

Mediation Model for Minimizing Transaction Costs of Bidding that Affect Construction Firms in Public Procurement System in Nigeria

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Abstract

Nigeria's public procurement Act 2007 is a major activity of government that safeguard capital misappropriation and important financial resources that leads to leakages in government treasury. This is part of a wider reform agenda targeted at reducing corruption and improving public financial management. However, despite the above mentioned advantage, the additional limitation attributed to PPA 2007 is the expenses incurred during the transaction, due to solicitation documents required by public sector organizations. Such eligibility documents are associated with significantly higher transaction costs in public sector projects. They are among the factors responsible for high building expenses, less indigenous companies participation and economic drain in the industry. The aim of the study is to develop a mediation model that can minimize the effect of such transaction costs (TCs) on construction firms in Nigeria. A structured survey questionnaire was used in collecting data from the federal contractors and services providers of 143 randomly selected from the Bureau of Public Procurement database based on their interim report registration (IRR) number in North West states of Nigeria. Advance Analysis of Covariance (ADANCO 2.1.1) was used for the mediation analysis and the result proved that, the mediation effects of proactive and reactive mechanism on eligibility documents costs that affects construction firms activity was both partial complementary and competitive mediation totally different from zero; the bootstrapped confidence intervals within which the mediating effects occur did not involve zero either. These signify mediation occurrence in the study mediation model. The study recommends the adoptions of proactive and reactive strategies by both government and construction firms in order to cushion the impact of the eligibility documents in tendering process. The study re-echoes the need for training procurement personnel in all public organization by the Bureau for a healthy competition among construction firms

Keywords: *Bidding, Construction firms, Eligibility documents, Mediation, Public Procurement Act and Strategies*

1.0 Introduction

Construction projects consist of all the activities concerned with development of civil engineering works and heavy infrastructural provisions. Effective construction project involves careful planning, execution, and efficient use of resources. Proper construction can ensure that infrastructure priorities are procured in line with organizational goals and objectives; spending is planned and controlled in accordance with established priorities and sufficient financing is available when it is needed both now and the future (Pride, Hughes, & Kapoor, 2002).

Frequent construction projects provide essential output for economic development.(Anaman & Osei-Amponsah, 2007; Kenny, 2007;Adeagbo, 2014). It signifies the progress in the gross domestic product (GDP) in the nation (NBS, 2015). Equally, 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, Boxer, & Staples, 2006; Jacob, 2010; Adeagbo, 2014).

For instance, in Australia housing and renovation projects contributed approximately \$64 billion to the economy, accounting for 5.3% of the country GDP (HIA Economic Groups, 2010). This view agrees with Wiley (2012), who also reported that housing projects in Philippines contributed positively to the country's economy. Whereby, for every one dollar (\$1) spent on housing activities, it yields additional \$16.61 to the country GDP. In Nigeria, construction activities (sector) have contributed to the nation GDP about 2.13% in 2011 and 2.88% in 2012 (National Bureau of Statistics NBS, 2015). Therefore, such improvement motivated various investors (governments, individuals and private organizations) to invest in construction activities such as real estate, schools and public private partnership contracts.

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 (Reimarova, 2011; Sarfo & Baah-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.

The procurement process spans a life cycle from identification of the need, through the selection of contracting firms, to post-contract award administration, including disposal. There is a duty on procurers in public sector organizations to apply the key principles of public procurement. These require the delivery of value for money (VFM), transparency, accountability, appropriate quality and service to meet public needs and appropriate governance (ie, adherence to government rules concerning the use of public money in procurement) as described in public procurement Act 2007.

Nigeria's public procurement Act 2007 is a major activity of government that safeguard capital misappropriation and important financial resources that leads to economic drain (Jibrin, Ejura, & Augustine, 2014; Olayiwola & Oyegoke, 2009; Onyema, 2011) and makes the country among the one with progressive economic growth in many developing countries. The public procurement reform programme is part of a wider reform agenda targeted at reducing corruption and improving public financial management. The objectives of the procurement reform are: to promote national development; enhance harmony with other local and international laws; foster competition, efficiency, transparency and accountability; facilitate ease procurement administration; and ensure value for money (Bureau of Public Procurement, 2007).

However, federal contractors and service providers (FCSP), and researchers (Jibrin et al., 2014; Onyema, 2011) identified shortcoming and organizational weaknesses inherent in the country's procurement system. These include the 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, Winston, & Hinson, 2015; Omagbon, 2016; Sarfo & Baah-Mintah, 2013; Shwarka & Anigbogu, 2012). Others are absence of the National council on Public Procurement and deployment of E-Procurement system as contained in the Act (Jacob, 2010; Jibrin et al., 2014; Onyema, 2011). But, our main concern from all this problems mention is the transaction costs incurred by contractors. Since it is not known whether transaction costs (TCs) are been reduce by the use of the PPA of 2007 as claimed by various quotas in the country. The costs lead to high construction costs and waste of social resources in the economy. Thereby, drain the economy indirectly through such processes; hence reduce the GDP at large. Finally, determining their magnitude would serve as evidence to government on complaint made by

FCSP, that the costs of doing construction business in Nigeria are exorbitant. Therefore, it should consider the amendment of the Act by the parliament as the calls persisted.

1.1 Statement of the Problem

Construction procurement projects are been carried out in Nigeria using the Public Procurement Act 2007 (PPA 2007). The rationale behind the use of this Act is to have what stakeholders call accountability, fairness, value for money and effectiveness in the procurement process in all federal government projects (Onyema, 2011). Hence, its tackle the difficulties of projects performance and a stable financial climate in the construction industry.

However, despite the above mentioned advantage, the additional limitation attributed to PPA 2007 is the expenses incurred during the transaction, due to long procurement time before awarding. Such time elongation is associated with significantly higher transaction costs in public sector projects (Dudkin & Väilä, 2006). They are responsible for high building expenses, less indigenous contracting companies and economic drain in the industry. For example, 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 (2006), 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. Hughes (2016), states that about 0.57% of the project costs was spent on bids by contractors, whether they won or lost in the tendering process in the United Kingdom (UK). This is against the reality that such expenses have a significant effect on the operating costs of the contracting company in the years to come. Considering, the enormous amount of money contractors paid to obtain the required documents to enable them to participate in bidding government projects.

As such various studies were conducted to ascertain their magnitude in different countries to establish facts against it (Farajian, 2010; Hughes, 2016; Li, Arditi, & Wang, 2014; Rajeh, Tookey, & Rotimi, 2013). Consequently, these researches focused mainly in areas of public private partnership (PPP) project. They evaluated transaction costs (TCs) based on variables such as contract enforcement, administration, negotiation, dispute resolution and stakeholders attitudes. Variables for mediation of such TCs were not extensively studies (Dadzie et al., 2015).

Transaction costs can take a significant proportion of the budget and cause shortages when underrepresented. It is therefore important to devise strategies to reduce transaction costs. In addition, many items of TCs in the PPA 2007 are monetary and non-monetary, difficult to measure and therefore it is cumbersome for contractors to devise a means that can minimize them when tendering for a public projects. Due to poor record keeping attitudes and under estimating their impact to their business performance.

Therefore, such problems are to be tackle by future researchers and academia in procurement and construction field. These necessitated the current study with the aim of developing a mediation model that can minimize the effect of such transaction costs (TCs) on construction firms in Nigeria.

To achieve the above aim of the study, the following research questions were to be answered:

- a. What strategies can be adopted to mediate the impact of TCs on construction firms?
- b. What type of mediation could be adopted in minimizing such impact?
- c. How effective are those mediation type?

Objectives of the study are as follows:

- a. Determine the strategies adopted to mediate the impact of TCs on construction firms.

- b. Identify the types of mediation adopted in minimizing TCs impacts
- c. Assess the effectiveness of those mediation types.

2.0 Literature Review

2.1 Concept of Transaction Costs

Commons (2001) launched the concept in 1931 that financial thinking was based on transactions. It is usually assumed, however, that Roland Coase originated the word "transaction price" when he used it to formulate a theoretical structure to determine when the company and the market would perform particular financial duties. The word did not appear in his works until the 1970s, however. Although he is not the originator of the particular word, in his 1937 article, *The Nature of the Firm*, Coase discussed the "expenses of using the price mechanism," thus presenting the notion.

He subsequently studied pricing processes and discovered that there are costs linked to searching, negotiating and contracting for appropriate rates (Coase, 1960, 1988, 1992). However, Scitovsky (1992) launched financial vocabulary with the label 'transaction price' (Hardt & Virno, 2006). It is evident that the introduction of Transaction Cost Economics into economics studies has long been pre-existing. It has lived as a science discipline for a very long time, but very soon. That account of the hypothesis of TCE began in the 1970s with Oliver Williamson. The word "Transaction Cost Economics" was first referenced in his 1979 article (*Transaction cost economics: contractual relationship management*). Table 2.1 presents transaction costs definitions.

Table 2.1: Chronological Definitions of Transaction costs

Authors	Definitions
Williamson (1989)	*The costs of drafting, negotiating and enforcing an agreement, and also the costs of governance and bonding to secure commitments.
Joskow (1985)	*cost of acquiring and processing information, legal costs, organizational costs and costs associated with inefficient pricing and production behaviour *The costs incurred by activities such as preparing a bid documents, estimating, drawing up a contract, administering the contract and dealing with any deviations from contract conditions are also important,
Li et al. (2014)	which are part of transaction costs.

2.2 Theoretical framework of transaction costs measurement models

Reimarova (2011) developed a linear combination of exploratory variables model as in Equation 2.0 in order to estimate transaction costs of public procurement. The author concentrates mainly on the transaction costs of public contractors

$$TC \sim P_{\text{awarding procedure}} \tag{2.0}$$

Where further stated that these costs are being defined as administrative costs concerned with the contract awarding procedure. The award procedure is regulated by law and most consist of specified activities. The transaction costs consist ex-ante, continuous and ex-post costs.

$$\text{Mathematically; } TC_{AP} = TC(TC_{ea}, TC_C, TC_{ep}) \tag{2.1}$$

Where:

TC_{ea} Transaction costs ex-ante- costs of recalling the tender, evaluation of the bid and contract completion.

TC_c Continuous transaction – costs of monitoring, controlling enforcement etc

TC_{ep} Transaction costs ex-post- costs which occur by inaccurately executed tender- delay of tender, correction of formal errors and penalization.

It clearly demonstrated relationship between research strategy and techniques which was adopted in this study. Therefore, for the purpose of this study, the transaction costs of public procurement contract can be approximated by the costs of bidding process of the contractors as shown in Equation 2.0.

$$TC_{bp} = TC(TC_{ea}, TC_{ad}, TC_{ep}) \quad (2.2)$$

Where:

TC_{bpi} Transaction costs of bidding for contractors (i)

TC_{ea} Transaction costs ex-ante- costs of eligibility documents

TC_{ad} Transaction costs of contract administration

TC_{ep} Transaction costs of ex-post- purchase of bids, accommodation, transportation, feeding, printing and photocopying, dispute resolution and information gathering.

However, a model development phase was proposed by Frajian (2010) to estimate transaction costs in public private partnership (PPP) projects using Bayesian Network (Figure 2.1). The model contains four major variables (Number of bidder, project value, procurement time and PPP maturity level). Data are being input or enter in the model to determine the TCs of the PPP project based on those four variables listed above. These data will be future interpreted to corresponding value based on some transactional equations which will relate the entered data to the data available from the European Investment Bank (EIB) study about transaction costs of PPP project in the European Union (EU). The limitation in the model is that only four variables were considered and it is based on the EIB assumption report that TCs are calculated. Therefore, variables such as bidders' document possession, contract administration costs, costs of tender paid to clients and other unseen costs are not captured in the model. Similarly, the transaction costs model is for PPP project in the United States of America. Such model cannot be applicable in Africa (Nigeria in particular) to determine the TCs of contractors bidding construction projects, due to location, data type, legal framework in the procurement and level of assumption made by the EIB.

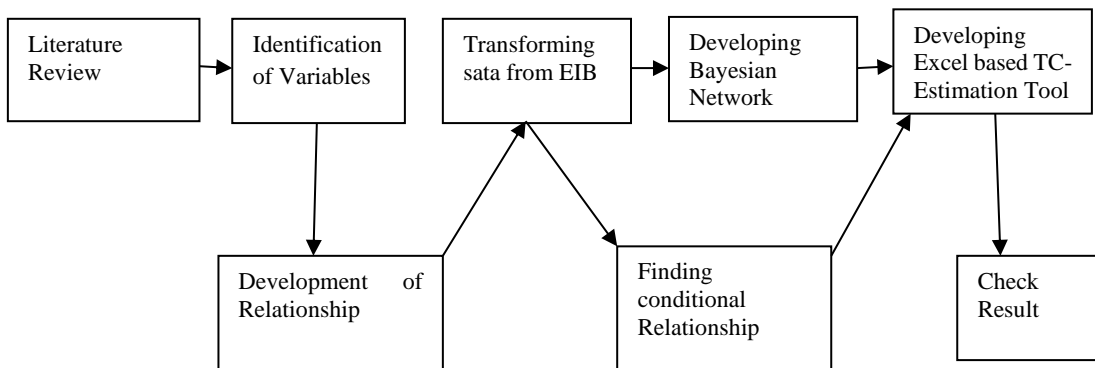


Figure 2.1: Transaction Costs Estimation Model Framework
Source :(Frajian, 2010)

2.3 Theories on the Approaches to the study of bidding

2.3.1 Neoclassical Theory

This theory describes the organisation as a social system made up of different interactive components and groups of individuals with common goals. It assumes that financial decision-making units are a given and focuses on how they interact in economies. The hypothesis is based

on the "perfect universe" in which the price mechanism exists and the trading value is determined exclusively on the basis of the supply and demand variables. In this "optimal universe," the seller and the purchaser meet in a free market and reach an agreement without any negotiations because the price is already determined by the free market. In this "ideal world," the exchange cost is just the cost of the item itself.

2.3.2 Transaction Costs Economics Theory

Most of the organizational theories used in the research have been created to examine interactions with organisations. However, these theories do not discuss the relationship between companies and the effect of the governance framework on the relationship. In building, organizational theory must consider, among other variables, building projects as a temporary entity with divergent objectives (Langford & Male, 2008).

Transaction Costs Economics Theory is a key strategy theory that addresses the presence of companies, their borders and the manner they manage their activities. According to Transaction Costs Economics (TCE), the issue of financial organisation is the issue of contracting, and there are alternative methods to accomplish the mission (Williamson, 2008). Each alternative is linked to accurate and understood contractual and administrative processes (Greenwood & Yates, 2006). Ronald Coase first launched the TC notion in 1937. He investigated the price mechanism and concluded that there were costs related to searching for relevant prices, negotiating and entering into contracts (Coase, 1960). Transaction Costs Economics (TCE) focuses on the individual transaction of the buyer-seller relationship. The issue then is, "Why are certain operations carried out in companies rather than on the market? As stipulated in the neoclassical perspective. Based on the principles of TC theory, when external TCs are greater than inner TCs, the business will develop through in-house operations. If the external TCs are lower than the internal TCs, the company will be reduced through outsourcing activities. In reality, market participants must pay the price of the agreement, develop rules for the implementation of the agreement and establish appropriate management and governance systems. This price of doing business is called the Transaction Cost (TC) (Ruester, 2010).

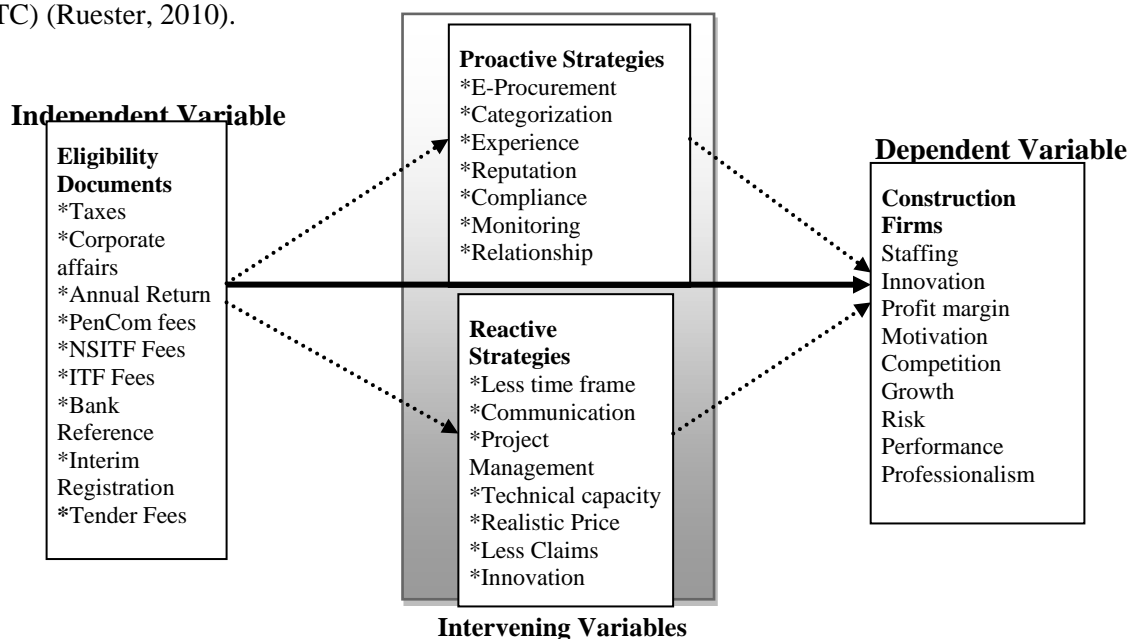


Fig. 2.2 Summary of conceptual framework for minimizing transaction costs of construction firms in bidding construction projects using PPA 2007.

2.4 The Conceptual Framework

The Conceptual Framework for this study was drawn from the combination of the framework reviewed above. 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 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 construction firms transaction costs on the basis of eligibility documents as contained in the PPA 2007 for any contractor to participate in federal government projects in Nigeria. It assesses the strategies adopted in mediating the impacts of such eligibility documents costs on construction firms. The strategies adopted are proactive and reactive strategies, that serves as intervening variables in the conceptual model as shown in figure 2.2 above.

Once the conceptual framework is shown, the next step is hypotheses development. The research model depicted in Figure 2.2 includes one direct and two mediating hypotheses:

H₁: Eligibility documents is negatively related to construction firms (c')

H₂: The relationship between eligibility documents and construction firms is negatively mediated by proactive strategies adopted (a₁b₁).

H₃: The relationship between eligibility documents and construction firms is negatively mediated by reactive strategies adopted (a₂b₂).

2.5 Sources of Transaction costs in construction bidding

2.5.1 Eligibility Documents

Li et al., (2014) defined a requirement to be "a condition or capability to which a project, product, service or system must conform". So, that cost, time and energy will be saving throughout the construction period. The issue of construction project requirements includes; lack of review and feedback to the client brief; client change requirements and design frequently; needs of end-users not clearly stated etc (Yu & Shen, 2013a). Yu and Shen (2013a) recommends that in order to reduce or mitigate the problem of requirement in construction project, an experienced project participant as the client requirement manager should be appointed. In addition to this, a formal procedure to record, manage and track changes in client requirement must be maintained.

Mandatory requirements includes not only Tax, Pencom, ITF, NISTF and IRR, but also the additional evidence to proof to the clients' the capability to carry out the construction project technically and financially (PPA, 2007) to build confidence both to the clients and other business. Yu and Shen (2013b) Li, Arditi, and Wang (2012b) summarized many studies and research on bidding success, and identified some components including clients' needs, contractors' behavior, transaction environment, information access, project management efficiency and magnitude of the transaction.

The public procurement Act 2007 identified about ten (10) key components in construction project bidding: tax clearance, pension certificate, industrial training certificate, national social insurance, financial capability, equipment ownership, court affidavit, bank guarantee performance bond, advance payment guarantee and interim registration report by BPP.

2.5.2 Organizational Behaviour/ Client

Many studies have listed different client's behavior that can impact bidding process in construction project. Studies of D. H. Walker (1995), Chan and Kumaraswamy (1997), Songer and Molenaar (1997), Dissanayaka and Kumaraswamy (1999) as cited by Li, Arditi, and Wang (2015) have pointed that owner's behavior are characteristics as client type and experience, knowledge of construction team, owner's construction sophistication, well-define scope, owner's risk aversion, and client project management are in practice. However, (Guo, Li, Li, & Zhang, 2016) emphasized that owner's behavior reduces uncertainty in the transaction environment and increases the efficiency of project management.

Therefore, negative attitudes of the owner's in his behavior can lead to high impacts towards the bidding process. Owner's (client's) of construction project dreadful behavior in terms of relationships with contractor's, consultants, co-workers and colleagues affect contractor's bidding in terms of time, efficiency of the process and poor plans and specifications during project implementation. A smooth relationship among parties when bidding may enhance cooperation, reduce disagreements, allow for easy resolution of conflicts and creates stability in the owner's behavior, hence reducing the uncertainties in the transaction environment.

Kululanga and McCaffer (2001) suggest that an effective organizational learning could be attained as a result of good lesson learned from existing harmony in the project execution. Hence, promoting stability in the owner's behavior and reducing uncertainties in the transaction environment (i.e negative impact on the contractor's bidding). Walker and Wing (1999) in their studies to explore the relationship between construction project management theory and transaction costs economics argues that owner's behavior as a human being is characterize by bounded rationality, which made him to act rationally due to the limited analytical and data processing capabilities. By likelihood of not choosing the most appropriate organizational structure, procurement method or bidding strategy etc. this is likely to be the case for clients which build regularly (Walker & Wing, 1999)

2.5.3 Contractors' Behaviour

The ability of contractors to define the behaviour of clients and competitors, the less transaction costs to incurred (Li *et.al*, 2015). The suspicion of unbalanced bidding, cheating, and collusion may cause uncertainty in the bidding process, may cause the owner's overall project cost to get higher (negative impacts), but it is difficult to detect unbalancing Arditi and Chotibhongs (2009) and collusions, and may generate contentious change orders (Manzo, 1997), all contributing to negative impacts. As mention with owner's behavior, contractors that maintain a good working relationship with sub-contractors may positively and strongly influence general contractors performance (Kale & Arditi, 2001) cited by Li *et.al*, 2015), and may lower transaction costs of bidding

Bresnen and Marshall (2000) states that a good harmony between contractors and owners enhance cooperation, trust, and creates stability in the contractor's behavior, hence lowering TCs. Li *et.al* (2015), Lingard, Hughes, and Chinyio (1998) identifies some of the elements or variables defining contractor's behavior as; bidding behavior, qualifications of the contractor, relationships with sub-contractors, relationships with previous clients, experience in similar type projects, material substitution and frequent claims (Chan & Kumaraswamy, 1997; Dissanayaka & Kumaraswamy, 1999). Similarly, the contractor is affected by bounded rationality issues as a human being, whereby he cannot identifies all possible contingencies due to contract incompleteness. Such characteristics may lead to time overrun or costs overrun, due to his refusal to rectify defects found in the bidding documents or project implementation, because he may ask for additional payment due to either of the above item mentions. This can have a negative impact to the project (Chang & Ive, 2007).

2.6 Mediation Effect of Proactive/Reactive strategies in minimizing transaction costs

Mediation is the process whereby a third variable called mediator is introduced into a model which explains the relationship between dependent and independent variable (Sekaran & Bougie, 2011). Hayes (2009) explained that mediator reduces the effect of independent variable on dependent variable. Proactive strategies adopted with categorization, timely delivery, reputation minimum time frame, innovation, capabilities and less claims goes a long way towards reducing the effects of eligibility documents costs affecting overall turnover of construction firms businesses and enhances overall performance of small-scale contract businesses. Dadzie (2015) stated that Transaction costs can take a significant proportion of the budget and cause shortages when underrepresented. It is therefore important to device strategies to reduce transaction costs. Proactive mediation should be taken to prevent frequent spending by contractors before the commencement of bidding. Dadzie (2015) opined that, streamlining vendors, computerizing transactions, building strong relationships with service providers, automating orders and standardizing payment systems could reduce transaction costs in the district assemblies. But, in his contribution towards minimizing costs of procurement in Nigeria Jibrin et al. (2014) pointed out flexible and less bureaucratic systems of government organization, openness in the awards and fairness in the competition. These create good perception in the population at large and less expensive in the process.

The following proactive/reactive strategies are identified as mediators that reduce transaction costs effects on construction firms: categorization, timely delivery, reputation minimum time frame, innovation, capabilities, E-procurement, knowledge on PPA 2007, good relationship, experience, implementation of the procurement rules and less claims (Onyema, 2011; Jibrin et al., 2014)

3.0 Method

This study is quantitative in approach; a questionnaire survey was administered to 143 federal contractors, in north-West part of Nigeria. The region comprises of 7 states (Kaduna, Kano, Katsina, Sokoto, Jigawa, Kebbi and Zamfara). The region represents almost 80% of the total country's landmass of 744,249.08 km and a population of about 95 million people (National Bureau of Statistics NBS, 2010). A total of 105 questionnaires were returned, of which 105 used for the analysis. A ADANCO 2.1.1 PLS algorithm was used to perform the regression analysis of the collected data related to the Transaction costs of contractors and strategies adopted in minimizing them in Nigeria. Also the software was used to assess the mediation effects of proactive and reactive strategies adopted in the bidding process.

PLS-SEM analysis has the ability to helps researchers in making proper interpretation of results and guides in making right decisions (Awang, Afthanorhan, & Asri, 2015; Kock, 2014). The collected data was bootstrapped to generate confidence intervals of the mediation effect of proactive and reactive strategies model. Bootstrapping approach generated an empirical representation of the sampling distribution of the effect by treating the original sample size as a representation of the population in miniature; this is repeatedly resampled during analysis as a means of copying the original sampling process (Hayes, 2009). The bootstrapping is used to obtain the accurate estimates of parameters and standard errors (Awang, Afthanorhan, & Asri, 2015). The resample was generated up to 999 from the original data with replacement. Bootstrapping is used to generate the confidence interval of the mediation effects of proactive and reactive measures on eligibility document costs that affect federal contractor in bidding public sector projects at 95%

3.1 Significance of direct and indirect effects

We assess the significance of one direct (c') and two indirect effects ($a_1 \times b_1$ and $a_2 \times b_2$). The critical issue is that if the significance of each indirect effect cannot be established, there is no mediating effect. Consequently, having a significant indirect effect is the key to determining the type of mediation effect and its magnitude. Considering that our hypotheses have been formulated with direction (+), we will use a one-sided test. Accordingly, we will estimate 90% confidence intervals (CI). Nitzl, Roldan, and Cepeda (2016) suggested a procedure using a spreadsheet and multiplying the bootstrapping outputs (i.e., $a_1 \times b_1$, and $a_2 \times b_2$) to calculate the percentile and the bias-corrected confidence intervals. Therefore, once we run the model, we next perform the bootstrapping procedure with 999 subsamples and no sign changes. In Figure 4.1 we can see the estimates for direct effects.

3.2 Content Validity

Sekaran and Bougie (2011) stated that content validity is used in research to validate the research instrument. Content validity is used to assess how well an idea or a concept is represented by the items in a questionnaire. The content validity for this study was conducted by requesting experts in the area of construction procurement research and academics on the suitability of the items in the questionnaire. After thorough discussions with the experts, they agreed with the items in the questionnaire, validated and verified 11 items under eligibility documents, 11 items under proactive, 7 items under reactive and 9 items under construction firms. A total of 19 items were scored under the constructs after conducting the iterations, and those with factor loading below 0.60 were deleted (Hair, Sarstedt, Matthews, & Ringle, 2016; Henseler, Hubona, & Ray, 2016) and value was calculated automatically by the software for analysis purpose (Table 1).

3.3 Assessing Mediation Effects of Eligibility documents costs with proactive and reactive measures

An assessment of the mediation effects on a model is achieved by two tests that were used to assess the indirect effects of mediator variable in the model:

- (1) Causal steps as presented by Baron and Kenny (1986)
- (2) Percentile and bias-corrected bootstrap CIs presented by Hayes and Scharkow (2013)

Once the mediation effect is defined, the procedure developed by Nitzl et al. (2016) to test mediation effects on PLS-SEM and also define the different types of mediation that researchers can find in their analysis was used. The procedure considers five important statements for testing mediating effects in PLS:

1. Testing the indirect effect $a \times b$ provides researchers with all the information they need to assess the significance of mediation. Therefore, it is not necessary to conduct separate tests for paths a and b by applying PLS-SEM.
2. The strength of the indirect effect $a \times b$ should determine the size of the mediation. Therefore, it is also not necessary to test the difference between c and c' .
3. A significant indirect effect $a \times b$ is the only prerequisite for establishing a mediation effect.
4. A bootstrap test should be used to test the significance of the indirect effect $a \times b$.
5. The significance of the direct effect (c') has to be tested in order to determine the type of effect and/or mediation.

Table 1: Research Variables and their factor Loadings

Indicator	Construction Firms	Proactive Strategies	Eligibility Documents	Reactive Strategies
PENCOM_CERT			0.9405	
NSITF_CERT			0.7894	
ITF_CERT			0.8520	
FRCN_CERT			0.6534	
IMPA	0.6398			
IMPC	0.7017			
IMPG	0.7862			
STRA		0.5937		
STRC		0.7112		
STRE		0.6285		
STRG		0.6705		
STRI		0.8019		
STRJ		0.6611		
STRL				0.8225
STRM				0.7632
STRO				0.6213
STRP				0.8268
STRQ				0.7732
STRR				0.8523

3.4 Reliability Test

The reliability of the survey instrument indicated an extent to which the variables are without bias (free from error) and hence ensures consistencies of measurement across the various items in the instrument (Sekaran & Bougie, 2011). The composite reliability and Cronbach’s alpha were used to measure the reliability of the variables.

Table 2 present the composites reliability coefficients donated by Jöreskog's rho (ρ_c), Dijkstra-Henseler's rho (ρ_A) and Cronbach’s alpha coefficients for four constructs; independent (ED), dependent (CF) and mediating variables (PRA and REA). The composite reliability indicated the internal consistency of the variables and should be .70 or higher to indicate adequate convergence or internal consistency (Gefen, Straub, & Boudreau, 2000). Both the Dijkstra-Henseler, Joreskog’s rho and Cronbach’s alpha were above the acceptable limit of 0.7 for all construct as shown in Table 2. These indicated that the instrument is considered consistent and reliable (Sekaran & Bougie, 2011).

Table 2: Construct Reliability Coefficient

Construct	Dijkstra-Henseler's rho (ρ_A)	Jöreskog's rho (ρ_c)	Cronbach's alpha(α)
Construction Firms (CF)	0.7620	0.7536	0.7515
Proactive Strategies (PRA)	0.7988	0.8372	0.7753
Eligibility Documents (ED)	0.9074	0.8866	0.8316
Reactive Strategies (REA)	0.8993	0.9024	0.8714

4.0 Empirical Evidence and Result

4.1 Model Fit Indices

A ADANCO PLS-SEM 2.1.1 algorithm was used to analyze the collated data via the boot- strapping resampling technique. The general model fit indices provided three indices: average path coefficient (APC), average R-squared (R^2) and average variance explained. Figure 2.3 and Table 3 presents the model and result of the direct effect of eligibility documents costs (ED) on the construction firms (CF); the average path coefficients APC of the model ($\beta = .430$, $T= 6.218$ $p < .001$), which is significant at $p = .05$ level of significance. The coefficient of determination R^2 according to [62](Henseler et al., 2016) an R^2 value of <0.350 is considered large, an R^2 value of $0.15-0.350$ is regarded as moderate, and an R^2 value in this study was 0.19 and is moderate. The average variance inflation factor $AVIF= 1.000$ and regarded as good if less than 5 and therefore, considered good [66] [67](Bagozzi & Yi, 1988; Fornell & Larcker, 1981). This satisfied the first procedure of mediation by [61] Baron and Kenny (1986), in that the direct effect between independent variable (ED) and dependent variable (CF) should be significant.

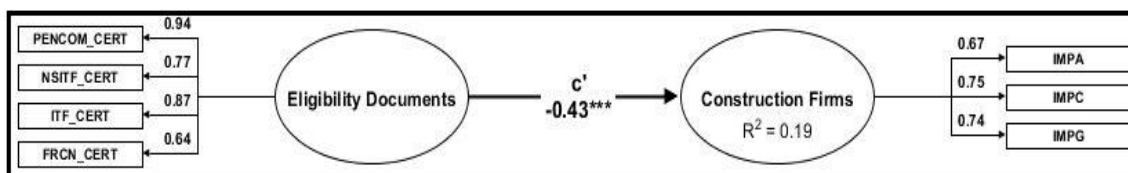


Figure 2.3: Direct effect of Eligibility documents costs on construction firms operating costs

Table 3: Inferential result of the direct effect of ED on CF

Effect	Standard bootstrap results					
	Original coefficient	Mean value	Standard error	t-value	p-value (2-sided)	p-value (1-sided)
c'	-0.4336	-0.4635	0.0697	-6.2184	0.0000	0.0000

4.2 Direct and Indirect effects of Eligibility documents costs (IV) on construction firms (MV)

Figure 2.4 and Table 4 present the direct coefficient of the effects of the eligibility documents on construction firm as the outcome construct along $path-a_1$ and b_1 (Proactive Strategies) was -0.343 and 0.626 , the test of the statistical significance t-value was -3.8702 and 5.7642 , the p-value was $= 0.0001$ ($P < 0.05$), indicating significant effects between the independent construct (ED) and mediating construct (PRA) as shown. Additionally, the bias-corrected lower limit C.Is (LCI) and the upper limit C.Is (ULCI) obtained along $path-a_1$ and b_1 were $-.591$, $-.143$ and 0.333 , 0.922 respectively obtained at 5% and 95% confidence interval (C.Is). Considering that the p-value ($P < 0.05$) and both LLCI and ULCI did not include zero, the effects between the independent construct (ED) and the mediating variable (PRA) was significant [58] (Nitzl et al., 2016). Similarly, the outcome construct along $path a_2$ and b_2 (Reactive strategies) was -0.3964 and -0.3584 , the T-test shows -5.0337 and -2.8724 , with p-value $= 0.000$ ($p < 0.05$), this also indicate significant effects between the independent construct (ED) and mediating construct (REA) as depicted in Figure 2.4.

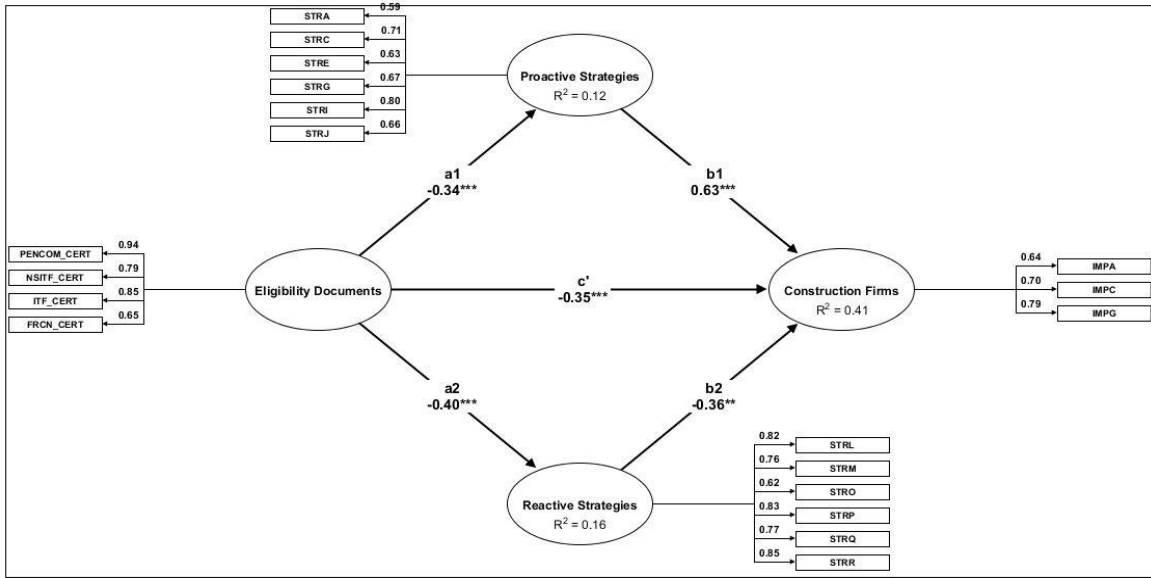


Figure 2.4: Direct and Indirect effect of eligibility documents on construction firms through mediators

The bootstrapped results of the indirect effects as in Table 5; present the output of the bootstrapped confidence interval at 95% with lower and upper limits interval ranges. The range was from 0.309 to -.107 path $a_1 \times b_1$ and the estimated effect was -.215 which indicated that proactive strategies had a negative effect on eligibility documents cost (ED) that affect construction firms costs of operating and the true indirect effect was not zero (0) and zero (0) does not occur between the lower and upper limits at 95% confidence level. Therefore the indirect effect was significant according to Hayes (2009) and that of Hayes and Scharkow (2013). This leads to the supporting of Hypothesis 2 that proactive strategies mediate the relationship between the effects of eligibility documents that affect construction firm operating costs in Nigeria. However, the indirect result in path $a_2 \times b_2$ shows that the BC confidence interval (C.I) for both lower and upper limits range from 0.405 to -.016 and the estimated effect was 0.152 which indicated that reactive strategies had a positive effect on eligibility documents (ED) that affect construction firm costs and the indirect result was not zero (0) between the lower and upper limits. Therefore, the path ($a_2 \times b_2$) was significant] (Hayes, 2009; Nitzl et al., 2016). This leads to the conclusion that hypothesis H3 that reactive strategies mediate the relationship between the effect of eligibility documents and construction firm is supported.

Table 4: Summary of Direct Effect Test

Direct Effect	Original Coefficient	Mean Value	Standard Error	T-Value	P-value (one-Sided)	Bias Corrected		Percentile	
						LC.I	UC.I	5%	95%
a1	-0.3426	-0.3701	0.0885	-3.8702	0.0001	-.564	-.116	-.591	-.143
b1	0.6261	0.6276	0.1086	5.7642	0.0000	.331	.920	.333	.922
H ₁ :c'	-0.3543	-0.3587	0.0737	-4.8101	0.0000	-.547	-.158	-.552	-.163
a2	-0.3964	-0.4182	0.0787	-5.0337	0.0000	-.615	-.191	-.593	-.213
b2	-0.3584	-0.3394	0.1248	-2.8724	0.0021	-.658	.085	-.677	.104

The total effects of ED on CF after introducing mediators into the model (c'-path) was 0.063 at p = .155, which was not significant at p = .05. This satisfied the second and third procedures of Baron and Kenny (1986) and therefore, mediation has taken place.

Table 5: Summary Indirect Mediating effect Test

Indirect Effect	Point Estimate	Percentile		BC		VAF
H ₂ : a ₁ x b ₁	-0.215 ^{sig}	-.197	-.132	.309	-.107	62.2%
H ₃ : a ₂ x b ₂	.152 ^{sig}	.401	-.022	.405	-.016	24.8%
Total Effect	-.063 ^{nsig}	.204	-.154	.714	-.123	87%

4.3 Type of mediation and magnitude

Table 5 indicates that c' (total effect) is not significant, and all postulated indirect effects are significant. Consequently, this means that proactive and reactive strategies fully and jointly mediate the influence of eligibility documents costs on construction firms (Nitzl et al., 2016). This is also supported by applying the variance accounted for (VAF) index. The VAF has an outcome above 80%, which indicate a full mediation Hair *et.al.* (2016) and (Nitzl et al., 2016), and in the current study the VAF occurs at 87% above the acceptance figure Table 5

4.4 Coefficient of determination (R²): The coefficient of determination measures the overall effect size and variance explained in the endogenous construct for the structural model and is thus a measure of the model's predictive accuracy. In current study, the inner path model was 0.410 (figure 2.3) for the construction firms costs explain 41.0% of the variance in the construction firms, meaning that about 41.0% of the change in the construction firm costs was due to three latent constructs in the model (Eligibility documents, Proactive and Reactive strategies). According to (Henseler et al., 2016) an R² value of <0.350 is considered large, an R² value of 0.15-0.350 is regarded as moderate, and an R² value in this study was 0.410 and is large. Similarly, eligibility documents costs explain 0.12 and 0.16 of variance in Proactive (PRA) and Reactive (REA) strategies which indicates as a weak determination. These has confirmed that the effect of ED on PRA and REA are not strong because they mediates its effect as seen in figure 2.3 and 2.4 above, which shows the type of mediation that occurs.

5.0 Discussion of Findings

ADANCO PLS-SEM 2.1.1 version was used to achieve the aim and objectives of this study on the mediation model and effects of proactive and reactive strategies in minimizing the negative effects of eligibility documents costs that affects construction firms in Nigeria. The study assessed the total effects of eligibility documents costs and found that ED affect the overall construction firms operating costs in Nigeria in a negative direction. The study beta coefficient was $\beta = -.43$ at p <.0001 level of significance.

The beta explained that -.43 value contributed towards the contribution of the construction firms in Nigeria. This further explained that the total effects of the four indicators of eligibility documents i.e. evidence of national pencom certificate, national social insurance, industrial training fund and financial reporting council certificates affect construction firms in a negative direction. The effects on the construction firm are in the form of qualified staff for project execution, retain profit for new projects and project uncertainty. According to Li, Arditi, and Wang (2012a), studies that uncertainty in a project increases transaction costs which affect a construction firm. Therefore, hypothesis H1 of the study was achieved, and confirmed that transaction costs in the form of eligibility documents affect construction firm activities (Yahaya, Oyediran, & Onukwube, 2019). However, a construction firm has to pay more attention on the type of their staff they will contribute for his national pension fund as a statutory by the Law. This will ensure that they are not contributing funds to a causal staff in the firm, which has no value at last. When the mediator variables i.e. proactive and reactive strategies was introduced into the model it mediates the effects of eligibility documents costs from $\beta = -.43$ at $p < .0001$ to $\beta = -.35$ at $p = .155$ which is not significant at $p = .05$ level of significance. This indicated that strategies adopted mediate the effects of eligibility documents on the construction firm activities. Therefore, contracting firms can minimize their transaction costs (ED) by having timely project delivery, good relationship with clients, knowledge on procurement process, innovation in executing construction, realistic prices and technical capabilities when bidding projects. On the other hand government should deployed e-procurement, reduce complain time, reduce bidding requirements as contained in the PPA 2007 and train more procurement staff at the various MDAs. The client behavior also has a significant role in minimizing construction firm TCs (Li *et al.*, 2015). He further stated that Good relationship enhances the cooperation between the parties, reduces disagreements, and facilitates the resolution of conflicts. This kind of stability in the owner's relationships reduces the likelihood of litigation (Arditi & Pulket, 2009) and is therefore likely to reduce transaction costs primarily in terms of legal fees, hence making the frequency and severity of conflicts a good yardstick for measuring this indicator.

Consequently, the two mediators tested in the study has shown that the mediation of eligibility documents on construction firms was through proactive and reactive is full mediation as there is no significant effect in path c' in the model after introducing the mediators. This also support hypothesis H₂ and H₃ that the relationship between eligibility documents and construction firms is negatively mediated by proactive and reactive strategies adopted, this answer the research question (2) in the study. From the result it was found that the variance accounted for (VAF) at the indirect path (a_1xb_1) was 62.2% and (a_2xb_2) is 24.8% with a total of 87% which indicates full mediation (Hair *et al.*, 2016; Cepeda, Nitzl & Roldan, 2016). Similarly, the coefficient of determination R^2 indicates that the endogenous construct for the structural model predictive accuracy is 41.0% for the construction firms. This indicates that the changes (variance) occurs in the construction firm was happens due to the three latent variables in the model (eligibility documents, proactive and reactive strategies). Indicators in the latent variables such as: national pension certificate, high frequency of claims by parties, much time frame on procurement complaint and bad relationship among stakeholders in contract are the major factors contributing towards such variance in construction firm's activities (Yahaya *et al.*, 2019). Therefore, proper and careful understanding of those factors would enable construction firm to excel in the business and in future time to compete with foreign construction firms (Gambo, Said, & Ismail, 2017).

The second process of testing the model which was the percentile and bias-corrected bootstrap CIs, generated results which indicated that the indirect effects were significant because the intervals between upper and lower limits at 95% confidence intervals (CIs) lies between 0.309 to -.107, and 0.405 to -.016 which, according to Hayes and Scharkow (2013), and Cepeda *et al.*, (2016), indicated that the intervals do not contain (zero, 0) between them. Therefore, the indirect path was significant and proactive and

reactive strategies adopted mediate the effects of eligibility documents on the construction firms' activities in Nigeria.

6.0 Conclusion and Recommendation

The study seeks to develop a mediation model that can minimize the effect of such transaction costs (TCs) on construction firms in Nigeria. The study's results revealed that the mediators for the two construct of minimizing effects of TCs on construction firms comprising of proactive and reactive strategies are valid and acceptable mediators. Based on these findings, it can be concluded that an effective mechanism for minimizing effects of TCs in construction firms entails timely project delivery, good relationship with clients, knowledge on procurement process, innovation in executing construction, realistic prices and technical capabilities when bidding projects. On the other hand government should deployed e-procurement, reduce complain time, reduce bidding requirements as contained in the PPA 2007 and train more procurement staff at the various MDAs. This training would enable the procurement offices to apply procurement rules and regulation procedure in their MDAs when procuring works, services and goods from third parties which would result in positive project objectives. Though this study has revealed some understanding of the construction transaction costs (PenCom certificate, NSITF, ITF and FRCN) in construction firms, this is not without limitations. Furthermore, it is noteworthy that the model used in this study is a valuable extension of the innovation and technology adoption models. Moreover, the above findings provide empirical support to the model, and provide evidence of its applicability and suitability to similar settings. In addition, these findings provide clear indicators to the contractors, consultants and policymakers on the core dimensions to be stressed in order to minimize the impacts of transaction costs (TCs) on construction firms, and which is expected to increase the competitiveness, growth and performance of indigenous construction firms in Nigeria. Particularly, the practitioners (contractors) should focus on those indicators with high factor loading in the proactive and reactive strategies adopted. In addition, the government authorities are required to amend the PPA 2007 so as to reduce time frame for complaint and bidding requirement for firms with less turnover of share capital, but with good reputation in terms of experience, financial capability and standard.

6.1 Recommendations

Finally, the futures studies are recommended to extend the current findings to other States of the federation were they practice procurement law as in the central government. This will enable the test and validation of the model developed in the current study. Moreover, they are recommended to cover a larger sample that includes the consultant, of both profession and clients of various MDAs and compare between them to identify any differences in adoption patterns. Similarly, the future studies are recommended to compare between the client's perception and expectations regarding the impacts of transaction costs factors in the construction industry. This will help the industry to make the necessary developments to satisfy and retain their reputation by providing them better services. As a result, they would have an opportunity to position themselves in a favourable competitive position with the foreign firms.

6.2 Implications of the Study

Technology adoption in the construction sector is a matter of debate amid construction professionals of contemporary. Taking into Consideration the phenomenon that, the adoption rate of public procurement Act 2007 framework is still fringe and marginalized, this research finds that transaction costs sources in the form of eligibility documents costs, are some of the salient factors affecting the activities of construction firms in Nigeria. This paper in consistency with other research, help the researchers of this study to suggest, there is the need for construction managing directors and directors

in Nigeria and around the world to minimize transaction costs and increase profit margin by adopting mediators that will reduce transaction costs in the construction industry in Nigeria, taking into consideration, the indicators that may mediate such effects when bidding/tendering.

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