



**MANAGEMENT OF NEED ASSESSMENT RISKS IN PROCUREMENT OF TERTIARY INSTITUTION
CONSTRUCTION PROJECTS IN NIGERIA**

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Abstract

The need assessment stage of project procurement is considered the first step in the public procurement process in Nigeria which begins with preparation of needs, where all requirements are clearly defined to determine the best solution between a need and other alternatives. However, this stage is confronted with risks which affect contract parties and project objectives. This paper aims to assess needs assessment risks management strategies for construction procurement of tertiary institution in Nigeria with a view to ensuring effective delivery of construction projects. The study employed the survey design approach utilising the quantitative method. A total of 240 structured questionnaires were administered to the respondents (contractors, procurement officers, and building professionals) of procurement and physical planning units of tertiary institutions in Nigeria and a total of 175 questionnaires were returned and found valid for analysis, representing a response rate of 72.91%. The collected data were analysed using Relative Importance Index (RII) to identify relatively the most important risks factors in the needs assessment of procurement. Regression analysis was employed to determine the impact of the identified need assessment risk factors on parties and the impact on project objectives. The study found that conflict of interest in procurement needs identification; poor communication between members during procurement need identification; poor project briefing; and inadequate financial capability of clients as the important need assessment risks factors. The study also concludes that the needs assessment risks were found to have statistical significant impact on project objective time, cost, quality, safety and environment; as well as the parties to the contract. The study concludes that risks reduction, risks avoidance/prevention, and risk sharing are important risks response strategies in managing needs assessment risks. It is recommended that procurement process of tertiary institution projects should focused on in-depth assessment and management of the risks at the early stage of needs identification/needs assessment in order to ensure effective delivery of construction projects.

Keywords: management, needs assessment, Nigeria, public procurement, risks, tertiary institutions

Introduction

Procurement systems have evolved globally with innovations and improvements on service delivery. However, the systems are given little acceptance in some developing countries (Adamu *et al.*, 2017). The traditional procurement system which is widely criticised of ineffectiveness is

+still the most frequently used in the Nigerian public sectors (Fabi *et al.*, 2015). This procurement system is known to be bedeviled with problems of mismanagement, professionalism and corruption in Nigeria (Ebenezer *et al.*, 2019).

In Nigeria, public tertiary institutions are generally compelled to follow 'due process' in their procurement arrangements (Kareem *et al.*, 2014). The Procurement Act of 2007 makes it mandatory for public tertiary institutions to use the design-bid build procurement route, except in very exceptional circumstances (Kareem *et al.*, 2014). However, the procurement management practices adopted by most public tertiary institutions in Nigeria are not in full compliance with the current Public Procurement Act of 2007 (Oso, 2017). For instance, the actual procurement costs in many public tertiary institutions usually exceed 10 percent of the budgeted cost and this leads to increase in operational costs (Oso, 2017).

The public procurement process is often confronted with inherent risks to include conflict of interest, ineffective project technical feasibility, lack of commitment to transparency, unavailability of indices for bids and costs, contractors' low managerial and technological ability, lack of competition among bidders, over-estimated quantities of work items, low procurement competence, use of inappropriate procurement strategy, and inconsistency of government policies, among others (Dahiru and Bashir, 2015; Oso, 2017). Unfortunately, these risks and their management strategies are given less attention in procurement process of most tertiary institutions in Nigeria and thus, some of the projects are being delayed unnecessarily, and having impact on cost, time and quality objectives of the projects (Emeka, 2016; Bamidele, 2020). Abdul-Mannan-Hussain *et al.* (2017) added that ineffective management of risks factors would lead to dispute, claims, litigation and hence having an impact on the contracting parties (client, contractors and consultants).

The Bureau of Public Procurement (BPP) in Nigeria requires that all public construction procurement by government agencies in Nigeria be executed in line with the 9 essential steps, which include efficient procurement plan driven by need assessment, budgetary appropriation, advertisement, transparent prequalification, bid submission, bid opening, bid evaluation, (technical and financial), tender board/Federal Executive Council (FEC) approval, and contract execution (BPP, 2012; Emeka, 2016). Additionally, that the key aspects of the 9 essential steps (for instance, appropriate market surveys, extensive feasibility and viability studies, fund sourcing/cash flow analysis, selection of procurement routes/options, and contract management plans), are mostly being compromised by tertiary institutions in Nigeria (Bamidele *et al.*, 2019; Bamidele, 2020; Ezeanyim *et al.*, 2020).

The Need Assessment stage (requirement definition stage) is primarily the first step in procurement process where practitioners' role is to estimate the procurement lead time given the most appropriate procurement method that would be suitable for such a requirement. There are also needs for goods and services which should undergo an analysis to clearly define requirements (Ezeh and Akanmu, 2013). This stage is mostly confronted with risks of improper briefing and wrong definition of needs, thereby affecting the delivery of construction projects (Bamidele, 2020). Dahiru and Bashir (2015) suggested effective risk control, and risk reduction as very important in any procurement management system. Waziri and Isa (2017) noted that management of risks in public procurement cannot be successful without a detailed understanding of the main categories of the risks, as the lack of understanding would lead to poor risks assessment and monitoring, which would have negative impact on time, cost and quality objectives of a project.

In Nigeria, many research has been conducted on construction project procurement in tertiary institutions. For instance, Ezeanyim *et al.* (2020) assessed the effect of procurement practices on performance of public tertiary institutions in Anambra State. Bamidele *et al.* (2019) investigated the causes of non-compliance with Public Procurement Act, 2007 among Federal and States tertiary institutions in project delivery in Southwest, Nigeria. However, very few studies focused and singled out the need assessment stage of construction procurement in Nigeria.

It is against this backdrop, that this paper aims to assess needs assessment risks management strategies for construction procurement in tertiary institution in Nigeria with a view to ensuring effective delivery of projects. This aim will be achieved by providing answers to the following research questions: What are the inherent need assessment risk factors in procurement process of tertiary institution in Nigeria? What are the impacts of the identified risk factors on project objectives? What are the impacts of the identified risk factors on project parties (client, contractor, and consultants) involved in procurement of the tertiary institution? And what are the need assessment risk management strategies in procurement process of construction projects in tertiary institutions in Nigeria?

Literature Review

Need assessment

The first step in the public procurement process is to identify the key requirements, as all procurement requirements begin with preparation of needs. For instance, the need to cross a body of water could create a requirement to build a bridge, a ferry, or other transportation systems (Ezeh and Akanmu, 2013). In defining the needs, considerations must be given to whether the need can be satisfied in-house or contracted out; and quantification of the initial budgetary estimates, and an idea of the procurement lead-time. The composition of the study team must be multidisciplinary in order to address the different questions to be answered to facilitate a comprehensive understanding of the needs so as to clearly define the actual requirement. At the end of the requirements definition stage, a clear determination of the terms of reference, technical specifications or statement of work should be possible, including an estimate of the budget and, most importantly, the procurement lead-time (Ezeh and Akanmu, 2013; Bamidele *et al.*, 2019).

Construction Procurement Risks

Over ninety percent of all building projects in the public sector are procured through the traditional procurement arrangement (Adamu *et al.*, 2017). The traditional procurement method involves risks where client is exposed to contractor claims, over-design and constructability issues since the client accepts liability for design in its contract with the contractor (Adamu *et al.*, 2017). The impact of risks engendered in traditional construction procurement inevitably lead to increased conflicts, and failure of contractors to satisfy clients' needs (Salako (2010).

Moreover, the design and build procurement method is prone to several risks. Some of these risks are borne by the design-build contractor and the client and in some cases are shared by both parties (Ogunsanmi, 2015). However, Salako (2010) has documented 35 sources from which design and build risks can emanate. These risk factors are further classified into three main categories of cost, time and quality related factors. They were as follows: permit and approvals; site access/right of way; different site conditions (unforeseen site conditions); unidentified utilities; constructability of design; quality control and assurance; government acts and

regulation; conflict of interest in needs identification; poor communication between members during need identification; poor project briefing; inadequate financial capability of clients and so forth (Salako, 2010).

Procurement Risk Management Techniques

Risk identification

Risks in each construction project have been identified by the project management level using brainstorming techniques or expert panel discussions. Koul *et al.* (2018) stated that risk identification is characterised by isolating the possible risks through risk breakdown structure and brainstorming the sources and classification of the risk, as well as the effects of the project. Various techniques have been developed for risk identification. These include brainstorming among project stakeholders, interviews, Delphi method the use of checklist and risk register (Kalam, 2017).

Risk assessment

Risk assessment evaluates risks by determining the probability of occurrence and potential impact or severity. The assessment can be performed qualitatively or quantitatively (Koul *et al.*, 2018). Qualitative risk analysis sometimes involves considering each risk in a purely descriptive way to imagine various characteristics and the effect that it might have on the project. It could also involve assigning probability to risk occurrence and risk impact using subjective probabilities (Ogunsanya *et al.*, 2016; Koul *et al.*, 2018; Nkrumah and Boateng 2020). Quantitative risk assessment goes a step further by considering risk impact on numeric terms as opposed to probability measures. This could be in terms of additional cost incurred or additional time to be spent on a project. Various techniques are available for quantitative risk assessment including priority table, risk register, probability analysis, sensitivity analysis and Monte Carlo simulation (Koul *et al.*, 2018).

Risk response/ mitigation

Critical risks identified and analysed must be mitigated by developing options and actions to enhance opportunities and reduce threats to project objectives. The technique or methods commonly used in the industry include risk avoidance, risk prevention, risk acceptance, risk reduction, risk transfer, risk exploitation for both negative and positive risks, with such risks best and comparatively handled by the contracting parties. These may be classified into risk allocation and or risk sharing amongst and between the contracting parties in construction projects (Kalam, 2017; Ceocea *et al.*, 2020).

Research Methodology

This research employed the survey design approach utilising the features of quantitative method by administering well-structured questionnaires to the respondents. The targeted population for this study constituted a total of 240 respondents, comprising contractors and staff of procurement and physical planning units of tertiary institutions in the North Central Nigeria as shown in Table 1. The sample frame for the study constituted the procurement officers, building professionals (Architects, Quantity Surveyors, Builders, Engineers) in the physical planning units, consultant and contractors in tertiary institution in North Central Nigeria.

Table 1 presented the number of public tertiary institutions in the selected states of North Central region of Nigeria (FCT, Niger, Kogi and Kwara). This covers a total of 7-Universities, 6-

polytechnics and 7-Colleges of education, making a total of 20 institutions. The value of 20 was multiplied by 6 set of respondents from each institution (contractors, procurement officers, Architects, Quantity surveyors, Builders and Engineers). This gave a total of 120 respondents. All the institutions had not less than one professionals and thus the value of 120 was further multiplied by 2 from each institution making a total population of 240 respondents. Therefore, a total of 240 questionnaires were administered to the respondents (contractors, procurement officers, and building professionals) and a total of 175 were returned and found valid for analysis. This represents a response rate of 72.91% which is considered adequate for analysis.

Table 1: Some Public Tertiary Institution in the North Central, Nigeria

| S/No | State | University | Polytechnic | College of Education |
|--------------|----------|---|--|--|
| 1 | FCT | University of Abuja Gwagwalada FCT | NIL | FCT, CoE, Zuba |
| 2 | Niger | FUT, Minna; IBB University, Lapai | Federal Polytechnic, Bida; Niger State Poly, Zungeru | Federal, College of Edu, Kontagora; CoE, Minna |
| 3 | Kogi | FU, lokoja; Kogi state University, Anyigba Kogi state | Federal Polytechnic, Idah; Kogi state poly, lokoja | Federal, College of Education, Okene COE, Ankpa |
| 4 | Kwara | University of Ilorin; kwara State University Malete, Ilorin | Federal Polytechnic, Offa; Kwara state polytechnic Ilorin | COE, Ilorin College of Education, (Tech) lafiyagi |
| TOTAL | 7 | | 6 | 7 = 20 |

Source: Joint Admission and Matriculation Board Brochure (2019).

In order to guarantee equal representation for each of the identified groups of professionals in the population, stratified random sampling method was adopted for the research. The respondents were grouped into different strata/groups, that is: procurement staff, professionals in physical planning units, and contractors which were each selected and randomly sampled accordingly.

Questionnaire survey was used in this research in order to obtain the views and opinions of procurement staff, professionals in physical planning units, and contractors. The idea of formulating precise written questions, for those whose opinions or experience you are interested in seems such an obvious strategy for finding the answers to the issues that interest you. The questionnaire was closed-ended based on the questions generated from the literature; these questions were scaled using the 5-point Likert scale of 1-5 (where: 1 Not Significant, 2 Low Significant, 3 Significant, 4 High Significant and 5 Very High Significant).

The questionnaire was structured into queries drawn out for each objective, such as the inherent need assessment risk factors in procurement of tertiary institution in Nigeria; impact of the identified risk factors on project objectives; impact of the identified risk factors on the parties; and management strategies for the identified risks.

To analyse the collected data in this study, both descriptive and inferential analytical tools were utilised. The descriptive methods included Relative Importance Index (RII) and rankings. The RII was used to identify relatively the most important risks factors in the needs assessment process of procurement. The RII values of 75% and above were deemed high or important according to Morenikkeji (2006). Regression analyses were used to determine the impact of the identified need assessment risk factors on parties and the impact on project objectives. The data on risk

factors were the independent variables and data on the impact of the identified need assessment risk factors on parties and on project objectives were considered as dependent variables.

Results and Discussion

Need Assessment Risk Factors in Procurement of Construction Projects

The results in Table 2 shows that conflict of interest in procurement needs identification; poor communication between members during procurement need identification; poor project briefing; and inadequate financial capability of clients, and government acts and regulation during needs identification are the key need assessment related risk factors in procurement of construction projects in tertiary institutions. They were deemed high because they had RII values of 75% and above. These results are in line the findings of Mangvwat *et al.* (2020) and Salako (2010) who documented 35 sources from which procurement risks can emanate and further classified them into 3 main categories of cost, time and quality related factors.

Table 2: Need assessment risk factors in procurement of construction projects

| Need Assessment Risk Factors | RII | Percentage | Ranking |
|--|------|------------|---------|
| Conflict of interest in needs identification | 0.95 | 95% | 1 |
| Poor communication between members during need identification | 0.94 | 94% | 2 |
| Poor project briefing | 0.90 | 90% | 3 |
| Inadequate financial capability of clients | 0.89 | 89% | 4 |
| Government acts and regulation during needs identification | 0.88 | 88% | 5 |
| Assessment of unprioritised needs/Poor assessment of needs | 0.85 | 85% | 6 |
| Improper project feasibility study | 0.58 | 58% | 7 |
| Political interference | 0.51 | 51% | 8 |

Impact of Needs Assessment Risks on Parties (Client, Contractor and Consultant)

Table 3 shows the result of the simple linear regression analyses conducted to test the impact of need assessment risk factors on contract parties (clients, contractors, and consultants). The result shows that the predictor expressed 82.90%, 83.10% and 86.50% of the variances ($R^2=0.829$, $F=0.479$, $p<0.026$); ($R^2=0.831$, $F=19.699$, $p0.017<0.05$); and ($R^2=0.866$, $F=25.662$, $p<0.015$) for clients, contractors, and consultants respectively. This results imply that procurement need assessment risk factors significantly impact on project clients, contractors, and consultants, respectively during procurement process. These depict that any of the need assessment risk factors that is not properly managed would result into a negative impact on the parties. The results corroborate the findings of Abdul-Mannan-Hussain *et al.* (2017) who noted that ineffective management of risks factors would lead to dispute, claims, litigation and hence having an impact on the contracting parties (client, contractors and consultants).

Table 3: Impact of needs assessment risks on parties (client, contractor and consultant)

| SN | variables | | Type of model | Inference | | Strength of relationship | Remarks |
|----|------------------------------|----------------------|----------------------------|----------------|---------|--------------------------|---------------------------|
| | X | Y | | R ² | P value | | |
| 1 | Need Assessment Risk factors | Impact on client | Linear regression analysis | 82.90% | 0.026 | Very strong | Statistically Significant |
| 2 | Need Assessment Risk factors | Impact on contractor | Linear regression analysis | 83.10% | 0.017 | Very strong | Statistically Significant |

| | | | | | | | |
|---|------------------------------|----------------------|----------------------------|--------|-------|-------------|---------------------------|
| 3 | Need Assessment Risk factors | Impact on consultant | Linear regression analysis | 86.50% | 0.015 | Very strong | Statistically Significant |
|---|------------------------------|----------------------|----------------------------|--------|-------|-------------|---------------------------|

Impact of Procurement Needs Assessment Risks on Project Objectives

Table 4 shows the result of the simple linear regression analysis conducted to test the impact of need assessment risk factors on project objectives (time, cost, quality, environment, and safety). The result shows that the predictors expressed 60.70%, 96.40%, 95.00%, 71.40% of the variances ($R^2=0.607, p<0.023$; $R^2=0.607, p<0.020$; $R^2=0.607, p<0.00$; $0.038, p<0.00$; 0.008) for time, cost, quality, and safety, and environment respectively. These imply that the procurement needs assessment risk factors significantly impact on project time, cost, quality, environment, and safety objectives respectively. The results therefore infer that persistent need assessment risks would lead to corresponding increase in project duration, project cost, project quality, safety and meeting environmental requirements. These results corroborate the findings of Salako (2010) who concluded that procurement risk factors have impact on time, cost and quality objectives of projects. The results are also in line with the findings of Bamidele (2020) who noted that these risks are given less attention in procurement process of most tertiary institutions in Nigeria.

Table 4: Impact of procurement need assessment risk factors on project objectives

| S/No | variables | | Type of model | Inference | | Strength of relationship | Remarks |
|------|--------------------------------|-----------------------|-------------------|----------------|---------|--------------------------|---------------------------|
| | X | Y | | R ² | P value | | |
| 1 | Needs Assessment risks factors | Impact on Time | Linear regression | 0.607 | 0.023 | Strong | Statistically Significant |
| 2 | Needs Assessment risks factors | Impact on cost | Linear regression | 0.964 | 0.020 | Very strong | Statistically Significant |
| 3 | Needs Assessment risks factors | Impact on Quality | Linear regression | 0.950 | 0.000 | Very strong | Statistically Significant |
| 4 | Needs Assessment risks factors | Impact on Safety | Linear Regression | 0.729 | 0.038 | Strong | Statistically Significant |
| 5 | Needs Assessment risks factors | Impact on Environment | Linear regression | 0.714 | 0.008 | Strong | Statistically Significant |

Management Techniques for Procurement Needs Assessment Risks

This section presents the techniques for managing procurement needs assessment risks factors for construction projects in tertiary institutions. These techniques include risk identification, qualitative and quantitative risks management techniques, and risks response techniques.

Risk identification techniques for procurement need assessment

The results in Table 5 show that the important risk identification techniques during the need assessment of procurement process are brainstorming, expert judgment or opinion, checklist guides and Delphi techniques. They were deemed important because the fall between RII values of 75% and above. These results are in alignment with the findings of Kalam (2017) who identified brainstorming among project stakeholders, interviews, Delphi, checklist and risk register.

Table 5: Risk identification techniques at Need Assessment stage of procurement

| S/No | Risk Identification Techniques | RII | % | Ranking |
|------|--------------------------------|------|----|---------|
| 1 | Brainstorming | 0.94 | 94 | 1 |
| 2 | Expert Judgment /opinion | 0.84 | 84 | 2 |
| 3 | Checklist guide | 0.83 | 83 | 3 |
| 4 | Delphi technique | 0.78 | 78 | 4 |
| 5 | Interview | 0.77 | 77 | 5 |
| 6 | Root Cause Analyses | 0.69 | 69 | 6 |
| 7 | Meeting on Risks review | 0.66 | 66 | 7 |
| 8 | Discussion with end user | 0.61 | 61 | 8 |

Qualitative need assessment risks management techniques

The results in Table 6 show that the important qualitative need assessment risks management techniques are brainstorming, interview, checklist/ register, probability analysis/ Monte Carlo Simulation. They were deemed important because they fall between RII values of 75% and above. These results are in agreement with the findings of Koul *et al.* (2018) who believes that risks assessment could be performed qualitatively or quantitatively. The results also corroborate Kalam, (2017) who identified these techniques as important risks assessment strategies.

Table 6: Qualitative need assessment risks management techniques

| S/No | Qualitative Techniques (Need Assessment) | RII | % | Ranking |
|------|--|------|----|---------|
| 1 | Brainstorming | 0.86 | 86 | 1 |
| 2 | Interview | 0.86 | 86 | 1 |
| 3 | Checklist / risks register | 0.83 | 83 | 3 |
| 4 | Probability analysis/ Monte Carlo Simulation | 0.76 | 76 | 4 |
| 5 | Decision trees | 0.73 | 73 | 5 |
| 6 | Delphi method | 0.72 | 72 | 6 |
| 7 | Multi-criteria decision-making method | 0.70 | 70 | 7 |
| 8 | Sensitivity Analysis: | 0.69 | 69 | 8 |
| 9 | Scenario Analysis: | 0.65 | 65 | 9 |

Quantitative need assessment risks management techniques

The results in Table 7 show that the important quantitative need assessment risks management techniques are brainstorming, checklist/ register, probability analysis/ Monte Carlo Simulation. They were deemed important because they fall between RII values of 75% and above. These results are in agreement with the findings of Koul *et al.* (2018) who believes that risks assessment could be performed qualitatively or quantitatively. The results also corroborate Kalam, (2017) who identified these techniques as important risks assessment strategies.

Table 7: Quantitative need assessment risks management techniques

| S/No | Qualitative Techniques (Need Assessment) | RII | % | Ranking |
|------|--|------|----|---------|
| 1 | Brainstorming | 0.89 | 89 | 1 |
| 2 | Checklist / risks register | 0.87 | 87 | 2 |
| 4 | Probability impact table | 0.75 | 75 | 4 |
| 5 | Cause / effect diagram | 0.71 | 71 | 5 |
| 6 | Risk Priority table | 0.68 | 68 | 6 |
| 7 | Data precision ranking | 0.67 | 67 | 7 |
| 8 | Influence diagrams | 0.64 | 64 | 8 |
| 9 | Assumption analysis | 0.63 | 63 | 9 |

Risks response techniques for need assessment stage of procurement

The results in Table 8 show that the key procurement risk response strategies for need assessment are Risk reduction (contingency planning; quality assurance; separation or relocation of activities and resources; contract terms); risks avoidance/prevention (detailed planning, alternative approaches, protection and safety systems, reviews of operation, regular inspections, training and skills enhancements); transfer or share the risks through insurance; and escrow agreements. They were deemed important because the fall between RII values of 75% and above. These results are in corroboration with the findings of Kalam (2017) and Ceocea *et al.* (2020) who classified risk response strategies into risk allocation and or risk sharing amongst contracting parties in construction projects.

Table 8: Need assessment procurement risks response techniques

| S/No | Response techniques at need assessment | RII | Percentage | Ranking |
|------|---|------|------------|---------|
| 1 | Reduction (contingency planning; quality assurance; separation or relocation of activities and resources; contract terms) | 0.78 | 78 | 1 |
| 2 | Avoidance/prevention of the risks (detailed planning; Alternative approaches; Protection and safety systems; Reviews of operation; Regular inspections; Training and skills enhancements) | 0.77 | 77 | 2 |
| 3 | Transfer or share the risks through insurance | 0.77 | 77 | 2 |
| 4 | Escrow agreements | 0.76 | 76 | 4 |
| 5 | Retain or accepting the risks e.g., for low level risks | 0.74 | 74 | 5 |
| 6 | Bond and guarantees agreement | 0.74 | 74 | 6 |
| 7 | Insurance cover | 0.72 | 72 | 7 |

Conclusion and Recommendations

Need assessment stage of project procurement is considered the first step in the public procurement process in Nigeria which begins with preparation of needs, where all requirements are clearly defined by comparative cost/benefit analysis to determine the best solution between a need and other alternatives. However, this stage is confronted with risks which affect contract parties and project objectives. This paper aims to assess needs assessment risks management strategies for construction procurement in tertiary institution in Nigeria with a view to ensuring effective delivery of projects. The study concludes that the key need assessment risks factors are conflict of interest in procurement needs identification; poor communication between members during procurement need identification; poor project briefing; and inadequate financial capability of clients. The study also concludes that the needs assessment risks were found to have statistical significant impact on project objective time, cost, quality, safety and environment; as well as the parties to the contract (clients, contractors, and consultants). The study concludes further that risks reduction, risks avoidance/prevention, and risk sharing are important risks response strategies in managing needs assessment risks.

It is recommended that procurement process of tertiary institution construction projects should focused on in-depth identification and management of risks at the early stage of needs identification/needs assessment in order to ensure effective delivery of construction projects.

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