Model of Predicting Bidding Costs for Construction Projects in Nigeria using Public Procurement Act 2007

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Abstract:- **The costs incurred by various stakeholders participating in the tendering process and their magnitude has attributed incongruity between government and contractors, economic drain and less competition in public sector projects. The aim of the study is to develop model that predict the transaction cost of bidding construction projects based on Public Procurement Act 2007 (PPA 2007). To achieve this, quantitative survey design based on structured questionnaire was used. The data collected from 143 sampled contractors selected using stratified sampling techniques from the North-West states of Nigeria were analyzed using Partial Least Squares-Structural Equation Modeling software. The results from the analysis revealed three (3) major sources of transaction costs identified from the field as; eligibility documents, contract administration costs, and securing related documents methods. In addition, the three identified transaction costs sources were found to be significant determinants of transaction costs for contractors bidding for construction projects of various types. Moreover, bidding costs model was found to exhibit good forecasting power that can be used to predict the magnitude of costs incurred by contractors in bidding projects in Nigeria. The study concludes that the transaction costs of contractors in bidding construction projects on average is 8.21% of contract sum after validating the model with real life data, and it will benefit incoming firms into the industry as a bidder by knowing their entry probable costs indicators for public projects. The study recommends that further studies should be explore to identify some potential factors such as Equipments, financial capability and professional staff strength which could provide new insights into bidding transaction costs incurred for construction projects.**

Keywords: *Construction projects; Eligibility documents; Public procurement Act 2007; PLS-SEM, Transaction costs theory*

INTRODUCTION

The rapid construction projects in developing countries have resulted into a progressive economic development (Anaman & Osei-Amponsah, 2007; Adeyemi & Kashiwagi, 2014; Kenny, 2007; Tominiyi, Wolemi, Ibe, Aluju & Olaniwun, 2015). It shows the progress in the Gross Domestic Product (GDP) in the nation (NBS, 2015). Equally, the construction output and processes have large impact on safety, health and environmental aspects of a nation (Bayliss, 2004). Such impacts were identified in education, manufacturing, Agriculture, Telecommunication, real estate transaction among other (Dalrymple, Lionel & Warren, 2006; Adinyira, Fugar & Osei, 2011; Tominiy *et al.,* 2015).

These are largely achieved through ensuring adequate procurement processes by all public sector organization in a country. Public procurement is the process whereby public sector organizations acquire goods, services and works from third parties (Pavel, 2009; Reimarova, 2011; Sarfo & Mintah, 2013). It also includes money spent by public sector to provide key services directly or indirectly to citizens in areas such as welfare, education, social care and health. Such services are delivered through procurement mechanisms with a formal competitive process.

Effective public procurement is essential for good public service and governance. The public sector in the United Kingdom (UK) for example spends over £150 billion a year on the goods and services necessary to deliver public services (European Commission, 2007). Public sector organizations are expected to apply the highest professional standards when spending money on behalf of taxpayers to ensure they get a good deal and to provide appropriate and necessary goods and services to the quality required meeting user needs (Sarfo, & Mintah, 2013).

However, Federal contractors, service providers (FCSP), and researchers (Onyema, 2011; Jibrin et al., 2015) identified some problems and organizational weaknesses inherent in the Nigerian procurement system (Public Procurement Act 2007). These include the bidding costs (transaction costs) incurred with participation in the tender processes by contractors, non- availability of trained procurement officer, less compliance with the Act by many government organizations, lengthy period of procurement processes before award (Dadzie, 2015; Omagobon, 2016; Shwarka & Anigbogu, 2012).

This paper investigates magnitudes of bidding costs incurred by contracting firms when tendering for construction projects in North-West Nigeria. The study explores these firms' expenses at the post bidding stage.

The objectives of this paper are: (1) to find explanatory variables (Procurement Act 2007 Sections) that significantly influence the bidding costs of a contracting firms' in the study area and (2) to construct and test models to predict the magnitudes of costs incurred by contracting firms, based on the procurement Law in Nigeria.

LITERATURE REVIEW

Construction Firms

The construction industry is one of the key players of any economy. The sector has the potentials to grow further due to economic development, industrialization, urbanization, information technology and relationship across displine (Gupta, 2009; Hosseini, Chileshe, Zuo, & Baroudi 2012; Ibrahim, Riy, Ahmed & Imtiaz, 2016). The industry contributed to the GDP of about 7to10% based on research evidence (Winch, 1996; Voordijk, 2000).

The industry comprises of organizations and persons who includes companies, firms and individuals working as consultants, main contractors and sub-contractors, material and component producers etc. operation or activities such as civil engineering works, infrastructural provision, housing, maintenance and repairs, residential and commercial building are the main activities were carried out. Government, individuals, privates and non-governmental organizations are the purchasers (Clients), financier, regulators and operators in the sector (Tanzania Ministry of works, 2003). It has been argued that the public sector organization is the major client of the sector among all those patronize it National Bureau of Statistics (NBS Report, 2015).

The public procurement Act 2007 (PPA 2007)

Since independence of Nigeria in 1960, the country has been experiencing a high degree of mismanagement of resources particularly in the area of public procurement. There have been existing open abuses to rules and standards in the award and execution of public contracts in Nigeria. These were evident in over-invoicing, inflation of contract costs, and proliferation of white-elephant projects and diversion of public funds through all kinds of manipulation of contract system.

The regulatory bodies that were set up to ensure compliance with laid down rules and regulations on procurement and award of contracts in the public sector appeared ineffective.

This resulted in a high level of corruption and enormous wastage of public resources, lack of transparency, accountability, fairness and openness. The situation made foreign and even local investors to lose confidence in the Nigerian economy. It must be noted that the prevailing high level of corruption was closely linked up with the public sector procurement systems, and considering that about ten percent of the gross domestic product (GDP) must pass through the procurement systems. It then became imperative that the public procurement systems must be reformed if Nigeria must achieve economic growth and developmental strides in this new millennium (Fayomi, 2013).

It was in the light of the above that President Olusegun Obasanjo on assumption of office, in 1999, sought for and obtained the World Bank assistance to undertake a study of the existing procurement and financial systems in Nigeria. The outcome was the proposal submitted by the World Bank to Mr. President in 1999 that was tagged the "Country Procurement Assessment Report" (CPAR) which indicated the need for reform of the procurement law based on the United Nations Commission on International Trade Law (UNCITRAL) which has proven effective in a number of countries in the developed world, even in Lithuania, Estonia and Tanzania. The findings of the Study (CPAR), which covered institutional as well as organizational structures relating to the existing procurement regime (Yahaya, Oyediran & Onukwube, 2019a; Fayomi, 2013).

Bidding/Tendering Cost

There are two concepts of bidding in the construction industry (Aje *et al.,* 2016): competitive and non-competitive bidding practice (Johnstone, Bedard and Ettredge, 2004). Shash (1993) argues that a construction company can either negotiate with the client or use a competitive bidding process to obtain a job. In the case of competitive bidding as a default method in the PPA 2007, openness in the process of selection becomes the underlying factor. As the name implies, it must also be competitive and transparent. In Nigeria today, traditional method of construction is commonly used (Oladinrin, Olatunji and Hamza, 2013). This procurement system allows flexible application of competitive bidding in construction process as contained in Part IV section (16)(6)(a)-(g), partV section (17-23)(e) and part VI section(24-33)(1)-(4) of the Act 2007. Documents such as company tax, pension, industrial training fund, national social insurance and methods of securing them are to be considered by the bidder in any public projects under the federal government (Yahaya, Oyediran & Onukwube, 2019b). These are part of the determinant factors to be considered for a contractor or supplier to win such projects. Oyeyipo, Odusami, Ojelabi and Afolabi (2016) opined that other factors have to be considered by contractors apart from the client requirement for survival, particularly in today's competitive bidding. The different bidding situations together with the decision involved in the conversion of the estimate into a tender bid is often considered to be the most important step in the bidding process (Oyeyipo *et al.,* 2016).

They further stated that factors such as reputation, performance, technical competence and managerial capabilities should be considered by contractors in competitive bidding. This will increase and guaranteeing their chances of winning bids in the market. To this list of bidding costs Rajeh (2014) added contract administration, information, enforcement and procurement system. From these studies, this research chose three bidding costs variables to ascertain magnitude of bidding construction projects by contracting firms (see Table 1) on the basis of minimizing overlaps among the bidding costs determinant. These were used as the dependent variables of this study.

Table 1: Bidding/Tendering Sources of Transaction Costs

Measures	Label	Description	Measurement Level
Eligibility Documents	ED_1	Various types of documents required at the bidding process with it related transaction cost associated with it	1=one-off costs, 2= contract sum, 3=company share, 4=Annual turnover, 5= Arbitrary.
Contract Administration	CA_2	Component of transaction costs attached with the pre-bidding administration by the contracting firms	1= very high, 2=high, 3= minimum, 4= very minimum and 1= weekly, 2=every two weeks, 3=monthly, 4= others
Securing related document	SRD_3	Processes adopted in securing the various documents with it associated costs by contracting firms	Same as in CA_2 above
Construction projects	BCC_4	Type of construction projects bids in the last three (3) years by contracting firms	1= Housing, 2= Residential, 3= Commercial, 4= Non-Residential 5= Infrastructure projects

Procurement Laws affecting Bidding Costs

After defining bidding costs measures (Table 1), the next level is to review procurement sections that influence bidding costs in construction projects. The federal governments through the legislatives enact a law called the PPA 2007 under the supervision of the Bureau of public procurement to make sure that all federal government parastatal complied with the PPA 2007 in all their procurement activities for a fiscal year. The PPA 2007 has its guide to how bidding/tendering will be conducted both by the contractors/suppliers and client.

This study adopted the PPA 2007 parts IV-VI and the various section under them. The PPA parts considered are: (Fundamental Principal of Procurement- Part IV Section 16 subsection (6)(a)-(d), 2. Organization of Procurements-Part V Sections 17 – 23 (3) Procurement Methods- Goods and Services- Part VI Section 24 – 38. These sections were used as the independent variables of this study.

Cost of bidding documents

The next factor which plays a role in influencing of transaction cost is the costs of financial bids document. In the event of a lesser amount for financial documents, transaction costs during the technical and financial bidding phases will be relatively low, but it is likely that total number of bidders will be higher due to a strong competitive bidding process. One would expect the public-sector cost of bidding to increase with less number of bidders.

This is due to more work for the public agency in terms of pre screening, and technical bids evaluations, and also due to the increase in the transaction cost of losing bidders. Figure 2 below outlines the transaction costs as a percentage of capital cost with respect to the costs of bids documents in the tendering phase.
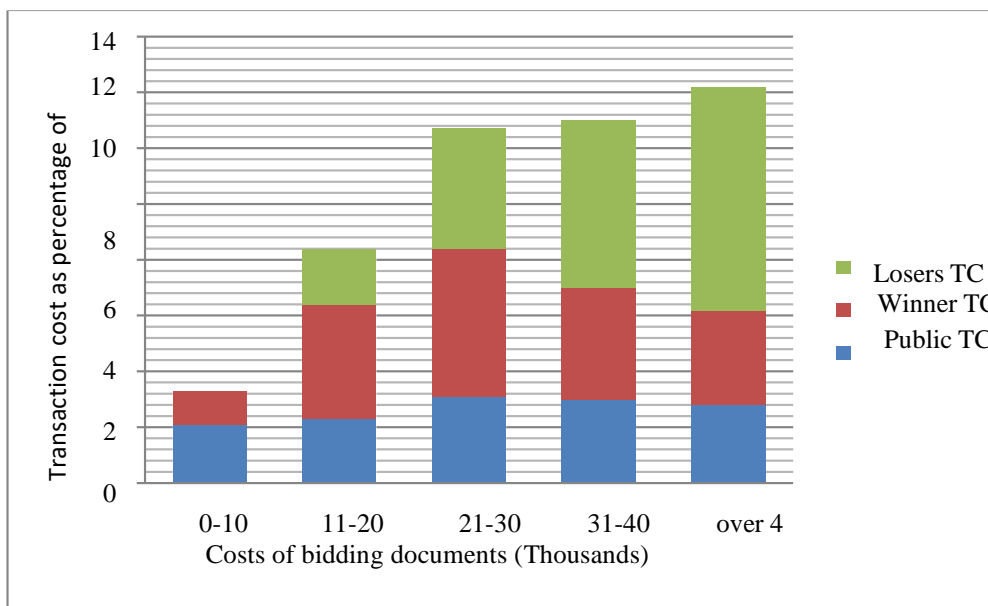

Figure 2: Construction Project transaction cost based on financial bids documents costs.
Source: (Dudkin & Välilä,2005)

Statement of the Research Problem and Knowledge Gap

Several studies have recognized the presence and magnitude of transaction expenses incurred by contracting company. For instance, Whittington (2008) finds in separate studies that pre-contract transaction costs in the design-bid-build method range from 0.4 to 8.8 per cent (average 2.6 per cent) of the contract value. Design and build project method 0-5.7 per cent (average 2.2 per cent) of the complete project estimate. According to Dudkin and Valila (2005), on average about 2-3 per cent of the complete contract amount was incurred as transaction costs during the pre-contract stage of infrastructure projects.

But, these studies evaluated transaction costs magnitude (TCM) based on variables such as: contract enforcement, tracking, administration, negotiation, dispute resolution, project management effectiveness, transaction environment and stakeholder attitudes. This results offer some first insight into the problem, therefore, it is important to recognise what they do not do. They have not stated the magnitude of the traditional public procurement of construction projects bidding with regards to developing countries (e.g Nigeria) in terms of their transaction costs magnitude (TCM) incurred.

Therefore, the review of the previous studies on transaction costs magnitude impact on contractors has indicated a vacuum of research based-knowledge. That can be fill through identify the magnitude of transaction costs incurred by contractors in terms of their bidding requirements and process in Nigeria. The predicament of this study, therefore, is to develop model that can predict the transaction costs magnitude of contractors in construction project procurement in public sector, and sources of such transaction costs within the PPA 2007.

In this study, it is hypothesized from H_1-H_7 could be used to predict transaction costs magnitude.

H_1: Public Procurement Act has a significant influence on Eligibility Documents in bidding

H_2: Eligibility Documents has a significant influence on Transaction costs incurred in bidding construction projects

H_3: Public Procurement Act has a significant influence on Contract Administration in bidding

H_4: Contract Administration has a significant influence on Transaction costs incurred in bidding construction projects

H_5: Public Procurement Act has a significant influence on Securing Related Documents in bidding

H_6: Securing Related Document has a significant influence on Transaction costs incurred in bidding construction projects

H_7: Public Procurement Act has a significant influence on Transaction costs incurred in bidding construction projects.

Figure 3 shows the typical hypothesized conceptual framework based on partial least squares-structural equation modelling (PLS-SEM).
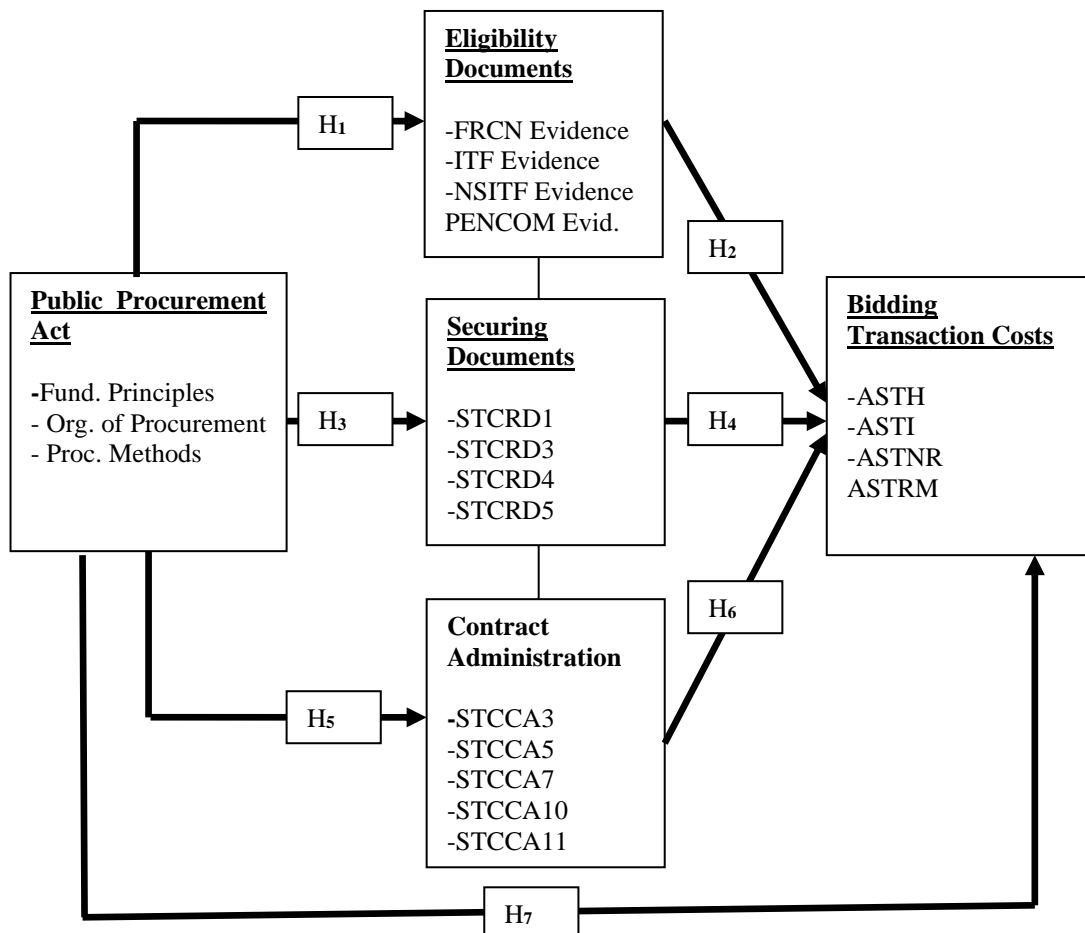

Figure 3: Conceptual Framework of the Research

The Conceptual Framework Operationalization

The Conceptual Framework for this study was drawn from the combination of the framework reviewed in the literature. The theory underpinning this conceptual framework was based on the economic theory of transaction costs.

The theory means that there were expenses linked to the search for the appropriate prices, the negotiation, contracting and the conclusion of agreements. In fact, market members must pay the cost of those items which are not part of the agreement to be concluded. This conceptual framework evaluated public procurement Act 2007 (PPA 2007) on the basis of the fundamental principles, organisation of procurement and method of procurement in the PPA 2007 and Transaction costs sources, addressing eligibility documents, contract administration and securing related documents costs.

It assesses the bidding transaction costs in construction as (average successful tender in Housing, Infrastructure, Non-residential building and repairs and maintenance buildings).

This study has one (1) independent variable, three (3) intervening variables and one (1) dependent variable. Procurement guides is the independent variable while eligibility document, contract administration and securing related document serve as the intervening variables between procurement Act and bidding transaction costs in construction. Bidding transaction costs in construction serves as the dependent variable.

RESEARCH METHODOLOGY

Research Approach

This study adopted quantitative method with data from questionnaire administration. This quantitative research viewed the world as made-up of observable and measurable facts, emphasing positivist paradigm. It tried to group problems into measurable categories which can be generalised on the entire subject (Golafshani, 2003). In addition, quantitative research provided opportunity to researchers to master the problem under investigation and generate testable hypothesis.

Research Design

However, this study adopted non-experimental research design also known as survey research design. Survey research strategy comprises of process of collecting data such as questionnaire and interview. Survey method refers to complete set of techniques used to carry out a survey research, collect and manage data (Lynn, Erens & Sturgis, 2012). Survey research approach was adopted in this study because research questions consisted of 'what' question where raised.

The strength of survey approach for this study was identified from the research question used and the degree of focus on contemporary as opposed to historical event (Yi, 2013). Therefore, it comprised of population and sample design, data collection mode, instrument administration and collection, data coding and imputation, weighting and analyses.

Research Population

The population for this study comprises construction firms that executed federal government projects in the study area (North-west geopolitical zone).

The population frame consists of 143 construction firms that carried out different category of works and goods from North-West State respectively.

Sampling Frame, Techniques and Size

The sample unit for this study is construction firms while the sample elements are Directors/CEOs and project managers in the organisations. The sample frame consists of all registered contractors on the national database of Bureau of Public Procurement (BPP) that are classified and categorized in the first batch exercise by BPP of 143.

The study employed a stratified simple random sampling technique in drawing the sample size. This is achieved by dividing the population of 143 by the number of stratum (states in the North-West geopolitical zones). Samples within each state in the stratum (construction firms) where drawn (Creswell, 2017). Each construction firm has common characteristics or identification means, in which other does not have such as, the contractors ID and Interim registration report ID. The sample size of 143 was used based on census methods.

METHOD OF DATA ANALYSIS

Partial Least Squares-Structural Equation Modelling (PLS-SEM)

Partial least squares structural equation modelling (PLS-SEM) is a variance based second generation multivariate statistical tool used in establishing structural relationship between exogenous latent constructs and endogenous latent constructs. In order to establish the relationship between the research constructs and to test the hypotheses of the research, the partial least squares structural equation modelling is employed. In using PLS-SEM, two stage evaluation criteria are used.

The first stage is the assessment of the measurement model to establish if the manifest items are measuring the underlying construct they supposed to measure. The second stage is the evaluation of the structural model which assess the interrelationships between the research constructs in the model (Ramayah, Lee, & In, 2011).

Evaluation of the measurement model entails assessing the individual item reliability, the internal consistency of the models through Cronbach's alpha and composite reliability, convergent validity and discriminant validity (Hair, Sarstedt, Ringle, & Mena, 2012; Memon & Rahman, 2013; Wong, 2013).

The structural model is assessed by evaluating the individual path coefficients, the coefficient of determination (R^2), the effect size (f^2), the predictive relevance (Q^2) and the Goodness-of-Fit (GoF) of the model (Hair, Sarstedt, Hopkins, & Kuppelwieser, 2014; Lowry & Gaskin, 2014).

RESULTS AND DISCUSSION

Assessment of Measurement Model

The first stage in PLS-SEM evaluation is the assessment of the measurement model to ensure that the manifest (indicators or factor loadings) variables are measuring the underlying constructs they are meant to measure.

As a rule of thumb, Hair et al. (2007) provide a guideline to interpret the factor loading, where factor loadings with value of ± .50 or greater are considered very significant; a loading of ± 40 is considered most important; a loading of ±.30 is considered significant (Osman & Muhammad, 2017). In this study, Table 2 and Figure 5 it can be seen that the factor loadings of all observed variables or items are adequate, ranging from 0.542 to 0.939.

Table 2: Factor Loadings for Construct

Construct	Code	Item	Factor Loadings
Eligibility Documents	FRCN_CERT	Financial regulation council of Nigeria Certificate	0.727
	ITF_CERT	Industrial training fund Certificate	0.837
	NSITF	National social insurance trust fund	0.753
	PENCOM	Pension contribution Certificate	0.925
Contract Administration	STCCA3	Time it takes to negotiate	0.788
	STCCA5	Interest rate on loan for projects	0.704
	STCCA7	Cost incurred annually in bidding	0.923
	STCCA10	Average amount spent in a year	0.580
	STCCA11	Average No. of public projects bid in a year	0.538
Securing Related Documents	STCRD1	Method used in obtaining documents	0.586
	STCRD3	Time it takes to obtain the documents	0.568
	STCRD4	Process of obtaining the documents	0.834
	STCRD5	Sources of information on bidding	0.647
Procurement Act	PGA	Selection of in appropriate procurement method	0.631
	PGB	Certificate of No Objection process	0.686
	PGC	Lowest responsive bidder experience	0.565
	PGE	Complaint of non-award of contract	0.714
Bidding transaction Costs	ASTH	Average successful tender in housing	0.910
	ASTI	Av. successful tender in infrastructure	0.696
	ASTNR	Av. Successful tender in non-Residential	0.811
	ASTRM	Av. Successful tender in repairs& Maint.	0.551

The factor loadings of latent variables as in Table 2 to observed variables where above .50 for all construct (Hair et al., 2006). This suggests that the items correlated significantly to the factor itself and evidence of indicator reliability.

Reliability and Validity of the Measurement Model

Table 3: Internal Consistency Reliability and Convergent validity Test

Paths	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Contract Admin	0.7015	0.818	0.685
Eligibility Documents	0.832	0.888	0.667
Procurement Act	0.71	0.765	0.798
Securing related document	0.722	0.796	0.789
Bidding Transaction Costs	0.764	0.819	0.738

After confirming the factor loadings for the indicators or manifest variable, the study tested the constructs for validity as discussed in the previous sections. Two tests were employed: convergent validity and discriminant validity. To test the convergent validity, Average variance extracted (AVE) from each item on a construct is measured whose value should be 0.5 or higher (Barclay, Thompson & Higgins (1995) and Fornell & Lacker (1981).

Table 3 shows that the values of AVE test of all constructs range from 0.667 to 0.798 which are above the recommended value of .50.

Discriminant Validity test

Table 4: Discriminant Validity Using Fornell and Larcker Criteria

Paths	CA	ED	PG	SRD	BTCC
Contract Administration (CA)	0.828				
Eligibility Documents (ED)	-0.326	0.817			
Procurement Guide (PG)	0.571	-0.533	0.893		
Securing Related Documents (SRD)	0.514	-0.442	0.543	0.888	
Bidding Transaction Costs (BTCC)	-0.115	0.441	-0.130	-0.223	0.859

For discriminant validity to be upheld, it has been suggested that the Average Variance Extracted (AVE) should be greater than .50 in order to justify using a construct (Barclay et al., 1995). All the AVE values for each construct (figures in bold in Table 4) is above the recommended value of .50.

Furthermore, the discriminant validity is checked by considering the latent variable correlation with square root of the AVE, which needs to be transferred to the diagonals in correlation table as shown in Table 4. The values that are bold in the diagonal must be higher than all other values in the row. According to Fornell & Larcker (1981a), the AVE should be greater than the squared correlation to achieve discriminant validity.

Moreover, it can also be observed that the square root of the AVE for a given construct is greater than the absolute values of the standardized correlation square of the given construct in the analysis. Thus, discriminant validity is supported, indicating that all constructs used in this study are different from each other (Osman & Muhammad, 2017).

ASSESSMENT OF STRUCTURAL MODEL

Assessment of path coefficients

Hypothesized relationships in the PLS-SEM are evaluated by examining the structural model's path coefficients. The path coefficients show the relative importance or influence of the exogenous constructs on endogenous construct. They range from -1 to +1. The closer the coefficient is to -1 or +1 the stronger the relationship while closeness to zero signifies weak relationship (Hair et al., 2014b; Memon & Rahman, 2013).

For better quality of the structural model, the path coefficients are required to be significant. The significant is determined through re-sampling procedure called bootstrapping.

The path coefficients of the research structural model are presented in Figure 5 and Table 5 below.
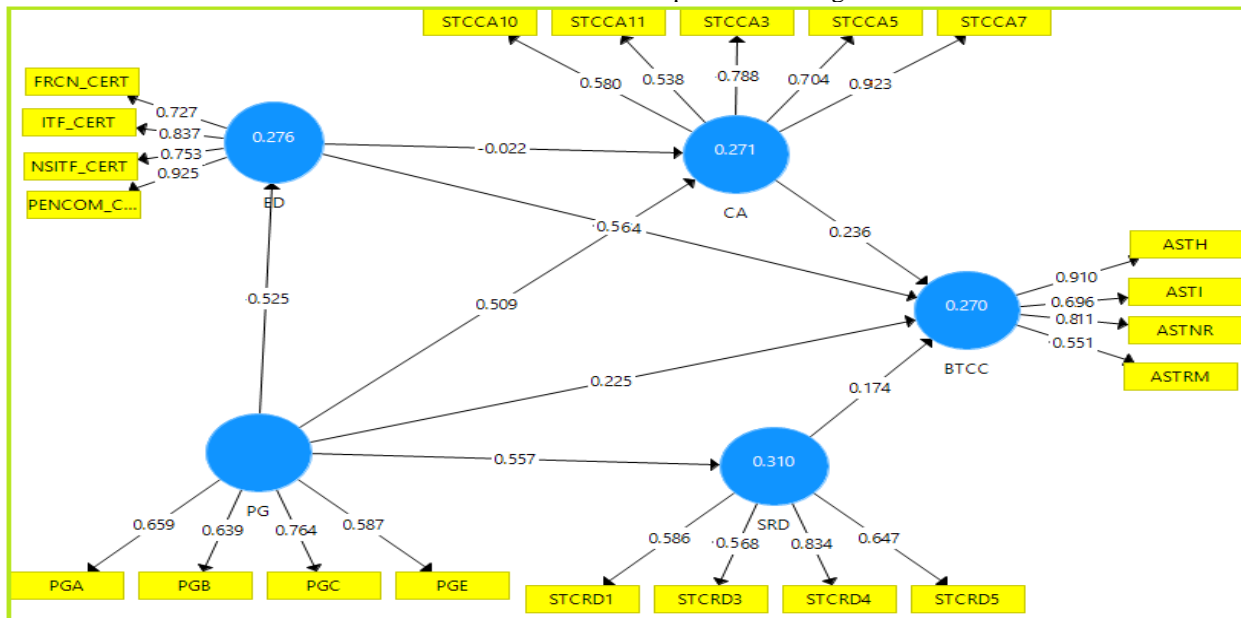

Figure 5 First iteration transaction costs of bidding structural model

The hypothesized model in this study Figure 5 has four direct hypotheses: (1) eligibility documents to bidding transaction costs, (2) procurement guide to bidding transaction costs, (3) contract administration to bidding transaction costs, (4) securing related documents to bidding transaction costs.

HYPOTHESIS TEST

Null Hypothesis (Ho): The source of transaction costs does not predict the costs of bidding for construction projects in North-West Nigeria.

The path coefficient in PLS-SEM is similar to the regression analysis and standardized beta coefficient (β) (Henseler, Ringle & Sinkovic, 2009).The significance of the hypothesis is tested by calculating the t_ value of every path on the model β-value, as shown in Figure 5. H_1 hypothesized that public procurement Act significantly influence the costs of eligibility document in the bidding transaction costs for construction (BTCC).

The findings in Table 5 and Figure 5 confirms the significant relationships (β = 0.489; T = 6.096; p < 0.0.05). Therefore, H_1 is supported. That the eligibility documents costs has significantly contributed to the transaction costs of contractors' bidding were hypothesized in H_2.

The result substantiates the hypothesis (β = -0.449, T = 6.151, p = 0.005). Public Procurement Act H_3 was also predicted to influence the costs of contract administration CA H_3 (β= 0.521; T = 2.579, p < 0.005), hence, H_3 is supported. H_4 was stated the contract administration will influence the bidding transaction costs for construction (β= 0.243; T = 1.976, p < 0.005), therefore, H_4 was robustly supported in the study.

Public Procurement Act may influence the method of securing the related document, which make it to be costly H_5 the result from the Table 5 and Figure 5 indicated that (β= 0.557; T = 11.285, p < 0.005) and this support the argument. In the same vain it was hypothesis that securing

related document may influence the bidding transaction costs for construction due to difficulties and other challenges H_6 (β= 0.156; T = 9.294, p = 0.000), this shows that the hypothesis is well supported. But, H_7 has shown that procurement guides does not contributed towards bidding transaction costs for construction directly (β=0.198; T=1.060; p=0.289) and this result disconfirm the hypothesis earlier stated.

Table 5: Parameter Estimate for final structural model of transaction costs of bidding

Paths	β Value	Standard Deviation (STDEV)	T Statistics (|β/STDEV|)	P Values	Decision
CA -> BTCC	0.243	0.123	1.976	0.021	SS
ED -> BTCC	-0.449	0.073	6.151	0.005	SS
ED -> CA	0.004	0.136	0.032	0.974	NS
PG -> BTCC	0.198	0.187	1.060	0.289	NS
PG -> CA	0.521	0.202	2.579	0.015	SS
PG -> ED	-0.489	0.080	6.096	0.000	SS
PG -> SRD	0.557	0.049	11.285	0.000	SS
SRD -> BTCC	0.158	0.017	9.294	0.000	SS

Note: SS=Significant, (T-statistics >1.96; p-value <0.05) NS=Not Significant

In addition, Table 6 show the result for the models fitness indicating the SRMR, d_G, $d_{ULS,}$ and the NFI (normal fit index) with their corresponding HI95 percentile bootstrap confidence interval (HI95) based on 999 bootstrap samples and acceptable level for NFI of >0.9 (Forze & Filippini, 1998; Henseler, et al., 2016; Awang, 2014; Ishiyaku et al., 2016). The geodesic discrepancy (d_{G}) between the empirical correlation matrix and the implied correlation matrix of the saturated model (i.e. a model in which all constructs are allowed to covary) is ranges between 0.796 to 0.819 and lies below its corresponding HI95 value of 1.104.

Table 6: Overall Goodness of Fit (GoF) Assessment for the predictive model

Fit Indices	Saturated Model	Estimated Model		HI95
SRMR	0.123	0.124		1.023
d_ULS	3.193	3.206		3.410
d_G	0.796	0.819		1.104
NFI	0.988	0.977		>0.9

Consequently, the implied correlation matrix does not differ significantly (1 percent level) from the empirical correlation matrix. Also, the SRMR also ranges 0.123 to 0.124 < HI95 and NFI >0.9 Table 6. This provides evidence for an acceptable model fit (Hu and Bentler, 1999). We can thus conclude that the measurement model provides an adequate explanation of the covariation in the data and can be used to predict the linear regression model as shown in equations (4.0-4.3) below.

The structural model Figure 5 depicted the coefficient of determination (R^2) value of 0.270. This provides information on the amount of BTCC variance explained or predicted by the research exogenous constructs. The model revealed that 27.0 percent of BTCC variance is explained by the research exogenous constructs. In other words, ED, CA SRD, and PG jointly determined, explained or predicted about 27.0 percent of the variance in BTCC.

Model Development
Using the SmartPLS-SEM (Partial Least Squares-Structural Equation Modeling) three models were developed to predict likely bidding transaction costs for construction projects based on the sources of transaction costs identified (see Table 1).

The following discussion focuses on significant exploratory variables (PPA 2007 sections) that influence sources of transaction costs bidding. Contracting firms and consultants could adopt these BTCC Models, which may help in determining the probable costs of their tendering expenses in a year.

Based on the results therefore, the three constructs of the transaction costs sources are found to be significant in determining bidding transaction costs for construction amongst those contracting firms. Although the application of the transaction costs economic theory in construction industry differs from the environment in which it was applied in previous studies, nevertheless the findings are consistent with Yahaya, Oyediran and Onukwube, 2019b; Li at al., (2012, 2013) concerning sources of transaction costs influence as significant antecedents of the expenses incurred in bidding. Therefore, based on this significance of the construct the models were being derived as follows:

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$$EDC_1 = \beta_0 + 0.925*PENCOM + 0.753*NSITF + 0.837*ITF + 0.727*FRCN \tag{1}$$

$$CAC_1 = \beta_0 + 0.580*STCCA_{10} + 0.538*STCCA_{11} + 0.788*STCCA_3 + 0.704*STCCA_5 + 0.923*STCCA_7 \tag{2}$$

$$SRD_1 = \beta_0 + 0.586*STCRD_1 + 0.568*STCRD_3 + 0.834*STCRD_4 + 0.647 STCRD_5 \tag{3}$$

While the overall transaction costs of bidding for contractors is:
The overall transaction costs model for bidding construction projects based on the result shown in Figure 4.4 and Table 4.21, eligibility documents cost at ($\beta = -0.449$, $p < 0.005$), contract administration costs at ($\beta = 0.243 < 0.021$) and securing required documents at ($\beta = 0.158$, $p < 0.006$) significantly predict the transaction costs model for bidding.

The overall model BTCC = $\beta_0 + \beta_1*EDC + \beta_2*SRD + \beta_3*CAC + e$ (4)

Where:
e = Error term (with jj = mean, zero and constant variance);
β_0 = the intercept term;
β_{ij} = The coefficients of the explanatory variables (i = 1,2…5); j = 0

CONCLUSION

This study is an in-depth analysis in examining factors underlying the expenses of contracting firms in North-West, Nigeria. It offers new insights into the understanding of the magnitude of costs incurred by various construction companies when bidding for construction projects in the public sector. Furthermore, the study extends the application of the theory of transaction costs economic in the construction industry area, namely the bidding processes.

The findings show that most of the factors investigated are very significant in determining the magnitude of bidding costs in Nigeria particularly in North-West States. Based on these findings, the contractors, consultants and government or policy makers can provide new relevant strategies for reducing such expenses so as to increase competition and easy of doing construction business in Nigeria. Moreover, the unforeseen factors identified, which determine parts of transaction costs in bidding processes, highlight the percentage of contract value a construction firms will spends as his transaction costs on averagely 8.21% after validating the model

Implications of the Study

The purpose of this study is to demonstrate how contracting firms incurred expenses (Transaction Costs) as a result of bidding public sector projects based on the public procurement Act 2007 in used. This highlight the main sources in the Act that influences such costs of bidding like the eligibility documents (ED), contract administration (CA) and securing related document processes (SRD). Through a survey of the construction firms and the subsequent structural equation modeling in SmartPLS, the main sources that lead to bidding expenses are identified.

In this research, eligibility documents required are Pension commission evidence (PENCOM), Industrial training fund (ITF), National social insurance trust fund (NSITF) and financial regulation council (FRCN). With loadings of 0.925, 0.837, 0.753 and 0.727 respectively, they are good indicators of eligibility documents (ED).

Construction companies and bidders should not overlook these mandatory elements of bidding because eligibility documents has been shown to significantly influence bidding transaction costs, their probability for winning the bids is solely based on this requirements and a firm should always acquire them before embarking into the bidding processes.

Meanwhile, it is also revealed that Time it takes to negotiate, Interest rate on loan for projects, Cost incurred annually in bidding, Average amount spent in a year and Average No. of public projects bid in a year are important indicators of contract administration (CA), with loadings of 0.788, 0.704, 0.923, 0.580 and 0.538 respectively. Although, reduction in time of negotiation, rate on interest, less bids document costs and the number of project to be participate will tremendously reduce the cost of administration in contract.

Generally, the result indicated that the procurement Act various sections have significant influence on those sources based on the path relationship. There is high correlation between the procurement Act (PG) and the three sources of the transaction costs in bidding, with β-value 0.525, 0.509 and 0.557. Abiding by the procurement law by public sector (Client) through proper selection of procurement method, processing certificate of No Objection from BPP in time, awarding to the lowest evaluated responsive bidder and less compliant from the contracting firms will mitigate the contractors transaction costs. As a result, contractors' can channel their recommendation through the Bureau of Public Procurement (BPP) to the legislative for considering the amendment of the procurement law especially those sections that increases their costs of bidding. This will furthermore reduce the level of abandon projects in public sector due to high costs of the transaction.

The analysis of inner model shows that eligibility documents (ED), contract administration (CA) and securing related documents (SRD) together can only explain 27.0% of the variance in bidding transaction costs (BTCC).

It is an important finding because it suggests that there are other sources that construction firms should consider when

exploring bidding transaction costs indicators in future research.

RECOMMENDATION

Although this study makes significant contributions to the literature and transaction costs theory, its two major limitations could offer directions for future researches in the area. Firstly, the location of the study is confined to North-West, Nigeria which means the findings cannot be generalized to other geopolitical zones in Nigeria that varies in level of competition, construction opportunities and knowledge on procurement laws. It is suggested that future studies could be conducted in the five geopolitical zones in Nigeria, which comprises North-East, North-Central, South-West, South-South and South-East. Construction activities in these five zones have distinct knowledge, professional, technology and competition level. It would be interesting to see how this would affect their bidding transaction costs despite the fact that the procurement law is the same in terms of application in public sector. Secondly, the study is based on limited number of explanatory factors. Presently, eligibility document, contract administration, and securing related document process are considered while other factors which could influence bidding transaction costs have not been investigated. Some potential factors such as Equipments, financial capability and professional staff strength could provide new insights into bidding transaction costs incurred for construction projects.

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