contractors relates to their established skill, reliability and proven experience for the type of work envisaged.

2.5 The Bidding Models

2.5.1 The Friedman’s Model

Friedman (1956) proposed that the probability of winning a contract at a given mark-up competing against a number of known competitors equals to probability of beating competitor ‘A’ x probability of beating competitor ‘B’ x probability of beating competitor ‘C’ etc. In dealing with the tendering situation of unknown competitors, Friedman (1956) suggested aggregating all competitors’ tenders into a distribution, where the historical behaviour represents typical contractor behaviour and not of any particular contractor. Thus, to predict the probability of winning a contract against a known number of unknown competitors, Friedman (1956) suggested that the probability of winning against unknown competitors for a given mark-up= (Probability of beating one ‘typical’ competitor).

2.5.2 The Gate Model

Gate (1967) criticised Friedman’s work on theoretical ground and offered his own solution, which is also based on the collection of historic data and the creation of a distribution of competitor’s tenders against the client estimates. In Gates Model, probability of winning a contract at a given mark-up against a number of known competitors is given by equation 1;

$$P = \frac{1}{\left[\frac{(1 - P_A)}{P_A} \right] + \left[\frac{(1 - P_B)}{P_B} \right] + \left[\frac{(1 - P_C)}{P_C} \right] + \dots + 1} \quad (1)$$

where P_A = probability of beating competitor A

P_B = probability of beating competitor B

P_C = Probability of beating competitor C

For the case of unknown competitors, the Gates Models becomes

$$P_n = \frac{1}{n \left[\frac{(1 - P_{typ})}{P_{typ}} \right] + 1} \quad (2)$$

where P_n = Probability of beating n unknown competitors

P_{typ} = Probability of beating a typical competitor.

2.4.3 The “A+B” Bidding Model

In the “A+B” bidding model, contractors’ tender price (called part A) like in any other conventional tendering system. If the contractor is awarded the project, those prices will be the base for the cost reimbursement for constructing the project. The client then determines the value of a time unit for the project (X). The value of the time unit will be included in the tender documents. Each contractor will then have to determine the time required for completing the project (called part B). When bids are submitted the client determines the lowest combined (A+B) contractor using the equation 3:

$$LCB = A + BX \quad (3)$$

where LCB=Lowest combined tender

A= Cost estimate of the contractor

B=Time estimate of the contractor

X=Determined time unit for the project

2.4.4 Modified Friedman’s and Gates Models

Friedman’s and Gate’s Models gave different answer, and generated serious debates. In attempt to resolve the conflict, other models evolved including the Grinyer and Whittaker (1974) model, which attempted to take account of managerial judgement. The model provides the basis for well-informed judgement. Boughton (1987) proposed a low competitor model based on the strength of the argument that the only competitor one is interested in beating is the lowest competitor. Seydel (1990) opined that the Friedman model was more correct when the cost estimates used by competitors were the same and the variability in tenders was due only to mark-up differences, and that the Gates Model was more correct when the mark-up used by competitors was the same and the variability in tenders was due to variations in cost estimate only and proposed a compromise model, which takes into account a weighted average of the probability predicted by Friedman and that by Gates, and proposed distribution or models for determining the winning tender which suggest that the probability of any particular tender being the winning tender, given an ‘overall distribution’ of tenders, from a number of projects estimates of the mean tender could be predicted accurately (to within $\pm 2\%$).

An alternative model was put forward that takes into account the cost estimate and mark-up as independent variables. Carr and Sandahl (1978) and Carr (1982) emerge as the major critics of Grinyer and Whittaker’s work on the grounds of the method of aggregating all contracts irrespective of the number of contractors, in order to obtain his distribution. They assert that the mean tenders can be estimated using managerial judgment with the required accuracy of $\pm 2\%$ and as such put forward as an alternative, a model based on conditional probabilities. However, it has been pointed out that such models were too simple in treating the cost estimate and the mark-up as independent variables (Carr, 1982). Harris and McCaffer (2001) took account of Grinyer and Whittaker’s model and the criticism of Carr and Sandahl work and produced distribution of tenders. The use of the overall distributions, or the distribution for projects grouped together by the number of contractors, makes it possible to predict the lowest bid from an estimate of the mean tender. This argument was supported by Flanagan and Norman (1982). Lo (2000) proposed two models. The first is a tendering model that ensures the existence of maximum likelihood estimates of the contractor’s effects and projects effects. Hence, the tendering strategies based on heterogeneous tendering patterns of contractors can be developed. This is a modification of the Skitmore’s model (1991). The second is a multiple regression model using an index of competitiveness as the dependent variable and a multivariate normal distribution that takes into account the interdependence of tenders among competitors. This is used to evaluate the probability of winning the project. The model is similar to that proposed by Skitmore and Pemberton (1994).

2.5 Tendering Process Paradigm

The core of all models of competitive, non-collusive tendering process for projects is based on three observations (de Neufville and King, 1991):

- i. Bidding is a risky process and the prospective benefits should be expressed in terms of expected values.
- ii. The expected benefits to a contractor depend jointly on the probability of winning, and on the difference between the tender sum and the actual cost of doing the project (mark-up).
- iii. The two parameters central to the process, the probability of winning and the mark-up, are dependent: i.e. the higher the mark-up, the lower the probability of winning.

The stereotypical model of the tendering process focuses on the optimal strategy from the contractor's perspective. It states that each contractor seeks to maximise the expected value (EV) of the process, as a function of the profit. That is, the mark-up proposed (M) and the probability of winning at that level of mark-up (PCM). In form of equation 4:

$$\text{Maximize: } EV[(PCM), M] \quad (4)$$

The model takes two forms i.e. the expected value stated in terms of money and the utility for money (Raiffa, 1968; de Neufville, 1990; Flanagan and Norman, 1993).

2.5.1 The Expected Monetary – Value Models

The competitive-tendering-strategy model was developed by Friedman (1956), and was based on maximising the contractor's monetary value. Further work on the model was done by Park (1966), Rosenshine (1972), Fuest (1977); and Ioannu (1988). Others have used it to develop computerised procedures (Morin and Clough, 1969) and for analyses of local construction markets (Wade and Harris, 1976) as well as to estimate the optimum mark-up (Sugrve, 1980). Gates (1967) develop models based on different concepts with respect to calculating the probability of winning over a group of competitors. Benjamin (1972); Rosenshine (1972); and Dixie (1974), further modified these models. The 'model' differs from the Friedman's model because different methods are used to calculate the probability of winning over a group of competitors. A third variant proposed by Carr (1982, 1983) treats cost, rather than profit, as the random variable. Therefore, form the basis for calculating the probability of winning over a group of competitors.

2.5.2 The Expected Utility Models

Concept of utility indicates that for any decision model about major choice, the fact that people value money non-linearly should be incorporated. This forms the basis for the evolution of tendering models based on utility (de Neufville *et al.*, 1977; Ibbs and Crandall, 1982). de Neufville and King (1990) argued that while a model including utility is clearly more realistic, its feature did not by itself change the implication for management and that the dynamics of the tendering process is better comprehended through investigation and understanding the factors that influence the personal utilities of contractors.

2.5.3 The Independent –Private –Value Model

Weber (1985) describes the independent –private –value model as the model that conceptualizes tenders as representing each contractor's independent –private –value, made without the knowledge of the other contractor's project value.

2.5.4 The Common–Value Model

The common-value model conceptually defines a tender as being an individual contractors' subjective estimate of an unknown project value that is common to all contractors. This model supposes that tenders are more alike than different by focusing on the underlying, unavoidable and common costs of each project that are dictated by the project scope, i.e. materials, labour and equipment (Casari and Cason, 2016). Less significance is placed upon the variability between contractors (Hausch and Li, 1993). This model according to Weber (1985) best fits the construction environment, because contractors are not significantly different in term of competitive advantage, productivity, and risk tolerance or profit objective.

3. Method

3.1 Methods of Data Collection

Data used in the study were sourced from various consultancy out-fits, clients organizations in the Federal Capital Territory, Abuja through questionnaires and interviews as well as examination of tender reports. A total of 46 different project files were studied. These were projects initiated and completed between 2017 and 2020. However, only 26 projects representing about 63% of the total projects studied were found to contain the required information that are appropriate and suitable for analysis. Table I shows the distribution of the projects by client.

Table I: Distribution of Questionnaire by Client type

Client Type	No. of Questionnaires Distributed	% Distributed
Ministries	26	56.5
Agencies	20	43.5

Source: Data Collection

Discussions centering on the problem of the research and a study of related literature in a wide-ranging manner resulted in the identification of appropriate technique for data analysis in the study. The distribution and details of responses from the administered questionnaires are presented in

3.2 Techniques of Data Analysis

The data used in the study were analyzed using both parametric and non-parametric techniques.

3.2.1 The Chi-Square (χ^2) test

The Chi-Square test was used to test the hypothesis that there is no significant difference between the tender sums received from contractors in the procurement of public sector construction projects in Nigeria. The χ^2 distribution is a non-parametric technique that is used to test if an observed series of values differs significantly from what is expected, where the difference cannot be explained as being probably due to chance (Siegel, 1988). The χ^2 statistics is given by:

$$\chi^2 = \sum \left(\frac{(Actual - Expected)^2}{Expected} \right) \quad (5)$$

If the actual results are exactly as predicted, then (actual-expected) = 0, for each item in the series, and $\chi^2 = 0$ (Harper, 1977). The test was adopted in the study because the samples are randomly selected, independent from each other and the measurement scale is ordinal.

3.3 Classification of Tender in the Study

3.3.1 Position of Contractors Tender in the Bid

The position of the contractor's tender in the bid was classified based on the mean tender sum. This is the average sum of all tenders submitted. It is based on the assumption that all tenders tend to assume an average value. Three classifications of tenders were adopted in the study i.e. the Mean Tender, Tender below the Mean, and Tender above the mean.

3.3.2 Contractors Performance Rating

The Clients was asked to rate the performance of the contractor as either below average, average or above average in each case.

4. Results Presentation

The data sourced for the study is presented in Table 2. The data was collected for the two categories of public clients selected for the study, namely: Federal Ministries and Agencies.

Table 2: Contractors' Tender Sum, Award Price and Final Project Cost

S/No.	Contractors Tender Sum X 10 ⁶	Contract Price X 10 ⁶	Final Project Cost X 10 ⁶	Contractors Position	Tender	Contractors Performance Rating
1	127.5	127.5	127.5	Below the mean Tender		Below Average
2	223.6	223.6	223.6	Below the mean Tender		Below Average
3	471.8	452.928	552.006	Above the Mean Tender		Average
4	547.2	547.2	547.2	Below the mean Tender		Below Average
5	57.9	57.9	57.9	Below the mean Tender		Below Average
6	96.7	96.7	96.7	Below the mean Tender		Below Average
7	183.8	176.448	207.694	Above the Mean Tender		Above Average
8	226.5	226.5	226.5	Below the mean Tender		Below Average
9	111.3	111.3	111.3	Below the mean Tender		Below Average
10	117.4	117.4	139.706	Above the Mean Tender		Below Average
11	88.89	88.89	88.89	Below the mean Tender		Below Average
12	348.6	348.6	348.6	Below the mean Tender		Below Average
13	630.8	603.4	719.112	Above the Mean Tender		Above Average
14	294.5	294.5	294.5	Below the mean Tender		Below Average
15	263.9	263.9	263.9	Below the mean Tender		Below Average
16	199.8	199.8	199.8	Below the mean Tender		Below Average
17	211.7	211.7	226.519	Above the Mean Tender		Average
18	128.8	128.8	128.8	Below the mean Tender		Below Average
19	370.7	370.7	370.7	Below the mean Tender		Below Average
20	195.9	195.9	195.9	Below the mean Tender		Below Average
21	89.1	89.1	89.1	Below the mean Tender		Below Average
22	317.12	310.7776	358.3456	Above the Mean Tender		Above Average
23	123.2	123.2	123.2	Below the mean Tender		Below Average
24	212.5	212.5	212.5	Below the mean Tender		Below Average
25	168.3	168.3	168.3	Below the mean Tender		Below Average
26	316.2	316.2	316.2	Below the mean Tender		Below Average

The components of the data consist of: contractors' tender sum which represents the submitted tender sum by the successful contractor; the contract price which is a reflection of the price at which the contract was awarded to the successful contractor, the final project cost which represents the final cost of the project at completion after final accounts, the position of the contractor in relation to the mean tender sum during bidding and the contractors performance rating as indicated by the client. Table 3 shows details relating to a contractor that has been awarded a construction contract within the period under review.

Table 3: Chi-Square Test for the Contract Price and Final Project Cost

S/No.	Contract Price (Expected)	Final Project Cost (Actual)	$\chi^2 = \sum \left(\frac{(Actual - Expected)^2}{Expected} \right)$	F Value	Remark
1	127.5	127.5	0	7.81	Not Significant
2	223.6	223.6	0	7.81	Not Significant
3	452.928	552.006	21.6733125	7.81	Significant
4	547.2	547.2	0	7.81	Not Significant
5	57.9	57.9	0	7.81	Not Significant
6	96.7	96.7	0	7.81	Not Significant
7	176.448	207.694	5.533145833	7.81	Not Significant
8	226.5	226.5	0	7.81	Not Significant
9	111.3	111.3	0	7.81	Not Significant
10	117.4	139.706	4.23814	7.81	Not Significant
11	88.89	88.89	0	7.81	Not Significant
12	348.6	348.6	0	7.81	Not Significant
13	603.0448	719.112	22.33929372	7.81	Significant
14	294.5	294.5	0	7.81	Not Significant
15	263.9	263.9	0	7.81	Not Significant
16	199.8	199.8	0	7.81	Not Significant
17	211.7	226.519	1.03733	7.81	Not Significant
18	128.8	128.8	0	7.81	Not Significant
19	370.7	370.7	0	7.81	Not Significant
20	195.9	195.9	0	7.81	Not Significant
21	89.1	89.1	0	7.81	Not Significant
22	310.7776	358.3456	7.280816327	7.81	Significant
23	123.2	123.2	0	7.81	Not Significant
24	212.5	212.5	0	7.81	Not Significant
25	168.3	168.3	0	7.81	Not Significant
26	316.2	316.2	0	7.81	Not Significant

It shows the contractors tender price, the award price, the final project cost, the contractors’ tender position in relation to the mean tender and the client performance rating of the contractor as applied in this study.

Table 3 hypothesized that; there is no significant difference between the Contract Price and Final Project Cost in the procurement of public construction projects in Nigeria at 5% significant level.

Expected = Contract Price

Actual = Final Project Cost

while $\chi^2_{(calculated)}$ is given by $= \sum (Actual - Expected)^2 / Expected$; and

F= the critical $\chi^2_{0.05,6} = 7.815$.

where the calculated values of χ^2 are greater than the critical value of 7.815, it was concluded that differences between the Contract Price and the final project cost was significant. From the above analysis, most of the projects were completely at zero sum difference. This indicates that the projects were delivered within the contract price.

A closer look at the data collected from Table 1 shows that even though most of the projects are delivered without additional financial commitment on the part of the client, the client rates the performance of such contractors as below average. This suggests that the clients are not satisfied with the quality and speed of the construction delivery of those contractors. Meanwhile, where the final project cost is higher than the contract price, χ^2 calculated was found to be greater than the critical F-Value shows that there is a significant difference between the contract price and the final project cost. This variation in the cost of the proposed projects between the contract price and the final project cost can be adduced mainly to the fact that contractors are the real constructors and are therefore most conversant with the actual cost of procuring projects, Perhaps a more realistic estimate of a proposed project may be a tender sum above average bid submitted by contractors during tender.

4.1 Data Analysis

The analysis of the sourced data is presented table 4:

Table 4: Summary of analysis from Data Collected

S/No.	Description	No.	% of Total
1	Total No. of Projects	26	100.00
2	No. Projects Awarded at Tender sum	22	84.62
3	No. Projects Awarded above Tender sum	0	-
4	No. Projects Awarded below Tender sum	4	15.38
5	No. of Projects Completed above Contract Price	6	23.08
6	No. Projects Awarded below the mean Tender sum	20	76.92
7	No. Projects Awarded above the mean Tender sum	6	23.08
8	Clients rating of contractors performance below Average	21	80.77
9	Clients rating of contractors performance at Average	2	7.69
10	Clients rating of contractors performance above Average	3	11.54

4.1.1 Respondents' View

Questionnaires were administered to two groups of respondents: Ministries and Parastatals. In all cases, respondents indicate that the tender evaluation records are properly kept in the organization and 83% of the respondents rely on the in-house Quantity Surveyors to carry out tender evaluation exercise. The 83% respondents indicates that in-house Quantity Surveyor's estimate is used to benchmark contractor's tender sum. Similarly, the respondents indicates that with respect to the mean tender sum, 76.92% of tenders submitted were below the mean tender sum, while 23.08% of the tenders are above the mean Tender sum. The respondents similarly show that 23.08% of projects are completed at cost that is significantly higher than the original contract price.

Furthermore, 80.77% of the respondents shows that contractors perform much below average expectation, while 7.67% of the respondents shows that contractors' performance is at average level of performance and 11.54% of the respondents indicates that contractors' performance is above average.

5. Conclusion

A review of literature was followed with a field survey which enabled the appraisal of contractors' tender position in relation to their mean tender sum for public construction projects in Nigeria. The analyses show that 76.92% of submitted bids were below the mean tender sum, while 23.08% of the bids were above the mean Tender sum. Further examination shows that 23.08% of projects are completed at cost that is significantly higher than the original contract price while 80.77% of the contractors delivered the project within the contract price. However, the clients rating of the performance of the contractor reveals that contractors delivering project at cost or slightly below at final account do perform below average by. Clients tend to disapprove of the quality and speed of delivery for such contractors. Meanwhile, the clients in terms of performance and the quality and speed of the delivery rated contractors delivering at cost above the initial contract price above average. The variation in the cost of proposed projects; difference between the contract price and the final project cost was adduced mainly to the fact that genuine constructors were most conversant with more realistic cost of procuring projects and perhaps, presented more realistic estimate for proposed projects which justified their tender sum above the average bids submitted by contractors while tendering.

From the results of this research, various analyses suggest that exist differences a relationship between a contractor's tender position in relation to the mean tender during bid and the performance of the contractor for public construction projects in Nigeria. The Analysis indicates that contractors tend to perform below average when their tender price is below the mean tender sum. In the same way, contractors do perform above average where the accepted tender sum is above the mean tender sum during the bidding process. This suggests that perhaps tender prices below the mean tender sum are likely to be inadequate. This is in agreement with the common-value model where tenders are assumed to be more alike than different by focusing on common costs of each project that are dictated by the project scope, i.e. materials, labor and equipment. From the analysis, it is suggested that contractors with tender prices above the mean tender sum tend to perform above average based on the perception of the client. It is therefore recommended based on the findings in this study that the scrutiny of tenders should be with reference to the mean tender sums while serving as a measure for deciding the relevance of the in-house estimate as a benchmark for taking decisions in the tender evaluation process in public construction projects.

References

- Ahmed, MO., El-adaway, IH., Coatney, KT. and Eid, MS. 2016. Construction Bidding and the Winner's Curse: Game Theory Approach. *Journal of Construction Engineering and Management*,. 142(1): 76-83
- Alien, LN. 2001. Comparison of design-build to design-bid-build as project delivery Method. Naval Postgraduate School, Monterey, California.
- Alves, TCL., Ravaghi, K., & Needy, KL. 2016. Supplier Selection in EPC Projects: An Overview of the Process and Its Main Activities. In *Construction Research Congress*, 12(1): 209–2018).
- Arain, F., Mcfarlane, T., Mah, D. and Zahed, M. 2014. Emerging Project Procurement Trends in Canadian Construction Industry. In *Construction Research Congress*, 11(1): 1399–1407.
- Araújo, MCB., Alencar, LH. and Mota, CMM. 2015. Contractor Selection in Construction Industry: A Multicriteria Model. In *IEEE IEEM*, 20(1): 519–523.
- Ashworth, A. and Perera, S. 2015. *Cost Studies of Buildings* (6th ed.). London: Taylor & Francis.
- Ballesteros-pérez, P., Skitmore, M., Pellicer, E. and Gonzalez-Cruz, C. M. 2015. Scoring Rules and Abnormally Low Bids Criteria in Construction Tenders: A Taxonomic Review. *Construction Management and Economics*, 33(4); 259–278.
- Benjamin, NBH. 1972. Competitive bidding: the probability of winning. *Journal of Construction Engineering and Management*, 93(1): 88-91.
- Boughton, P. 1987. Competitive bidding process beyond probability models. *Industrial Market Management*, 16: 87- 94.
- Bustani, SA. 2004. An Appraisal of Tender Evaluation Practice for Public Construction Projects in Nigeria. An Unpublished Ph.D Thesis. University of Jos, Jos, Nigeria.
- Bustani SA and Anigbogu, NA. 2004. An Assesment of Consultant Codt Estimate in the Procurement of Public Building Projects in Nigeria. *Nigerian Journal of Tropical Engineering*, 5(1): 9-15.
- Brook, M. 2017. *Estimating and Tendering for Construction Work*, 5th edn: Routledge, p. 356.
- Carr, P. 1994. *Reducing Highway Congestion- A Creative Approach to Highway Contracting*, New York. John Wiley and Son. p. 189.
- Carr, RI. and Sandahl, J. 1978. Competitive bidding strategy. *Operational Research*, 2: 106-112.
- Carr, RI. 1982. General bidding model. *Journal of Construction Engineering and Management*, 108 (4): 639-650.

- Carr, R.I. 1983. Impact of the number of bidders on competition. *Journal of Construction Engineering and Management*, 109(1): 61-73.
- Carpenter, N. and Bausman, DC. 2016. Project delivery method performance for public school construction: Design-bid-build versus CM at risk. *Journal of Construction Engineering Management*, 142 (10): 609-609.
- Casari, M. and Cason, TN. 2016. Common Value Auctions with Voluntary and Qualified Entry. *Revue Economique*, 65(5): 953-976
- Chen, L., Manley, K., Lewis, J., Helfer, F. and Widen, K. 2018. Procurement and Governance Choices for Collaborative Infrastructure Projects. *Journal of Construction Engineering Management*, 144(8): 1–10.
- Dada, MO. 2012. Predictors of procurement selection: An investigation of traditional and integrated methods in nigeria. *Journal of Construction in Developing Countries*. 17(1): 69–83
- de Neufville, R. 1990. *Applied Systems Analysis in Engineering Planning and Technology Management*, New York. McGraw-Hill, p. 396.
- de Neufville, R. and King, D. 1991. Risk and need- for- work premiums in contractor bidding. *Journal of Construction Engineering and Management* 117, 4: 659-673.
- Dikko, HA. 1999. Open and competitive tendering- a holistic approach. *Journal of Nigerian Institute of Quantity Surveyors*, 28: 17-20.
- Dixie, JM. 1974. Bidding models- The final resolution of a controversy. *Journal of Construction Engineering and Management*, 100(3): 265-271.
- Doloi, H. 2012. Empirical Analysis of Traditional Contracting and Relationship Agreements for Procuring Partners in Construction Projects. *Journal of Management in Engineering*, 29(3): 224–235.
- Dorée, AG., and Holmen, E. 2004. Achieving the unlikely: innovating in the loosely coupled construction system. *Construction Management and Economics*, 22(8): 827–838.
- Erdogan, SA., Šaparauskas, J., and Turskis, Z. 2017. Decision Making in Construction Management: AHP and Expert Choice Approach. *Procedia Engineering*, 172: 270–276.
- Eriksson, P. and Lind, H. 2016. Strategies for Reducing Moral Hazard in Construction Procurement: A Conceptual Framework. *Journal of Self-Governance and Management Economics*, 4(1): 7–33,
- Frank, J. 1998. *Building Procurement Systems – A Client’s Guide*, 3rd Edition: London. Longman, p. 161.
- Friedman, L. 1956. Competitive bidding strategy. *Operational Research*, 2: 106-112.
- Flanagan, R. and Norman, G. 1982. An examination of the tendering pattern of individual building contractors. *Building Technology and Management*, 28: 25-28.
- Flanagan, R. 1993. *Risk Management and Construction*, Boston. Oxford Press, p. 208.
- Fuest, M. 1977. Theory of competitive bidding. *Journal of Construction Engineering and Management*, 103(1): 139-152.
- Gate, M. 1967. Bidding strategies and probabilities. *Journal of Construction Engineering and Management*, 93(1): 75-107.
- Grega, M., Orviska, M., Nemeč, J. and Lawson, C. 2019. Factors Determining the Efficiency of Slovak Public Procurement. *NISPAcee Journal of Public Administration and Policy*, 12(1): 43–68.
- Grinyer, P. and Whittaker, J. 1974. Managerial judgment in a competitive bidding market. *Operational Research Quarterly*, 24: 181-191

- Hale, DR., Shrestha, PP., Gibson, GE. and Migliaccio, GC. 2009. Empirical comparison of design/build and design/bid/build project delivery methods. *Journal of Construction Engineering Management*, 10(1): 579–587.
- Harper, WM. 1977. *Statistics Handbook for Engineers*, Plymouth. Macdonald and Evans Ltd, p.67
- Harris, F. and McCaffer, R. 2001. *Modern Construction Management*, London. 5th edn. Granada Press, p. 588.
- Hausch, DB and Li, L. 1993. A common Value Auction Model with Endogenous Entry and Information Acquisition. *Economic Theory*, 3(2): 315-334
- Hommen, L. and Rolfstam, M. 2009. Public Procurement and Innovation: Towards A Taxonomy. *Journal of Public Procurement*, 45(1): 1–19.
- Hughes, W., Champion, R. and Murdoch, J. 2015. *Construction Contracts; Law and Management (5th Editio)*. London: Taylor & Francis.
- Ibbs, CW. and Crandall, KC. 1982. Construction risk: multiple attribute approach. *Journal of Construction Engineering and Management* 108(2): 187-200.
- Idiako, JE., Shittu, AA., Anunobi, AI. and Akanmu, WP. 2015a. A Comparative Analysis of Traditional and Design & Build Methods of Procurement in the Nigerian Construction Industry. *International Journal of Construction Engineering and Management*, 4(1): 1–14.
- Idiako, JE., Shittu, A. Anunobi, AI. and Akanmu, WP. 2015b. A Comparative Analysis of Traditional and Design & Build Methods of Procurement in the Nigerian Construction Industry. *International Journal of Construction Engineering and Management*, 4(1): 1-14.
- Ioannu, PG. 1988. Bidding models – symmetry and state of information. *Journal of Construction Engineering and Management*, 114(2): 214-232.
- Ireland, V. 1984. Virtually Meaningless Distinctions between Different Procurement Methods. *Proceedings of the 4th International Symposium on Organization and management of Construction*, 8(4): 203-211.
- Ling, FYY., Chan, SL., Chong, E. and Ee, LP. 2004. Predicting Performance of Besign-Build and Design-bid-Build Projects. *Journal of Construction Engineering Management*, 1(7): 75–83.
- Lingard, H., Hughes, W. and Chinyio, E. 1998. The Impact of Contractor Selection Method on Transaction Costs: A Review. *Journal of Construction Procurement*, 4(2): 89–102.
- Liu, B., Huo, T., Liao, P., Gong, J. and Xue, B. 2014. A Group Decision-Making Aggregation Model for Contractor Selection in Large Scale Construction Projects Based on Two-Stage Partial Least Squares (PLS) Path Modeling. *Group Decis Negot.*
- Lo, HP. 2000. Models for bidding strategies in Construction. *Hong Kong Journal of Construction Studies*, 2(1): 7-11.
- Minchin, JRE., Li, X., Issa, RR. and Vargas, GG. 2013. Comparison of Cost and time Performance of Design-build and Design-Bid-Build Delivery Systems in Florida. *Journal of Construction Engineering Management*, 139(10): 1–14.
- Mohammed, YY, Waziri, AA, Sulzakimin, M. and Azlina, MY. 2019. Contributing Factors of Poor Performance in Nigeria. *International Journal of Property Science*, 9(1): 1-11.
- Morledge, R. and Smith, A. 2013. *Building Procurement (2nd Ed.)*. John Wiley and Sons Ltd. UK.
- National Construction Policy 1991. Federal Ministry of Works and Housing: National Construction Policy of the Federal republic of Nigeria, Abuja, p. 43.

Neuman, Y., Alves, T. da CL., Walsh, KD. and Needy, KL. 2015. Quantitative Analysis of Supplier Quality Surveillance Practices in EPC Projects. *Journal of Construction Engineering and Management*, 141(11): 66-73.

Nguyen, PHD., Lines, BC. and Tran, DQ. 2018. Best-Value Procurement in Design-Bid-Build Construction Projects: Empirical Analysis of Selection Outcomes. *Journal of Construction Engineering & Management*, 144(10): 1–10.

Nurshikin MS, Roslan A. and Sofield, T. 2016. Level of Importance of Performance-based Tender Evaluation Indicators. *Indian Journal of Science and Technology*, 9 (34): 1-8.

Ojo, EA. and Gbadebo, AM. 2012. Critical Selection Criteria for Appropriate Procurement Strategy for Project Delivery in Nigeria. *Journal of Emerging Trends in Economics and Management Sciences*, 3(5): 422–428.

Olaniran, OJ. 2015. The Effects of Cost-Based Contractor Selection on Construction Project Performance. *Journal of Financial Management of Property and Construction*, 20(3): 235 - 251.

Olanrewaju, A., Anavhe, PJ., Rashid, A., Aziz, A., Chen, CH. and Han, WS. 2016. Determinants of Procurement Strategy for Construction Works: Quantity Surveyors' Perspectives. In *MATEC Web of Conferences*, 66(93): 1-9.

Oo, BL., and Yan, Y. 2018. Procurement of construction services: A case study on bidding competition in Singapore public sector contracts. In *IOP Conference Series: Earth and Environmental Science*, 140: 012113

Palaneeswaran, E. and Kumaraswamy, MM. 2000. Contractor Selection. *Journal of Construction Engineering and Management*, 126(5): 144-152.

Papadonikolaki, E. 2018. Loosely Coupled Systems of Innovation: Aligning BIM Adoption with Implementation in Dutch Construction. *Journal of Management in Engineering*, 34(6): 1–13.

Park, RW. 1966. *The Strategy of Contracting for Profit*, New Jersey. Prentice-Hall, Inc. p. 196.

Park, HS., Lee, D., Kim, S. and Kim, JL. 2015. Comparing Project Performance of Design-Build and Design-bid-build methods for large-sized public apartment housing projects in Korea. *Journal of Asian Architecture and Building Engineering*, 14(2): 323–330.

Pratt, D. 2017. *Fundamentals of Construction Estimating*. Delmar Press. New Delhi. 2nd Edition. pp. 482.

PPA. Public Procurement Act. 2007. Published by the Bureau for Public procurement, Nigeria. pp. 1-25.

Raiffa, H. 1968. *Decision Analysis: Introduction to choices under Uncertainty*, Reading. Addison-wesley, 341p.

Rajeh, M., Tookey, J. E. and Rotimi, JOB. 2015. Estimating Transaction Costs in New Zealand Construction Procurement: A Structural Equation Modelling Methodology. *Engineering, Construction and Architectural Management*, 22(2): 242–267.

Ramsey, D., El Asmar, M. and Gibson Jr., GE. 2016. Quantitative Performance Assessment of Single-Step versus Two-Step Design-Build Procurement. *Journal of Construction Engineering & Management*, 142(9): 1–14.

Rosenshine, M. 1972. Bidding model-resolution of controversy. *Journal of Construction Engineering and Management*, 98 (1): 143-148.

Okunlola, SO., Aina, O. and Yakeen, AA. 2011. A comparative analysis of the performance of traditional contracting and design-build procurements on client objectives in Nigeria. *Journal of Civil Engineering Management*, 17(2): 227–233.

Setiawan, H., Erdogan, B. and Ogunlana, SO. (2015). Competitive aggressiveness of contractors: A study of Indonesia. In *Procedia Engineerin.*, 125: 128-134.

Seydel, J. 1990. An Investigation into Bid Acceptance Probabilities and their Distribution. *Proceedings of the 21st Annual Conference of the Decision Sciences Institute*, 21: 220-222.

- Shah, MIA., Tang, LCM. and Hughes, W. 2012. Exploring Process, Productivity and Structure in Design. In S. . (Ed) Smith (Ed.), 28th Annual ARCOM Conference, Edinburgh, UK. pp. 77–87.
- Skitmore, RM. 1991. The contract bidder homogeneity assumption-an empirical analysis. *Construction Management and Economics*, 9(5): 403-429.
- Skitmore, R.M. and Pemberton, J. 1994. A multivariate approach to contract bidding mark-up strategies. *Journal of Operational Research Society*, 45(11): 1263-1272.
- Sugrve, P. 1980. An optimum bid approximation model. *Journal of Construction Engineering and Management*, 106(4): 499-505.
- Stanford, MS. and Molenaar, KR. 2016. Measuring Owner Transaction Costs in Construction Contracting. In *Construction Research Congress*, 144(2): 398–407.
- Tao, Y., Geoffrey, QS and Qian, S. 2019. Comparing the Performance Quality of Design-Bid-Build and Design-Build Delivery Methods. *Journal of Management Engineering*, 35(5): 1–11.
- Thai, KV. 2001. Public Procurement Re-examined. *Journal of Public Procurement*, 1(1): 9–50.
- Thai, KV. 2009. *International Handbook of Public Procurement*. (B. E. M R. Jack, Ed.). CRC Press, Taylor & Francis Group. pp. 25-28
- Turner, A. 1990. *Building Procurement*, London. Macmillan Ltd, p. 179.
- Vassailo, P. 2003. Competitive Bidding, is it killing our industry?. *Business Times*, 13th March, 2001 pp. 7.
- Walker, A. 2015. *Project Management in Construction* (6th ed.). UK: John Wiley & Sons, Ltd.
- Watt, DJ., Kayis, B. and Willey, K. 2010. The Relative Importance of Tender Evaluation and Contractor Selection Criteria. *International Journal of Project Management*, 28: 51–60.
- Wade, RL. and Harris, RB. 1976. “LOMARK”: A bidding strategy. *Journal of Construction Engineering and Management* 102 (1): 197-211.
- Weber, RT. 1985. Auctions and Competitive Bidding. *Proceedings of Symposia in Applied Mathematics*. American Mathematical Society, 33: 143-170.
- Xia, B., Chan, A., Zuo, J. and Molenaar, K. 2013. Analysis of Selection Criteria for Design-Builders through the Analysis of Requests for Proposal. *Journal of Management in Engineering*, 29(1): 19–24.
- Xia, B., Chen, Q., Xu, Y., Li, M. and Jin, X. 2014. Design-Build Contractor Selection for Public Sustainable Buildings. *Journal of Management in Engineering*, 31(5): 1–7.
- Zavadskas, EK., Turskis, Z. and Tamošaitiene, J. 2008. Contractor selection of construction in a competitive environment. *Journal of Business Economics and Management*, 9: 181-187.