Clinton Aigbavboa · Wellington Thwala
Editors

The Construction Industry in the Fourth Industrial Revolution
Proceedings of 11th Construction Industry Development Board (CIDB) Postgraduate Research Conference
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Sustainable Project Delivery of Public Procurement Projects: Contractor Selection Procedure

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Abstract. Selecting a competent contractor is a yardstick for sustainable project delivery. It ensures the project is completed within time, cost and quality standard. This study assesses the procedure of Nigeria’s public procurement Act of 2007 and identifies the frequency of use of prequalification criteria. The research is both exploratory and quantitative in nature. The population for the quantitative study was public clients and consulting organization. Stratified random sampling technique was used. The sample size was calculated using Cochran formula. A total of 300 questionnaires were distributed using Cochran formula to generate the sample size. From the sample size calculated, 196 were from consulting firms and 31 from public clients’ organization. Statistical Package for Social Science (SPSS) 21st version was used to analyse the data using frequency, percentage, relative importance index (RII) and t-test. There was an agreement between public clients’ and consultant organisation on the frequency of use of contractors’ prequalification criteria. In conclusion, it is important to consider the method of procurement, size of the project and complexity of the project to ensure the optimum balance of experience, positive references, working chemistry and teamwork.

Keywords: Contractors · Prequalification · Project delivery · Public Procurement · Tendering

1 Introduction

Public Procurement Projects system entails organizing, processing and procedure of actualizing construction project [1]. The process begins from the design stage to the completion of the project. However, the decision taken at the design stage has a direct effect on the construction stage and the performance of the project. One of the unique decisions taken by the client and his representatives at the design stage is the selection of the appropriate contractor for the project. The selection of a competent contractor for the proposed project influences the performance of construction activities on site. However, if an incompetent contractor was selected, it will leads to time and cost overruns, poor workmanship, rework, disputes and litigation [2]. Thus, it becomes necessary for a coherent approach is use to ensure a competent and suitable contractor is chosen for a project.

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The Federal Government of Nigeria (FGN) established the Public Procurement Act (PPA) of 2007 to ensure that all government projects go through “Due Process” in order to ensure fairness, transparency, and accountability [3] and proper value procurement system. Similar Procurement Act had been developed in many other countries to guarantee efficient procurement system [4, 5]. In Egypt, where a Procurement Act of 9 was used for public projects, the Act failed to mandate point system for contractor evaluation. There is no appropriate criteria given to the project managers. However, evaluation of contractor was on price criterion [5]. In Ghana, the Public Procurement Act, 2003 (Act 663) was also enacted with the same purpose with that of Nigeria PPA of 2007 [6]. The main objective of the Public Procurement Board in these countries were to synchronize public procurement process in the public service in order to secure a transparent and objective judgment in the management of the use of the country resources in public procurement. It will helps to prevent fraudulent and unhealthy practices in the discharged of public procurement projects. For instance, in Nigeria PPA of 2007, the criteria were stated in the Act but the procedures for evaluation were not given. Thus, the stakeholders used different yardstick for evaluating contractors data.

Due to the risk involved, several researchers, [7, 8] have developed models to aid decision makers in choosing the appropriate contractor. Such model includes Analytical Hierarchy Process (AHP), Artificial Neural Network (ANN), Cluster analysis, Multi-criteria decision model (MCDM), Data-Base Management system (DBMs) and Multi-attribute analysis (MAA). However, these models have their weaknesses. The DBMs fails to address existing problems of prequalification and it increases subjectivity by restricting the range of decision criteria, thus, it does not reflect clients’ goals and objectives [11].

Contractor selection method entails competitive and non – competitive [6]. Competitive contractor selection methods comprise of open and selective methods. While, nominated/negotiated method is known as the non - competitive contractor selection methods. In adopting the competitive contractor selection method, the criterion for selecting the contractor is on the lowest bidder. However, lowest bid selection criteria could sometimes result in delay, cost overrun, poor quality and disputes [12]. This suggests the need for a critical evaluation of contractor selection criteria in construction project procurement [10–13].

Many researchers have proffered solution in form of the use of multi-criteria approach in the selection of contractors [7–10]. Multi- criteria selection includes the use of price related and non- price related criteria. The non- price related criteria used at the prequalification stage of the contractor selection. Contractor’s financial ability, experience, managerial capability, health and safety compliance, experience as well as contractors’ reputation and image have been included in the non-price related criteria [14].

This study intends to provide an insight into how the prequalification of contractors are carried out in accordance with the provision of the PPA of 2007 as required by the provision of section 16 (6) of PPA, 2007. In addition, to compare the criteria listed in the PPA with criteria in literature in order to identify the frequency of prequalification criteria use. The project entail the construction of a reinforced concrete framed structured with an aesthetically appealing façade modern high-rise building on pile foundation in Lagos State, Nigeria. The scope of work includes amongst others: excavation and filling; earthwork support; preparing concrete pile and installation of 450 mm
diameter bored piles; 43 m depth below pile cut of level including steel reinforcement with grade 30 grout mix; developing minimum 30 N/mm² work strength; fittings and fixtures; electrical and mechanical installations among others.

For this study, to evaluate the contractor’s suitability in order to realize the construction of a multi-floor building. Criteria stipulated in the advertisement based on the provisions of Public Procurement Act, 2007 (PPA, 2007) as stipulated in section 16 sub-section 6, Sections 31 and 32 respectively were used. This was coupled with the provisions of the public procurement procedure manual on evaluation published by the Bureau of Public Procurement (BPP). The criteria stipulated are mandatory in compliance with section 16 (6) of PPA, 2007. This study also intends to seek the opinion of the Decision Makers (DMs) on the frequency of prequalification criteria according to the PPA.

2 Procedure of Procurement Process for Construction Projects

Development of criteria for prequalification and bidding documents was done before the advertisement of the project. Contractors interested in the advertisement collect the tender document with non – refundable fee and submitted as specified in the advertisement. Advertisements are usually done in the National Newspapers, official website, Federal Tender Journal (FTJ) and on the notice board of the procuring entity in line with the provision of section 25 of PPA, 2007. Following the advertisements for the Multi Floor Project, these following eight bidders responded. They are: Ax Project Limited, Bx Company Limited, Fl Construction Limited, Mf Nigeria Limited, Nd Nigeria Limited, Sg Limited, Ui Construction Ltd, and Vi Construction Limited. The prequalification documents were opened in line with section 30 of PPA, 2007.

2.1 Criteria for Pre-qualification

In accordance with the provisions of Section 16 (6) of PPA, 2007 the criteria for the selection of bidders as advertised were based on the following:

i. Evidence of Certificate of Incorporation with Corporate Affairs Commission (CAC)
iii. Evidence of Tax Clearance Certificate (201, 2013, 2014)
iv. Pension Clearance Certificate PENCOM
v. Evidence of compliance with ITF
vi. Two (2) registered structural engineers with COREN not less than ten years post registration with COREN
vii. Three (3) registered civil engineering technologist with not less than five years post registration with COREN
viii. Two (2) registered builders with not less than five years post registration with CORBON
ix. Two (2) registered Quantity Surveyors with not less than five years post registration with QSRBN
x. Two registered Architects with not less than five years post registration with Architect Registration Council of Nigeria (ARCON)
xi. Financial capability & Banking support
xii. Company’s Technical staff experience & qualification
xiii. Performance on previous construction work of not less than five-storey building
xiv. Equipment and Technology capacity
xv. Annual turnover not less than five hundred million naira (#500M).

2.2 Prequalification Evaluation

The evaluation was carried out based on the provisions of PPA, 2007 using the advertised criteria as stipulated in section 16 sub-sections 15, Sections 31 and 32 respectively coupled with the provisions of the public procurement procedure manual on evaluation published by the Bureau of Public Procurement. The criteria stipulated are mandatory in compliance with section 16 (6) of PPA, 2007. The Evaluation of compliance of bidders indicates the level of compliance of the bidders to the criteria specified in the solicitation document.

3 Research Method

The study was both exploratory and quantitative in nature. The exploratory aspect illustrated how contractor selection practice in Public Procurement Project was carried out. While the quantitative entails sampling the opinion of public clients’ and construction professionals on the procedure based on the frequency of prequalification criteria use. Thus, the construction professional entails Architects, Builders, Engineers and Quantity Surveyors. The study area was Lagos State because Lagos is a state with population of over twenty-three (23) million [15], making it 12% of Nigeria population (195 million) by the National Population Commission. Lagos has a land area of 3,577 sqkm, thus it the sixth most populous city in the world and the second largest city in Nigeria. It is one of the most populous cities in Africa [16] and the new biggest city in Africa [17]. Being the industrial as well as commercial centre of the country, the city had experienced an increased in population and abundant economic opportunities. It had led to over utilization of available utilities with attractive resources. The increasing rate of urbanization had resulted in pressure on land use; hence, it involves a lot of construction activities [18] to meet the expectation of its populace. The sampling frame was obtained from the professional bodies of the construction professionals as shown in Table 1.

Stratified random sampling technique was used to select the respondents. The sample size was calculated using Cochran formula as displayed in Table 2. It gives a sample size of 227. From the sample size calculated, 196 were from construction professionals in consulting firms and 31 were from public clients’ organization.
Table 1. Sampling frame of respondents in Lagos

<table>
<thead>
<tr>
<th>Respondents</th>
<th>Lagos State</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Architects</td>
<td>250</td>
</tr>
<tr>
<td>2. Quantity Surveyors</td>
<td>345</td>
</tr>
<tr>
<td>3. Builders</td>
<td>220</td>
</tr>
<tr>
<td>4. Engineers</td>
<td>294</td>
</tr>
<tr>
<td>5. Public clients</td>
<td>108</td>
</tr>
<tr>
<td>Total</td>
<td>1217</td>
</tr>
</tbody>
</table>

Source: Institute of the respective professional bodies (Consulting firms) and www.Lagosstategov.ng/pagement (Lagos public clients)

Table 2. Sample size

<table>
<thead>
<tr>
<th>Respondents</th>
<th>Research area (Lagos State)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Consulting Architect</td>
<td>44</td>
</tr>
<tr>
<td>2. Consulting Quantity Surveyors</td>
<td>61</td>
</tr>
<tr>
<td>3. Consulting Builders</td>
<td>39</td>
</tr>
<tr>
<td>4. Consulting Engineers</td>
<td>52</td>
</tr>
<tr>
<td>5. Public clients</td>
<td>31</td>
</tr>
<tr>
<td>Total</td>
<td>227</td>
</tr>
</tbody>
</table>

Cochran formula \( (n_0) = \frac{t^2 \times s^2}{d^2} \)

Where: \( n_0 \) = sample size; \( t \) = t value for the acceptable margin of error \( (t = 1.96) \); \( s \) = estimate of variance in the population distribution (standard deviation \( (SD^2) \)); \( d \) = acceptable margin of error \( (0.05) \).

300 questionnaires were distributed and 210 were collected giving a response rate of 70%. Statistical Package for Social Sciences (SPSS) was used for the analysis. Frequency, percentage, t-test for proportion and Spearman Rank Correlation statistical tools were used to generate the result from the data. This study was subjected to a reliability test using pre - test method. The reliability of the scale for the questionnaires was tested using Cronbach’s alpha method, which was found to be 0.79. The result suggested that the questionnaires are highly reliable and there was an internal consistency. This was judged from the fact that, 0.79 was greater than 0.70 minimum reliability level [19, 20].
4 Data Analysis and Result of Findings

4.1 List for Prequalification

Table 3 displays the characteristic of consulting firms and public clients’ organisation on ways they obtained list of contractors for prequalification. 81% of Architects, 89% of Builders, 63% of Quantity surveyors, 89% of Engineers and 80% of public clients’ obtained their list of contractors through standing list of certain types and sizes. 19% of Architects, 11% of Builders, 22% of Quantity surveyors, 11% of Engineers and 20% of public clients used an ad-hoc list for a particular project to obtain list for prequalification. It shows that all the respondents from public clients’ and consulting organisations agreed that the list of prequalified contractors were obtained from standing list based on the type of projects. Thus, such contractors must have registered with that organisation.

<table>
<thead>
<tr>
<th>Prequalification list</th>
<th>Consulting organisation (Freq.)</th>
<th>%</th>
<th>Clients’ organisation (Freq.)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standing list for project of certain types and sizes</td>
<td>151</td>
<td>80</td>
<td>65</td>
<td>76</td>
</tr>
<tr>
<td>An ad-hoc list for a particular project</td>
<td>39</td>
<td>20</td>
<td>21</td>
<td>24</td>
</tr>
<tr>
<td>Total</td>
<td>190</td>
<td>100</td>
<td>86</td>
<td>100</td>
</tr>
</tbody>
</table>

Freq. = Frequency; % = Percentage

4.2 Review of Contractors’ Information on Standing List

Table 4 presents the review of contractors’ information on standing list for consulting and public clients’ organisations. Due to the technicality involved in prequalification and tender evaluation procedure for purpose of selecting appropriate contractor for a proposed project, it shows that the information submitted by the contractors needs to be reviewed. Hence from the table, 48% of Architects, 42% of Builders, 40% of Quantity surveyors, 38% of Engineers and 38% of public clients’ review contractors’ information annually.

<table>
<thead>
<tr>
<th>Review of contractors information</th>
<th>Consulting organisation (Freq.)</th>
<th>%</th>
<th>Clients’ organisation (Freq.)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never</td>
<td>4</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Annually</td>
<td>81</td>
<td>42</td>
<td>41</td>
<td>47</td>
</tr>
<tr>
<td>Once in a while</td>
<td>62</td>
<td>32</td>
<td>27</td>
<td>31</td>
</tr>
<tr>
<td>Bi-annually</td>
<td>25</td>
<td>13</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Half-yearly</td>
<td>22</td>
<td>11</td>
<td>11</td>
<td>13</td>
</tr>
<tr>
<td>Total</td>
<td>194</td>
<td>100</td>
<td>87</td>
<td>100</td>
</tr>
</tbody>
</table>

Freq. = Frequency; % = Percentage
4.3 Frequency of Prequalification on Type of Projects

Analysis of descriptive data of frequency of prequalification on type of projects was presented in Table 5. From the table, it reveals that the most ranked project by Architect (MIS = 0.82), Builders (MIS = 0.85), Quantity Surveyors (MIS = 0.84), Engineers (MIS = 0.79) and Public clients’ organisations (MIS = 0.86) were commercial projects in comparison with other type of projects such as residential, industrial, religion and transport projects. The least ranked project by Architects (MIS = 0.53), Engineers (MIS = 0.54) and Public clients’ (MIS = 0.62) were transport projects. While for Quantity surveyors, the least ranked were religion (MIS = 0.72) and transport projects (MIS = 0.72). It could be as a result of the value of the project and their functionality. In the study of [5] in Egypt, they concluded that prequalification should be carried out no matter how complex the project. They however, prequalified electro - mechanical, industrial and utility projects than building projects.

Table 5. Frequency of prequalification on type of projects

<table>
<thead>
<tr>
<th>Type of projects</th>
<th>Consulting organisation</th>
<th>Clients’ organisation</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MIS</td>
<td>R</td>
<td>MIS</td>
</tr>
<tr>
<td>Commercial</td>
<td>0.83</td>
<td>1</td>
<td>0.84</td>
</tr>
<tr>
<td>Residential</td>
<td>0.79</td>
<td>2</td>
<td>0.83</td>
</tr>
<tr>
<td>Industrial</td>
<td>0.72</td>
<td>3</td>
<td>0.75</td>
</tr>
<tr>
<td>Religion</td>
<td>0.64</td>
<td>4</td>
<td>0.69</td>
</tr>
<tr>
<td>Transport</td>
<td>0.61</td>
<td>5</td>
<td>0.66</td>
</tr>
</tbody>
</table>

Very often = 4; often = 3; rarely = 2; never = 1; MIS = Mean Item Score; R = Rank

4.4 Frequency of Use Prequalification Criteria

Table 6 shows the frequency of use prequalification criteria. The overall most frequently used financial criteria were current fixed asset (87%), subcontractor (78%), balance sheet statement (76%) and annual turnover (74%). The least overall frequently used financial criteria were short term borrowing (55%), medium term borrowing (54%) and profitability (24%). For overall experience criteria, the most frequently used were skill including professional technical expertise such as qualification with experience expertise (97%), technical skills (97%), type of projects (96%), ability to handle projects (96%), ability to meet target dates (95%) and size of past projects completed (94%). The least overall experience criteria were the ability to efficiently integrate contract (85%) and national or local catchment (56%).

Frequently used overall managerial capability criteria were past performance (97%), quality control programme and quality of works on past projects (95%), quality workmanship (88%) and possession of quality assurance certificate (77%). For overall health and safety criteria, the top frequently used were provision of health and safety regulation (90%), company safety policy (88%), and level of adherence to health and safety regulation (87%) and the least ranked were accident book (62%) and experience in noise control (43%).
Table 6. Agreement between public clients’ and consulting organisation on frequency of use prequalification criteria

<table>
<thead>
<tr>
<th>Prequalification criteria</th>
<th>Spearman rank correlation Public clients’ ((r_1))</th>
<th>Spearman rank correlation Consultants ((r_2))</th>
<th>(t_{cal.})</th>
<th>(t_{tab.})</th>
<th>Sig.</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial</td>
<td>0.95</td>
<td>0.95</td>
<td>9.13</td>
<td>2.262</td>
<td>S</td>
<td>(H_1) accepted</td>
</tr>
<tr>
<td>Experience</td>
<td>0.97</td>
<td>0.97</td>
<td>13.98</td>
<td>2.179</td>
<td>S</td>
<td>(H_1) accepted</td>
</tr>
<tr>
<td>Managerial capability</td>
<td>0.00</td>
<td>0.97</td>
<td>6.99</td>
<td>3.182</td>
<td>S</td>
<td>(H_1) accepted</td>
</tr>
<tr>
<td>Health and safety</td>
<td>0.96</td>
<td>0.96</td>
<td>5.9</td>
<td>3.182</td>
<td>S</td>
<td>(H_1) accepted</td>
</tr>
<tr>
<td>Contractors’ reputation and image</td>
<td>0.98</td>
<td>0.98</td>
<td>9.80</td>
<td>2.776</td>
<td>S</td>
<td>(H_1) accepted</td>
</tr>
</tbody>
</table>

\(\alpha = 0.05\); \(t_{cal.}\) = t-test calculated; \(t_{tab.}\) = t-test tabulated; Sig. = Significant; \(H_1\) = Alternate hypothesis

Contractors’ reputation and image criteria overall top ranked frequently used were capacity of work handled presently (93%) the amount of projects executed in the past 5 years (89%), permanent place of business (78%), and financial penalties previously levied in respect of failures to perform the terms of contract (68%) and the least was litigation tendency (53%).

The result of this study shows that organisation prequalified contractors but no particular prequalification criteria been used because clients’ goals and objectives differs on projects. Thus clients’ organisations advertise for contractors using open method of tendering and attached an expression of interest, which stated the prequalification criteria for the projects. Different prequalification criteria were been used depending on the type of projects or procurement method for the project.

**Hypothesis 1**

The null hypothesis that there is no agreement between public clients’ and consulting organisation on frequency of use of contractors’ prequalification criteria was tested using t-test for proportion to compare two proportions.

There was an agreement between public clients’ and consultant organisation on frequency of use of contractors’ prequalification criteria because, t-test calculated \((t_{cal.})\) for financial, experience, managerial capability, health and safety and contractors’ reputation and image \((t_{cal.} = 9.13, 13.98, 6.99, 5.93, 9.80)\) is greater than t-test tabulated \((t_{tab.})\). Thus, the alternate hypothesis \((H_1)\) is accepted. The Spearman rank correlation \((r)\) from public clients’ and consulting organisations as indicated in Table 6 shows a positive correlation among the variables.

From this study, it shows that prequalification criteria requirements for any construction projects were according to the clients’ objectives/goal. [20] study on decision
criteria for periodic prequalification in the UK found that there was no significant difference between the frequency of use of periodic prequalification criteria among client and contractor using chi-square. This study opposed that of [20] probably because the methodology differs.

5 Conclusion and Recommendation

This study provides an insight into how the prequalification of contractors are carried out in accordance with the provision of the Public Procurement Acts (PPA) 2007 as required by the provision of section 16 (6) of PPA, 2007 of the construction of multi-floor building. A quantitative study was also done to identify the frequency of use prequalification criteria. It was realized that prequalification criteria requirements for any construction projects were according to the clients’ objectives/goal. Contractor selection in public sector has been a much-debated issue over the past years. It could be deduced that the tender submitted by the tenderers should be evaluated to check for arithmetical, basic rate and consistency of rate to ensure the appropriate contractor is given the project. It is also in support of other researchers [7-10-17] that, the lowest tender price, should not be the main criterion for selecting the appropriate contractor, hence, the argument of multi-criteria is supported by this study. However, the study of [5] placed more value on choosing contractors on lowest bidder even against the by-law (Act 1989/1998) of the study research area (Egypt) that combines the result of the technical and financial evaluation. This study default the used of the lowest bidder as proposed by the Public Procurement Act (2007) of Nigeria due to the shortcoming of the criterion. [21] argued the used of multi-criteria procedure rather than mono-criterion.

References