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ASSESSMENT OF THE MAJOR CONTRACTORS' SELECTION CRITERIA AND THEIR IMPACTS IN CIVIL ENGINEERING CONSTRUCTION PROJECTS

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ABSTRACT

Construction projects in especially developing countries are characterised by failure to meet project baselines (time, cost, quality). This is worsened by the inefficiencies in the application of contractors' selection criteria during the bidding processes of both civil and building construction projects. The application of contractor selection criteria and their benefits in civil engineering projects is an area that is underexplored in construction management literature in the Nigerian context. This study aims to assess the major criteria influencing the selection of contractors on civil engineering construction projects and to determine the impacts of the contractor selection criteria. A well-structured quantitative research questionnaire was purposively administered to experienced construction experts in both clients and consultants organisations to gather data. The gathered data were analysed using frequency, percentage, relative Importance index (RII), Severity index (RI) and Mann-Whitney Test. It was found that the major criteria that are considered during contractors' selection in civil engineering construction projects are; managerial capability and competent supervisory staff, technical ability, financial soundness, competitive tender/bid price, and health and safety policy/performance. Also, the major benefits of contractors selection criteria in civil engineering construction projects are; enable the client or project owner to select contractors who are performers for the project, facilitate the achievement of project success and the objectives within the scheduled time and cost, to minimise project risks, maximize overall value to the project owner or client, and selection of contractor with sound financial management capabilities. The study recommended that clients and consultants should adopt the major criteria in the selection of suitable contractors for civil engineering construction projects.



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I. INTRODUCTION

The construction industry globally is critical to the economic growth and development of a nation. According to [1], "the construction sector is the economic prime mover and the bedrock of survival of nations". The provision of buildings, roads, bridges, among other structures, job creation, contribution to gross domestic product (GDP) and national income; are all evidence of the contributions to economic growth and development of the economics of the world [2, 3]. Despite the economic contribution and being an agent that drives economic development [4],

construction projects executed in the sector is known to be characterised by not meeting project baselines targets. Poor time, cost, quality and safety performance have been the order of the day [5]. These situations have been blamed on poor contractors' selection systems driven by inefficient selection criteria implementation during the bidding process of construction projects [6, 7], especially in developing construction markets of the world. In addition, the poor performance of construction contractors has also been linked to qualification and resources related problems [8, 9].

Contractor evaluation and selection is a vital process in construction projects (whether public or privately owned), it is aimed at choosing an experienced and suitable contractor that can deliver the project in line with the clients' requirement and project objectives [10, 6]. Contractor selection is a major decision process that impacts the success and progress of construction projects. This implies that if a contractor is improperly selected, the consequences will be poor quality, schedule overrun and cost performances of the project [6, 11, 12]. The selection of the best bidder is a difficult task whose success relies oftentimes on the appropriateness of tender requirements, the knowledge and experiences of the client and project managers [13, 14]. The essential set of indicators that influence the decision of the client towards the selection of a capable contractor for a project is known as 'contractor selection criteria' [15, 11]. Contractor Selection Criteria is an amalgam of prequalification and tender evaluation criteria that is related to time, cost and quality performance [16, 17]. Project clients' and consultants' decisions are shaped by factors such as contractors' track record, previous experiences in a similar job, clients' knowledge and experience of the contractors, financial capability, and the reputation of the contractors, among others. These factors influence contractor selection for the job at hand and future patronage [18].

These section criteria help to reduce to the barest minimum the risks associated with project delivery, ensure value maximisation for the client and build a long-term relationship between project members [19]. Accidents are reduced on construction sites where the selection criteria are effectively followed [20]. The tradition of using the lowest bid criterion has not yielded the best results in project performance; multiple criteria have been advocated for effective contractor section [6]. Focusing on bid price alone in the selection of contractors has been the main cause of the problems in the delivery of projects [21]. [22] reported that in the UK, the tradition of the lowest tenderer section is still in practice. Research has shown that the lowest tenderer is most likely to put the project in a situation where the planned duration and cost are overshoot, and Quality might be compromised.

In Nigeria, [17] reported that the contractors' selection criteria impact significantly the project time and quality performance. This is because of the lowest cost mentality that has been found to cause problems that affect the project baselines and contractors' profit and revenue. Studies regarding contractors' pre-qualification and section are enormous, especially at the international scene [e.g. 18, 23, 19, 24, 11], while it is scanty in the Nigerian context. Furthermore, the benefits of contractors' selection criteria on the project clients and construction performance have not been given detailed attention by researchers in the Nigerian context. Again, the few existing studies on contractors' selection and prequalification [e.g. 19, 25, 26, 27] focused on building construction projects. Contractors' section criteria and their benefits on the project clients and civil engineering projects have been underexplored in the Nigerian context. Furthermore, such studies are grossly lacking in the study area of this present study. It is based on this knowledge that this study assessed the major criteria influencing the selection of contractors on civil engineering construction projects, with a few to determine the benefits of contractors' selection criteria. The working objectives of this study are; i) To assess the major criteria influencing contractors selection in civil engineering construction projects, and ii) to determine the benefits of contractors selection criteria.

It is the understanding of this study that clients and project managers within the study area will be better informed on the key

and most critical factors that need to be considered before contractor selection. Knowing the importance of investment is a major driver of an innovative approach, effective implementation of the outcome of this study could help improve project performance and contractor's profitability as uncertainties regarding performances are minimised or even eliminated early in the project life cycle. It will also add to the existing body of knowledge in the subject matter.

II. LITERATURE REVIEW

II.1 CONTRACTORS' SELECTION CRITERIA ON CIVIL ENGINEERING CONSTRUCTION PROJECTS

Contractors' selection is dependent on certain criteria that are used as a basis for assessing, evaluating a bid and the suitability of the contractor. Studies abound that have identified a series of factors and criteria for appropriate contractor's assessment and selection on construction projects [28]. The use of the lowest bid price is common but is counter-productive in the industry. [29] emphasized value for money in contractors' selection and the practice of the automatic selection of the lowest bidder instead of the most optimum (responsive) tender should be avoided. Selecting the lowest bidder by clients often leads to awards of construction contracts to incompetent, unqualified, inexperienced and inadequately financed contractors [30]. In a similar vein, an inappropriate selection of contractors could lead to severe extra costs that result from rework which evolves from poor quality work, claims, disputes, abandonment, bankruptcy, among others [31]. [32] states that researchers do agree that the major selection criteria for contractor are; past experienced and capability and performance of employees, financial reliability and soundness, safety, firm's reputation, quality, capability of equipment, technology, local information available, current workload and backlog, contractors accessibility, time and cost performance in previous projects, and among others.

According to [23] in Egypt after a survey of 29 construction experts, found that the top twelve significant factors that influence sub-contractors selection in construction projects are; flexibility and cooperation when resolving delays, reputation, delay, failure to comply with the quality specifications, quality, suppliers incompetency to deliver materials on time, failure to complete the contract, physical resources, tender price, contractor's difficulty in reimbursement, flexibility in critical activities and safety consciousness on the job site. Similarly, in Egypt, [33] state that the main criteria for the pre-qualification and bid evaluation of contractor's submissions are; financial soundness, technical ability, management capability, health and safety, and reputation.

According to [18] in the Jordanian construction industry sampled clients on the factors that could increase a contractor's chances of being pre-qualified and reported that the top ten factors are contractor's; willingness to offer a reasonable and competitive price to do the job after being qualified, strength and financial arrangements, previous track record and experience in similar projects, ability to provide a high-quality recommendation from satisfied clients, competence and knowledge to do the job, managerial capability and supervisory staff competence for the project, ability to select competent sub-contractors from a list provided by the client, ability to provide a detailed programme to execute the project, effectiveness and attitude to work with the client as a team, and size in relation to project size. A specialised pre-qualification requirement is suggested to be good manufacturing practices that are required in the Jordanian construction industry. Five critical factors were established to

influence the selection of contractors in Ghana according to the report of [34]. These factors are managerial capabilities, quality standards, resource availability, duration, project cost and project location. These factors should be prioritised when selecting the 'best' contractors for a construction project for clients to achieve social and economic value for money. The familiar considerations in the Ghanaian construction sector is the criteria of selecting contractors based on the evaluations of their management and technical ability, experience, past performance, health and safety, and environmental measures [11].

In the Pakistani construction industry, [7] reported that the most vital influencing factors for the selection of contractors as perceived by the clients and consultants are; proper planning, creditworthiness, transition plans, plant and equipment holding, financial stability, past performance, and quality. It was further stated that there is a high level of possibility for project success if a multi-criteria approach is used to select a contractor. In Turkey, [6] found that the top twelve criteria that influence contractors selection in public construction projects are; termination of construction work, the experience of technical staff, financial strength, financial credibility, lowest bid, safety plan and safety record, construction work quality reference, length of time in the construction sector, similar work experience, number of technical staff, materials and equipment, and work experience document.

Through a systematic review, [35] found that the most important contractors' selections criteria for construction projects are; price, health and safety, past project performance, duration, experience in similar jobs and quality. By virtue of putting these factors into consideration during contractors' selection, critical aspects of the project such as time, cost and quality are observed. The role of management capability, technical ability, past

performance records, financial capability, and health and safety performance has been highlighted as critical factors for contractors' selection [36, 37]. Through a comprehensive review of the criteria for the selection of contractors and bid evaluation, [24] found that the most important criteria for selecting suitable contractors for construction projects are; management capability, financial capability, Experience, Resources, technical capability, Environment, health and safety, time of completion, and political consideration. In selecting an appropriate and suitable contractor for construction projects, it is a good practice to consider and evaluate the contractor's safety performance records, how workers are compensated, the rate of injuries recorded, periodic safety programme conducted and personnel safety competency level [20].

Six selection criteria were identified by [38], and they are turnover, manpower resources, equipment resources, post-experience, past performance, and affordable relatable projects. The study of [39] recommended that recommended bid price (amount), financial soundness, technical ability, management capability, safety and health records, and reputation should form the basis for selecting suitable contractors on construction projects. An extensive list of criteria was developed by [40] which comprise majorly financial performance, technical performance, safety and health policy, and public work past performance. The common contractors' selection criteria in literature are; management capability, technical ability, financial capacity, and occupational health and safety [41]. Emphasize was however laid on the management capability as it has a major impact on the performance of the contractors in terms of time and cost.

Sixteen contractors' selection criteria have been selected from the literature and summarized in Table 1 below.

Table 1: Major contractors selection criteria on Civil engineering construction projects.

| S/nr | Contractors selection criteria | Source(s) |
|------|--|--|
| 1 | Financial soundness | [33, 40, 39, 23, 41, 11, 34, 7, 6, 24] |
| 2 | Technical ability | [33, 40, 39, 41, 11, 7, 6, 24] |
| 3 | Managerial capability and competent supervisory staff | [33, 18, 39, 11, 34, 6, 24, 41] |
| 4 | Health and safety policy/performance | [33, 40, 39, 23, 41, 11, 6, 20, 24] |
| 5 | The reputation of the contractor | [33, 23, 39] |
| 6 | Competitive tender/bid price | [18, 23, 34, 6, 39] |
| 7 | Quality compliance records | [18, 23, 34, 7, 6] |
| 8 | Size in relation to project size | [18] |
| 9 | Previous track record and experience in similar projects | [18, 40, 11, 7, 38, 6, 24] |
| 10 | Competence and knowledge to do the job | [18, 11, 6] |
| 11 | Project duration/time of completion | [18, 34, 24] |
| 12 | Resource availability | [34, 23, 24, 38] |
| 13 | Project location | [34] |
| 14 | Proper planning | [7, 6] |
| 15 | Environment measures | [24, 6] |
| 16 | Political consideration | [24] |

Source: Authors, (2022).

II.2 BENEFITS OF CONTRACTORS SECTION CRITERIA IN PROJECT PERFORMANCE

Literature has highlighted poor project performance as a consequence of wrong contractor's choice during evaluation and selection of contractors for a project [12, 42]. The major ideas behind contractors as well as sub-contractors selection process are to minimise project risks, achieve better project quality, maximise value and maintain reliable and strong relationships between the parties to the projects [23, 19]. The selection of an appropriate

contractor is an important tool for minimising accidents in the workplace. This is because safety consideration is important in choosing suitable contractors that will be compatible with the safety management systems of the client [20]. Fong and Choi [43] submitted that elements that can be problematic during the project development are eliminated during contractor selection by the clients.

Contractors' selection criteria help to speed up bid evaluation and contract awards. This is true as the number of tenderers is limited only to those with the necessary financial

capability and project experiences. Furthermore, unprepared contractors are weeded out, bidders are protected from being given jobs that are above their capability and competencies, and project risks are reduced [44]. Thorough evaluations of the potentials of the contractors are made before employing them for the job. This makes it possible for optimum performance to be attained with regards to time, cost and quality [45]. Selecting a competent contractor will help to guarantee success and the efficient use of scarce financial resources, projects are completed on time and within budget [46, 47].

Serious considerations should be given to other attributes of contractors in addition to the submission of the lowest prices. The use of prequalification criteria was reported to help reduce subjectivity in the selection of contractors by the project owner [48]. Prequalification criteria lead to huge project success [49], thus, helping clients to select the most qualified contractor that will not delay the project, cause failures, abuse and misuse of project funds, and whose actions or inaction will not lead to project abandonment [21]. Contractors' selection is useful in evaluating experiences, determining capable and qualified contractors, eliminating those contractors who do not have the required experience, competent, as well as those with poor financial status

[6]. The contractor's prequalifying criteria is important in project planning as they have a huge impact on what the outcome of the project will be [41].

The number of bidders who might default is minimised by the client through selection criteria. This is achieved through the streamlining of the number of eligible bidders involves in the bidding process [50]. According to the findings of [11], the major benefits of the criteria used by clients for selecting contractors in construction projects are; "enabling the client or project owner to select contractors who are performers for the project, saving the project owner a lot of time, minimising the possibility of contractor default, and facilitating the achievement of project success and the objectives within the scheduled time". The overall aim of the contractor selection criteria is to ensure that the employed contractor has the capability and the know-how to deliver the project with the clients' requirements. A suitable selection of a contractor is equivalent to a successful performance [35, 6].

Thirteen selected benefits of contractors' selection criteria on civil engineering construction projects are summarized in Table 2 below.

Table 2: Benefits of contractors section criteria in civil engineering projects.

| S/n | Benefits of contractors section criteria | Source(s) |
|-----|--|-----------------------------|
| 1 | To minimise project risks | [21, 43, 44, 23, 19, 6] |
| 2 | achieve better project quality | [23, 45, 19] |
| 3 | maintain strong relationships between the parties to the projects | [23,19] |
| 4 | minimising accidents and better health and safety performance in the workplace | [20] |
| 5 | Facilitate the achievement of project success and the objectives within the scheduled time and cos | [46, 44, 47, 45, 11] |
| 6 | helps in project planning towards the outcome of the project | [41] |
| 7 | Maximize overall value to the project owner or client | [6] |
| 8 | Enable the client or project owner to select contractors who are performers for the project | [21, 44, 49, 6, 11, 51, 52] |
| 9 | Minimize the possibility of contractor default | [11, 50] |
| 10 | help to speed up bid evaluation and contract awards, thus saving the client time | [44, 6] |
| 11 | Weeding out unprepared, incompetent and unsuitable contractors | [44, 50, 53, 11] |
| 12 | Selection of contractor with sound financial management capabilities | [21, 46, 47, 6] |
| 13 | reduced subjectivity in the selection of contractors by the project owner | [48] |

Source: Authors, (2022).

III. MATERIALS AND METHODS

This study utilised a survey research questionnaire to meet the purpose of the study. Data on the major criteria influencing contractors section in civil engineering projects, and the benefits of contractors selection criteria, were obtained from construction experts such as (Architect, Builders, Engineers and Quantity Surveyors) engaged by clients and consultants organisations in Owerri, Imo State, Nigeria. These experts were chosen because they are key employees of construction-based organisations in the construction industry of any nation [54]. The questionnaire is widely used and it covers large samples at a shorter time [55]. The government as well as private investors and clients are embarking on numerous construction and developmental projects within the study area.

The construction experts sampled are those with an appreciable level of experience in construction contracts procurements, especially civil engineering construction projects such as road projects. Owing to the quality of responses expected and respondents' availability, purposive sampling techniques was adopted in the administration of the questionnaire to the experts. The researcher administered the research instrument using both manual and electronic means. The idea was to improve the response

rate and ensure an eco-friendly sustainable survey. [54] posit that the electronic means of the survey is an environmentally friendly means of a survey, as the number of hardcopy paper questionnaires is minimised or even eliminated. The questionnaire used was developed from variables obtained from the literature review and was designed into three divisions. This first division gathered data on the respondents' demographic information. Information gathered on the first part was used to do a quality check on the other parts. The second division gathered data on the major criteria influencing contractors section in civil engineering projects, and the third division gathered data on the benefits of contractors' selection criteria. A 5-point Likert scale served as the basis for the questions in the research instrument. A scale of 1 mean 1 is the lowest rank while a scale of 5 is the highest rank.

The sampling period lasted for about 3 months, during which usable responses of 132 were collected and used for the analyse that followed. Descriptive analytical tools such as Frequency, percentage and relative Importance index (RII), Severity index (RI), Mann-Whitney U-Test were used to analyse the gathered data. Frequency and percentage were used to analyse data gathered on the respondents' demographic information.

Relative Importance Index (RII) and Severity index (RI) were used to analyse data collected on the major criteria influencing contractors section in civil engineering projects, and the Relative Importance Index (RII) was used to analyse data on the benefits of contractors' selection criteria. Mann-Whitney U-Test was used to compare the views of the participants regarding the ranking pattern of the assessed variables. The Cronbach's alpha test was used to

verify the reliability of the research instrument. A Cronbach's alpha values of 0.884 and 0.825 were obtained (see Table 3), these values are above the 0.70 cut-off points proposed by [56]. It is premised on this that the data were adjudged reliable and of good quality. The entire research methodological flow as been summarised in figure 1 below.

Table 3: Reliability Statistics.

| Variables | Cronbach's Alpha | N of Items |
|--|------------------|------------|
| Contractors' selection criteria on Civil engineering construction projects | 0.884 | 16 |
| Benefits of contractors section criteria | 0.825 | 13 |

Source: Authors' Analysis, (2022).

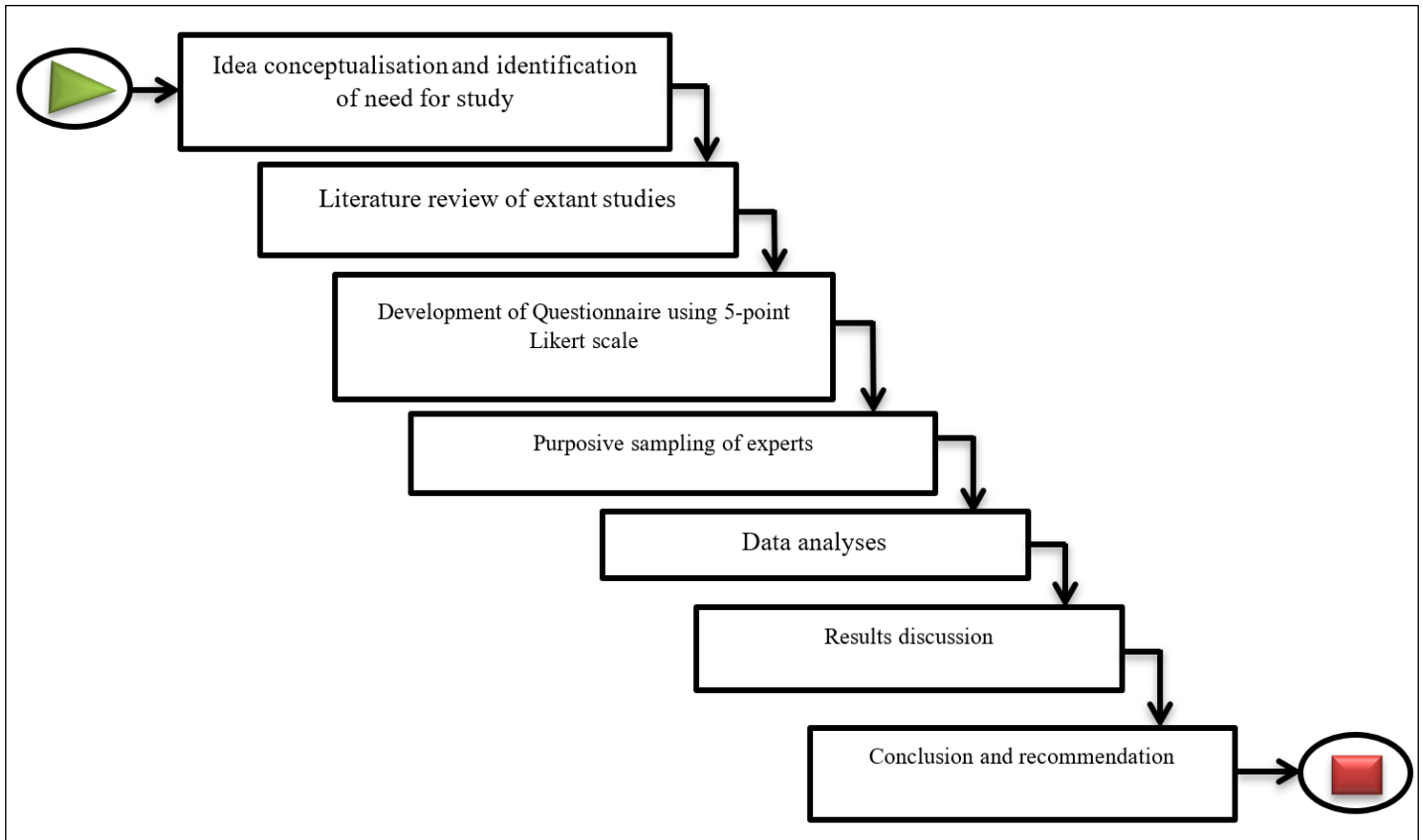


Figure 1: Study methodological flow chart.
Source: Authors, (2022).

IV. RESULTS AND DISCUSSIONS

IV.1 RESPONDENTS' BACKGROUND CHARACTERISTICS

Table 4 shows that 38.64% of the respondents are from client organisations and 61.36% are from consultants organisations. In terms of the respondents' profession, 17.42% are Architects, Builders are 9.09%, Engineers are 44.70%, and Quantity Surveyors are 28.79%. With regards to the respondents' years of experience; the average years of experience is 11.63%. However going by the grouping, 9.09% have between 1-5years of experience, 32.58% have between 6-10years of experience,

38.64% have spent between 11-15years, 13.64% have spent between 16-20years, and 6.06% have over 21 years of industry experience. This shows adequate experiences in the industry and the subject of this study. The educational qualification of the respondents shows that those with BSc/B.Tech is more with 44.70%, followed by M.Sc/M.Tech (30.30%), then HND and PGD with 10.61% each, and last PhD holders are 3.79%. This indicates that they are educated enough to understand the content of the questionnaire towards meeting the study objectives. The respondents who are majorly built environment professionals are majorly chartered members of their different professional bodies. This show they have the requisite professional qualification that would aid this study.

Table 4: Respondents' demographic information.

| Variables | Classification | Freq. | Per cent | Cum. % |
|-------------------------|--------------------------|------------|---------------|--------|
| Organisational Type | Client organisation | 51 | 38.64 | 38.64 |
| | Consultants organisation | 81 | 61.36 | 100.00 |
| | TOTAL | 132 | 100.00 | |
| Profession | Architects | 23 | 17.42 | 17.42 |
| | Builders | 12 | 9.09 | 26.52 |
| | Engineers | 59 | 44.70 | 71.21 |
| | Quantity Surveyors | 38 | 28.79 | 100.00 |
| | TOTAL | 132 | 100.00 | |
| Years of experience | 1-5years | 12 | 9.09 | 9.09 |
| | 6-10years | 43 | 32.58 | 41.67 |
| | 11-15 years | 51 | 38.64 | 80.30 |
| | 16-20 years | 18 | 13.64 | 93.94 |
| | 21-above | 8 | 6.06 | 100.00 |
| | TOTAL | 132 | 100.00 | |
| Education qualification | HND | 14 | 10.61 | 10.61 |
| | PGD | 14 | 10.61 | 21.21 |
| | BSc/B.Tech | 59 | 44.70 | 65.91 |
| | M.Sc/M.Tech | 40 | 30.30 | 96.21 |
| | PhD | 5 | 3.79 | 100.00 |
| | TOTAL | 132 | 100.00 | |
| Professional status | Corporate member | 117 | 88.64 | 88.64 |
| | Probationer member | 15 | 11.36 | 100.00 |
| | TOTAL | 132 | 100.00 | |

Source: Authors' Analysis, (2022).

IV.2 CONTRACTORS SELECTION CRITERIA ON CIVIL ENGINEERING CONSTRUCTION PROJECTS

Results in Table 5 shows that the top five major criteria that are considered during contractors selection in Civil engineering construction projects are; managerial capability and competent supervisory staff (RII=0.867; S.I=86.67%; ranked 1st), technical ability (RII=0.861; S.I=86.06%; ranked 2nd), financial soundness (RII=0.853; S.I=85.30%; ranked 3rd), competitive tender/bid price (RI=0.838; S.I=83.79%; ranked 4th), and health and safety policy/performance (RII=0.826; S.I.=82.58%; ranked 5th). While the least ranked contractor section criteria are; resource availability (RII=0.745; S.I=74.55%; ranked 12th), Environment measures (RII=0.744; S.I=74.39%; ranked 13th), political consideration (RII=0.729; S.I=72.88%; ranked 14th), project location (RII=0.702; S.I=70.15%; ranked 14th), and proper planning (RII=0.698; S.I=69.85%; ranked 16th).

Overall, the assessed criteria are all significant in the selection of suitable contractors for civil engineering construction projects. This is premised on the maximum RII (0.867) and S.I (86.67%) values, minimum RII (0.698) and S.I (69.85%) values, with an average value of RII (0.702) and S.I (79.24%). It follows that these criteria are given adequate attention and consideration by way of evaluations of every contractor's bid submission against these criteria to come up with the best contractors that can sufficiently execute the project to completion and within baselines.

Furthermore, the Mann-Whitney U-Test (see Table 5; columns 6 & 7) performed to compare the views of the client and consultant respondents groups on the relative ranking of the assessed variables showed that; the participants' ranking styles are the same 14(87.50%) of the assessed variables. That is, their views converge in 87.5% of the criteria for selection contractors. The significant p-value of these variables is greater than a 5% level of significance. This further means that there is no statistically significant difference in the way the participants ranked these criteria. However, divergent opinion was observed in 2(12.50%) of

the variables as the p-value is less than 5% level of significance. This shows that a statistically significant difference exists in the way the participants ranked these criteria. These variables are project location ($Z=-2.513$; $p\text{-value}=0.012$) and political consideration ($Z=-2.447$; $p\text{-value}=0.014$). There is thereof the need for a further reflection on this criteria.

However, with a mean rank of 59.24 for the Client organisations group and 71.07 for the Consultants organisations group, the overall Mann-Whitney U-Test showed that there is no significant statistical difference in the ranking of the variables by the two groups of participants. These imply that these variables are given adequate consideration in the section of contractors for civil engineering construction projects.

The major contractors' selection criteria reported in this study is in support of the findings from previous studies such as [40, 39, 41, 24, 6, 34]. The managerial capability of the contractor team is very critical to ensuring that the works will be performed in accordance with the specifications and project requirements. The competence of the supervisor engineers and other senior trades heads are an indication of the management capacity to deliver. The managerial strength and capability of the contractors have been highlighted in construction management literature to be top criteria for the selection of a suitable contractor for construction projects [18, 34, 11]. The technical capability and financial soundness of a contractor is a pointer to experience, maturity and performance ability. The quality of tools and equipment, technical and production team experiences, creditworthiness, ability to manage clients' scarce financial resources; are evident in the technical and financial capability records of the contractors. This is in line with the reports of [33, 36-37,6-7].

Bid price is another vital selection criterion for contractors in civil engineering projects. While the practice of basing contract awards or contractor selection of bid price along, particularly the lowest bid price, is still on in some construction markets of nations. The practice has not yielded the needed result in terms of guaranteeing that such a contractor can perform. Bid price or tender

price was highlighted as one of the factors influencing contractors section [39, 23, 35]. A Contractor with sound health and safety policies, a good compensation system, a better motivation system for workers, good records on health and safety; is a careful and experienced candidate that value risk management. High accident rates show inexperienced supervisory teams and a lack of health

and safety policies and regulations. The consequences of the high accidents rates are; stoppage of work, high expenses, death, schedule slippage, quality issues, among others. Health and safety performance records were highlighted by [20, 36-37] as being a critical selection criterion for contractors.

Table 5: Major contractors selection criteria on Civil engineering construction projects.

| S/N | contractors selection criteria | RII | S.I | Rank | Z | Sig. |
|-----|---|-------|-------|------------------|--------|--------|
| 1 | financial soundness | 0.853 | 85.30 | 3 rd | -0.961 | 0.322 |
| 2 | technical ability | 0.861 | 86.06 | 2 nd | -0.413 | 0.679 |
| 3 | managerial capability and competent supervisory staff | 0.867 | 86.67 | 1 st | -1.032 | 0.302 |
| 4 | competitive tender/bid price | 0.838 | 83.79 | 4 th | -0.308 | 0.758 |
| 5 | health and safety policy/performance | 0.826 | 82.58 | 5 th | -0.993 | 0.321 |
| 6 | the reputation of the contractor | 0.823 | 82.27 | 6 th | -0.905 | 0.365 |
| 7 | Quality compliance records | 0.823 | 82.27 | 6 th | -0.311 | 0.716 |
| 8 | size in relation to project size | 0.794 | 79.39 | 10 th | -0.308 | 0.758 |
| 9 | previous track record and past experience in similar projects | 0.818 | 81.82 | 8 th | -0.173 | 0.852 |
| 10 | competence and knowledge to do the job | 0.794 | 79.39 | 10 th | -0.888 | 0.375 |
| 11 | Project duration/time of completion | 0.814 | 81.36 | 9 th | -0.838 | 0.402 |
| 12 | resource availability | 0.745 | 74.55 | 12 th | -0.464 | 0.589 |
| 13 | project location | 0.702 | 70.15 | 15 th | -2.513 | 0.012* |
| 14 | proper planning | 0.698 | 69.85 | 16 th | -1.022 | 0.305 |
| 15 | Environment measures | 0.744 | 74.39 | 13 th | -0.833 | 0.403 |
| 16 | political consideration | 0.729 | 72.88 | 14 th | -2.447 | 0.014* |

Source: Authors, (2022).

Table 6: Mann-Whitney U test for Contractors selection criteria.

| Variables | Respondents Groups | N | Mean Rank | Sum of Ranks | Z | Sig. |
|--------------------------------|---------------------------|------------|-----------|--------------|--------|-------|
| Contractors selection criteria | Client organisations | 51 | 59.24 | 3021.00 | -1.733 | 0.083 |
| | Consultants organisations | 81 | 71.07 | 5757.00 | | |
| | Total | 132 | | | | |

Source: Authors' Analysis, (2022).

IV.3 BENEFITS OF CONTRACTORS SECTION CRITERIA

Results in Table 7 shows that the top five benefits of contractors selection criteria in Civil engineering construction projects are; enable the client or project owner to select contractors who are performers for the project (RII=0.9106; ranked 1st), facilitate the achievement of project success and the objectives within the scheduled time and cost (RII=0.897; ranked 2nd), to minimise project risks (RII=0.865; ranked 3rd), maximize overall value to the project owner or client (RII=0.861; ranked 4th), and selection of contractor with sound financial management capabilities (RII=0.844; ranked 5th). While the least benefits of contractors section criteria in Civil engineering construction projects are achieving better project quality (RII=0.820), maintaining strong relationships between the parties to the projects (RII=0.794), help to speed up bid evaluation and contract awards, thus saving client time (RII=0.783), minimising accidents and better health and safety performance in the workplace (RII=0.782), and helps in project planning towards the final outcome of the project (RII=0.768).

Notwithstanding the relative ranking of these variables, they are all the benefits of contractors' section criteria in Civil engineering construction projects. This is based on the maximum RII of 0.911(91.1%), minimum RII of 0.768 (76.8%) and an

average RII value of 0.832 (83.2). It follows that criteria for contractors section in civil engineering projects are very vital for achieving the needed clients and project requirements. These assessed contractor section criteria are therefore justified in civil engineering construction projects as the benefits are numerous and impact positively on the project and the clients.

A 100% convergence was observed in the ranking of these Benefits of contractors' selection criteria by the two groups of participants. All the assessed variables have a p-value of more than 0.05. Therefore, there is no significant statistical difference in the ranking of the variables by the various professions in the client and consultant organisations. This is based on the result of the Mann-Whitney U-Test (see Table 7; columns 5 & 6).

In addition, with a mean rank of 57.75 for the Client organisations group and 72.01 for the Consultants organisations group, the overall Mann-Whitney U-Test supports what was reported in Table 7. There is no significant statistical difference in the ranking of the variables by the two groups of participants (see Table 8). This implies that the participants are in agreement that the application of contractor selection criteria would yield numerous benefits to the clients and the projects.

The findings in this section regarding the benefits of contractors selection criteria in civil engineering construction projects, support what has been reported in previous related studies [23, 19, 11, 6, 44-47]. Selecting the most suitable contractor that

will deliver a construction project within cost, time, quality and other project constraints is the major benefit of the selection criteria for contractors. By this, clients can achieve maximum value for

their monies as risks are minimised or even eliminated via the contractor's selection. Problems at the construction stage will be minimised and work will progress smoothly.

Table 7: Benefits of contractors section criteria in civil engineering projects.

| S/N | Benefits of contractors section criteria | RII | Rank | Z | Sig. |
|-----|---|-------|------------------|--------|-------|
| 1 | To minimise project risks | 0.865 | 3 rd | -1.738 | 0.082 |
| 2 | Achieve better project quality | 0.820 | 9 th | -1.144 | 0.253 |
| 3 | Maintain strong relationships between the parties to the projects | 0.794 | 10 th | -0.928 | 0.354 |
| 4 | Minimising accidents and better health and safety performance in the workplace | 0.782 | 12 th | -0.237 | 0.814 |
| 5 | Facilitate the achievement of project success and the objectives within the scheduled time and cost | 0.897 | 2 nd | -1.844 | 0.064 |
| 6 | Helps in project planning towards the final outcome of the project | 0.768 | 13 th | -0.015 | 0.988 |
| 7 | Maximize overall value to the project owner or client | 0.861 | 4 th | -0.971 | 0.332 |
| 8 | Enable the client or project owner to select contractors who are performers for the project | 0.911 | 1 st | -0.177 | 0.858 |
| 9 | Minimize the possibility of contractor default | 0.821 | 8 th | -0.878 | 0.383 |
| 10 | Help to speed up bid evaluation and contract awards, thus saving the client time | 0.783 | 11 th | -0.326 | 0.744 |
| 11 | Weeding out unprepared, incompetent and unsuitable contractors | 0.838 | 6 th | -1.308 | 0.232 |
| 12 | Selection of contractor with sound financial management capabilities | 0.844 | 5 th | -0.701 | 0.483 |
| 13 | Reduced subjectivity in the selection of contractors by the project owner | 0.833 | 7 th | -0.353 | 0.726 |

Source: Authors' Analysis, (2022).

Table 8: Mann-Whitney U test for benefits of contractors section criteria.

| Variables | Respondents Groups | N | Mean Rank | Sum of Ranks | Z | Sig. |
|--|---------------------------|------------|-----------|--------------|--------|-------|
| Benefits of contractors section criteria | Client organisations | 51 | 57.75 | 2945.50 | -1.494 | 0.158 |
| | Consultants organisations | 81 | 72.01 | 5832.50 | | |
| | Total | 132 | | | | |

Source: Authors' Analysis, (2022).

V. CONCLUSIONS

This study used a quantitative research questionnaire to assess the major criteria influencing the selection of contractors on civil engineering construction projects and to determine the benefits of the contractor selection criteria. Experienced construction experts engaged in clients and consultants organisations were sampled using the purposive sampling technique in the study are. The data gathered were analysed using named analytical tools and findings made and conclusion drawn.

The study found that the top five major criteria that are considered during contractors' selection in civil engineering construction projects are; managerial capability and competent supervisory staff, technical ability, financial soundness, competitive tender/bid price, and health and safety policy/performance. It was also found that the top benefits of contractors selection criteria in civil engineering construction projects are; enable the client or project owner to select contractors who are performers for the project, facilitate the achievement of project success and the objectives within the scheduled time and cost, to minimise project risks, maximize overall value to the project owner or client, and selection of contractor with sound financial management capabilities. There was no significant statistical difference were observed in the views of the participants' groups regarding the contractor selection criteria in civil engineering construction projects and the benefits of the contractor selection criteria to the clients and the projects.

It is recommended that the critical contractors selection criteria reported in this study should be adopted in the selection of

suitable contractors for civil engineering construction projects. In addition, the selection criteria are very beneficial to achieving better project performance and success as well as the clients. The major aim of contractor selection criteria which is to meet project baselines is evident in the benefits found in this present study.

The various construction experts that are charged with the responsibility of selecting suitable contractors in their organisations will benefit from the outcome of this study in making informed decisions and guiding project owners to employ the best contractors for civil engineering projects. Awareness of the benefits of a technique, process or idea triggers interest in the adoption and application of such process, idea or techniques. This study will make it possible for clients/consultants organisations to use and base their choices of contractor selection/contract awards on the reported criteria. The study also adds to the few existing studies of contractors section criteria and benefits of the criteria on civil engineering projects in Nigeria and other developing countries of Africa and beyond. This study is limited by the number of variables (criteria and benefits) assessed, sample size, study area, sampling technique, and data analysis methods. Therefore, generalisation of the study outcome should be made with caution. Based on these, a similar study should be carried out in other states in Nigeria or other African countries with similar construction market conditions as Nigeria. This could lead to more variables identification and results for comparison purposes will be available. An empirical study to ascertain the drawback in the application of contractor selection criteria in the delivery of construction projects can be embarked upon.

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VII. REFERENCES

- [1] Eze, E.C., Awodele, I.A., Adegboyega, A.A., Onyeagam, O.P., & Guto, J.A. (2020). Assessment of the Triggers of Inefficient Materials Management Practices by Construction SMEs in Nigeria. *International Journal of Real Estate Studies*, 14(1), 38-56.
- [2] Ahmed, F. H. (2017). *Improving construction materials management practices in construction sites* (MSc Thesis). Universiti Tun Hussein Onn Malaysia, Malaysia. Available at: <https://www.semanticscholar.org/paper/Improving-construction-materials-management-in-Ahmed/08fea695f8e0ddbeba7d48cc47eebcadad9c7bb5>
- [3] Onyeagam, O. P., Eze, E. C., & Adegboyega, A. A. (2019). Assessment of quantity surveying firms' process and product innovation drive in Nigeria. *SEISENSE Journal of Management*, 2(2), 22-38.
- [4] Ibrahim, A. R., Roy, M. H., Ahmed, Z., & Imtiaz, G. (2010). An investigation of the status of the Malaysian construction industry. *Benchmarking: An International Journal*, 17(2), 294-308.
- [5] Holt, G. (2010). Contractor selection innovation: examination of two decades' published research. *Construction Innovation*, 10(3), 304-328.
- [6] Alptekin, O., & Alptekin, N. (2017). Analysis of Criteria Influencing Contractor Selection Using TOPSIS Method. *IOP Conference Series: Materials Science and Engineering*, 245, 1-9. doi:10.1088/1757-899X/245/6/062003
- [7] Maqsoom, A., Bajwa, S., Zahoor, H., Thaheem, M. J., & Dawood, M. (2020). Optimizing contractor's selection and bid evaluation process in construction industry: Client's perspective. *Revista De La Construcción. Journal of Construction*, 18(3), 445-458. Retrieved from <http://revistadelaconstruccion.uc.cl/index.php/RDLC/article/view/10434>
- [8] Hwang, J.-S., & Kim, Y.-S. (2016). A bid decision-making model in the initial bidding phase for overseas construction projects. *KSCE Journal of Civil Engineering*, 20(4), 1189-1200.
- [9] Akcay, C., & Manisali, E. (2018). Fuzzy decision support model for the selection of contractor in construction works. *Revista de la Construcción. Journal of Construction*, 17(2), 258-266.
- [10] Yılmaz, A., & Ergönül, S. (2011). Selection of contractors for middle-sized projects in Turkey. *Gazi University Journal of Science*, 24(3), 477-485
- [11] Ayettey, D.N.A., & Danso, H. (2018). Contractor Selection Criteria in Ghanaian Construction Industry: Benefits and Challenges. *Journal of Building Construction and Planning Research*, 6, 278-297. <https://doi.org/10.4236/jbcpr.2018.64019>
- [12] Khoso, A.R., Yusof, A.M., Chen, Z.S., Wang, X.J., Skibniewski, M.I., & Memon, N.A. (2021). Embedded Remote Group Environment Through Modification In Macbeth – An Application of Contractor's Selection In Construction. *Journal of Civil Engineering and Management*, 27(8), 595-616. <https://doi.org/10.3846/jcem.2021.15763>
- [13] Watt, D., Kayis, B. & Willy, K. (2010). The Relative Importance of Tender Evaluation and Contractor Selection Criteria. *International Journal of Project Management*, 28, 51-60. <https://doi.org/10.1016/j.ijproman.2009.04.003>
- [14] Bochenek, J. (2014). The Contractor Selection Criteria in Open and Restricted Procedures in the Public Sector in Selected EU Countries. *Proceedings of the Creative Construction Conference*, Prague, 21-24 June 2014.
- [15] Enyinda, C., Ogbuehi, A., & Udo, G. (2011). A Decision Support Model for Contractor Selection in a Government Procurement Supply Chain: Evidence from an Emerging Market. *Journal of Management Policy and Practice*, 12, 9-17.
- [16] Doloi, H. (2009). Analysis of pre-qualification criteria in contractor selection and their impacts on project success. *Construction Management and Economics*, 27(12), 1245-1263. doi:10.1080/01446190903394541
- [17] Aje, I. (2012). The impact of contractors' prequalification on construction project delivery in Nigeria. *Engineering, Construction and Architectural Management*, 19(2), 159 – 172. <http://dx.doi.org/10.1108/09699981211206098>
- [18] Tarawneh, S.A. (2004). Evaluation of Pre-qualification Criteria: Client Perspective; Jordan Case Study. *Journal of Applied Sciences*, 4(3), 354-363.
- [19] Monyane, T., & Emuze, F. (2015). Exploring Contractor Selection Process for Public Sector Projects in South Africa. A Provincial Case Conference, Paper 011.
- [20] ASK-EHS (ASK -Environmental Health Safety) (2018). *Selection Criteria for Contractors*. Available at: <https://www.ask-ehs.com/blog/selection-criteria-for-contractors/>
- [21] Holt, G.D., Olomolaiye, P.O., & Harris, F.C. (1994) Factor Influencing UK Construction Client' Choice of Contractor. *Building and Environment*, 29(2), 241–248. [https://doi.org/10.1016/0360-1323\(94\)90074-4](https://doi.org/10.1016/0360-1323(94)90074-4)
- [22] Eke, G., Elgy, J., & Wedawatta, G. (2019). Establishing a Link between Contractor Selection Strategy and Project Outcomes: Simulation Study. *Journal of Construction Engineering and Management*, 145(10), 04019062. DOI 10.1061/(ASCE)CO.1943-7862.0001703.
- [23] Marzouk, M.M., El- Kherbawy, A.A., & Khalifa, M. (2013). Factors influencing sub-contractors selection in construction projects. *Housing and Building National Research Center (HBRC) Journal*, 9, 150–158
- [24] Rashid, I., Ismail, S., & Mohamed, Z. (2017). Contractor Selection Criteria for Construction Projects. *Journal of Engineering and Applied Sciences*, 12 (23), 7325-733
- [25] Ajayi, O.M., Ayanleye, A., Achi, F., & Johnson, O. (2010). Criteria for selection of subcontractors and suppliers in a building project in Lagos state, Nigeria. *Proceedings 5th Built Environment Conference Durban, South Africa* 18-20, July 2010, p.55-65.
- [26] Olaniran, O.J. (2015). The effects of cost-based contractor selection on construction project performance. *Journal of Financial Management of Property and Construction*, 20(3), 235-251. .doi.org/10.1108/JFMPC-06-2014-0008
- [27] Ajayi, O.M., Ogunsanmi, O., & Godwin Idoro, G. (2016). Contractor Prequalification Criteria (CPC) and Project Time Performance In Nigeria. *Lagos Journal of Environmental Studies*, 8(1), 24-34
- [28] Vahdani, B., Mousavi, S. M., Hashemi, H., Mousakhani, M., & Tavakkoli-Moghaddam, R. (2013). A new compromise solution method for fuzzy group decision-making problems with an application to the contractor selection. *Engineering Applications of Artificial Intelligence*, 26(2), 779-788
- [29] Holt, G., Olomolaiye, P. O., & Harris, F. C. (1995). A review of contractor selection practice in the UK construction industry. *Building and Environment*, 30(4), 553-561.
- [30] Morkūnaitė, Ž., Podvezko, V., & Kutut, V. (2017). Selection Criteria For Evaluating Contractors Of Cultural Heritage Objects. *Procedia Engineering*, 208, 90-97.
- [31] Polat, G. (2016). Subcontractor selection using the integration of the AHP and PROMETHEE methods. *Journal of Civil Engineering and Management*, 22(8), 1042-1054.
- [32] Khoso, A. R., & Yusof, A. M. (2020). Extended review of contractor selection in construction projects. *Canadian Journal of Civil Engineering*, 47(7), 771–789. <https://doi.org/10.1139/cjce-2019-0258>
- [33] Salama, M., Abd El Aziz, H., El Sawah, H., & El Samadony, A. (2006). Investigating the criteria for contractors' selection and bid evaluation in Egypt. In:

- Boyd, D (Ed) Procs 22nd Annual ARCOM Conference, 4-6 September 2006, Birmingham, UK, Association of Researchers in Construction Management, 531-540.
- [34] Sidik, M.A., Ibrahim, A., Bondinuba, F.K., & Fugar, F.D.K. (2020). Contractor Selection for Construction Works in Ghana: Towards Policy and Practice. *Civil and Environmental Research*, 12(7),59-69
- [35] Araujo, M. C. B., Alencar, L. H., & Mota, C. M. M. (2015). Contractor selection in construction industry: A multicriteria model. *2015 IEEE International Conference on Industrial Engineering and Engineering Management (IEEM)*. doi:10.1109/ieem.2015.7385701
- [36] Ibadov, N. (2015). Contractor selection for construction project, with the use of fuzzy preference relation. *Procedia Engineering*, 111, 317-323.
- [37] Nasab, H.H., & Ghamsarian, M.M. (2015). A fuzzy multiple-criteria decision-making model for contractor prequalification. *Journal of Decision System*, 24, 433-448.
- [38] Trivedi, M. K., Pandey, M. K., & Bhadoria, S. S. (2011). Prequalification of Construction Contractor using a FAHP. *International Journal of Computer Applications*, 28(10), 39-45
- [39] Manideepak, G., Bhatla, A., & Pradhan, B. (2009). Methodologies for Contractor Selection. In *Construction Industry*, ACSGE. BITS Pilani, India.
- [40] Anagnostopoulos, K. P., & Vavatsikos, A. P.(2006). An AHP Model for Construction Contractor Prequalification. *Operational Research*, 6(3), 333-346.
- [41] Rashvand,P., Abd Majid, M.Z., Baniahmadi, M., & Ghavamirad, F. (2015). Contractor Selection At Prequalification Stage: Current Evaluation And Shortcomings. *Jurnal Teknologi (Sciences & Engineering)*, 77 (16), 81–89
- [42] Chen, Z. S., Zhang, X., Rodríguez, R. M., Pedrycz, W., & Martínez, L. (2021). Expertise-based bid evaluation for construction-contractor selection with generalized comparative linguistic ELECTRE III. *Automation in Construction* , 125, 103578. <https://doi.org/10.1016/j.autcon.2021.103578>
- [43] Fong, P.S., & Choi, S.K. (2000). Final Contractor Selection Using the Analytical Hierarchy Process. *Construction Management and Economics*, 18, 547-557. <https://doi.org/10.1080/014461900407356>
- [44] Topcu, Y. (2004). A Decision Model Proposal for Construction Contractor Selection in Turkey. *Building and Environment*, 39, 469-481. <https://doi.org/10.1016/j.buildenv.2003.09.009>.
- [45] Kog, F., & Yaman, H. (2014). A Meta Classification and Analysis of Contractor Selection and Prequalification. *Procedia Engineering*, 85, 302-310. <https://doi.org/10.1016/j.proeng.2014.10.555>
- [46] Al-Harbi, K.M. (2001). Application of the AHP in Project Management. *International Journal of Project Management*, 1, 19-27. [https://doi.org/10.1016/S0263-7863\(99\)00038-1](https://doi.org/10.1016/S0263-7863(99)00038-1)
- [47] Huang, X. (2011). An Analysis of the Selection of Project Contractor in the Construction Management Process. *International Journal of Business and Management*, 6, 184-189. <https://doi.org/10.5539/ijbm.v6n3p184>
- [48] Ramani, J. (2000). Reducing the Bias in Contractor Prequalification Using Data Envelopment Analysis (DEA). M.Sc., the Project, Department of Civil Engineering, University of Toronto, Toronto.
- [49] Ogunsemi, D.R., & Aje, I.O. (2006). A Model for Contractors' Selection in Nigeria. *Journal of Financial Management of Property and Construction*, 11, 33-43. <https://doi.org/10.1108/13664380680001078>
- [50] Darvish, M., Yasaei, M., & Saeedi, A. (2009). Application of the Graph Theory and Matrix Methods to Contractor Ranking. *International Journal of Project Management*, 1, 610-619. <https://doi.org/10.1016/j.ijproman.2008.10.004>
- [51] Nwachukwu, G. (2006) Selection of Consultants and Contractors under Due Process. *35th Annual Conference of NIOB*, Aba, 5-7 October 2006.
- [52] Olatunji, O. (2006). Procurement of Construction and Reconstruction Projects in the International Context—Due Process and Contractor Selection for Public Works in Nigeria. University of Newcastle, Newcastle.
- [53] Morote, A.N. and Vila, F.R. (2012). A Fuzzy Multi-Criteria Decision-Making Model for Construction Contractor Prequalification. *Automation in Construction*, 1, 8-19. <https://doi.org/10.1016/j.autcon.2012.04.004>
- [54] Nwaki, W. N., and Eze, C. E. (2020). Lean construction as a panacea for poor construction projects performance. *ITEGAM- Journal of Engineering and Technology for Industrial Applications (ITEGAM-JETIA)*, 6(26), 61-72. <https://doi.org/10.5935/jetia.v6i26.723>
- [55] Tan, W. (2008). *Practical Research Methods* (3rd ed.). Singapore: Pearson Education.
- [56] Pallant, J. (2005). *SPSS Survival Manual: A Step By Step Guide to Data Analysis Using SPSS for Windows (Version 12)*., (2nd ed.).. Allen and Unwin, Crows Nest NSW 2065