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EVALUATION OF THE USE OF DECISION SUPPORT TOOLS IN THE SELECTION OF PROCUREMENT STRATEGIES AMONG CONSTRUCTION STAKEHOLDERS IN IMO STATE, NIGERIA

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ABSTRACT

In principle, the choice of project procurement strategies is contingent on the strategic needs of the project under consideration, and the selection of an appropriate procurement strategy is a major determinant of overall project outcome. Project success is more significantly driven by adopting collaborative models and multi-criteria Decision Support Tools (DSTs), and this understanding predicts that the procurement strategies used in different contexts vary and address the specific needs of each project. However, it is common knowledge in Imo State (Nigeria) that the choice and selection of procurement strategies for different projects follow a regulated pattern adopting traditional design-bid-build, pure design and build and in few cases, management contracting. This paper sought to evaluate the use of decision support tools in procurement strategies selection with a view to ensuring efficiency in choice of project delivery methods in Imo State, Nigeria. The data were obtained from a random survey of 169 construction professionals comprising of quantity surveyors, architects, engineers, and builders in Imo State using a 5-point Likert scale structured questionnaire. Data analysis enlisted descriptive statistics and One-Sample Wilcoxon Signed-Rank Test. The result showed that stakeholders' knowledge across all the seven identified DSTs is mathematically verified as significant (MS $\geq$ 3.00), their practical operational adoption rate is uniformly deficient (MS = 2.24), the local construction stakeholders fully understand the benefits of these tools, every single one of the 11 identified barriers to the adoption of DSTs scored well above the 3.00 significance baseline; listing Changes in conventional practices, and Politics in construction with top mean scores of 3.89 and 3.82 as the most critical. Based on the results, the study concluded that Stakeholders have the necessary knowledge of the available Decision Support Tools, recognize the benefits and the selection criteria, yet adoption remains deficient due to personal bias, institutional preference for conventional strategies and underlying political factors. These findings suggest the need for Imo State House of Assembly to review and amend the Imo State Public Procurement Law to explicitly codify the mandatory use of objective DSTs in state projects procurement decision making to avoid political subjectivity, and for Professional institutions (like NIQS, NIA, NSE, NIOB) to organize mandatory training workshops to help stakeholders unlearn rigid conventional methods and transition to the adoption of DSTs in procurement strategies selection decision making.

Keywords: Construction, Construction Procurement, Procurement Strategies, Decision Support Tools

1.0 INTRODUCTION

Construction industry activities involve the creation of unique, one-off product that enlists the inputs of several parties. These parties are unified in a project using a relationship framework defined by procurement strategies. The parties assembled for a typical project, vary and have different background, training, interest and understanding of the problem ('project') to be accomplished. These multiple structures therefore require a governance framework that could harmonize the relationships and interests of all parties (employer, consultants and construction team (Ashworth, 2013). Procurement strategy/method offers a veritable mechanism for integrating various parties' roles and interests in construction project delivery. According to Naoum and Egbu (2016), Procurement systems describe how an organizational system assigns specific responsibilities and authorities to people and organizations, defining the relationship of various parties in the construction of a project.

The selection and use of procurement strategies have attracted vast discussion across construction industry spread, but the consensus of stakeholder suggests, it is a critical decision in project development, capable of undermining project goals, where it is not properly managed (Opawole, Babatunde and *Ujaddighe*, 2010). The selection of an appropriate procurement system is a prerequisite that determines the ability to deliver a project based on value for money (Rahmani, 2016). According to Naoum and Egbu (2016), the selection of an effective procurement method remains an emergent contemporary problem for the procuring clients and other stakeholders in the construction industry. Studies have also correlated effective selection of an appropriate procurement strategy with project success (Luu & Chen, 2005). Despite this vastly embedded understanding, the decision to select an appropriate procurement method for project delivery is subject to subjective-intuitive judgment, and biases of key stakeholders (design and client teams)(Davies, 2008). In most cases, project is tailored to existing practices without due regards to the varying contexts and characteristics of individual projects, in order to avert the risk of failure in the use of emerging procurement system (Cartlidge, 2018).

The difficulty in the selection of procurement has been expansively considered in the relevant literatures. One significant problem has to do with the inability to prioritize the advantages of conflicting procurement approaches (Osipova and Erickson, 2012). The proliferation of project types and changing nature of construction practice and project delivery over the years, and problems faced in the use of different procurement strategies are pertinent issues necessitating the decision to prioritize procurement selection (Cartlidge, 2018). Before now, the choice of procurement systems for use was largely determined by factors of familiarity, simplicity, economic and procedural factors and risks of uncertainty in use of innovative procurement options (Mosey, 2009; Masterman, 2002). However, these crude yardsticks did not assist to solve the problems of project failure and overall general poor performance problems (Love, Smith, and Regan 2010). As the industry develops towards the involvement of private sector in the development of construction goods which hitherto was mainly the responsibilities of the public, it became pertinent to adopt more strategic procedure in the

selection of project delivery routes. Moreover, since different procurement options are suitable in varying project conditions, it became imperative to prioritize their advantages using structured decision-making process otherwise contextualized in this study as Decision Support Tool (DST). According to Rahmani (2016), DSTs refer to structured procedures that limit personal judgment

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in decision making process. It consists of formal instructions maintained within an organization that mandates decision takers to adopt a procedural objective framework based on numerical utility ranking. The use of DST represents an era of radical departure in history of procurement practices, even though the practice has been institutionalized in developed settings like the United Kingdom (UK).

Several DST are obtainable despite the plethora of problems encountered in the selection of an effective procurement strategy (Rahmani, 2016). Studies across the world have demonstrated potency of DST in selecting effective procurement systems for project delivery (Love *et al.,* 2010; Ekung, *Siriwardena, and Adeniran* 2013).

Royal Institution of Chartered Surveyors (RICS) (2000) began full implementation of project procurement selection based on an objective disciplined manner that suits the clients overall strategic project objective framework. Rahmani (2016) enthused that several scholars and practitioners have recognized this necessity, and have developed planned methods, tools and models of varying dimensions to support stakeholders to navigate the procurement selection debacle.

Ekung, Agu, and Iheama (2017) showed that ineffective implementation of project governance structure (procurement system), based on industry best practices accounts for the remote cause of failure in mega tourism projects in Nigeria. It is therefore necessary to conduct a study about the uses of certain procurement practices' improvement mechanics. Effort to improve procurement strategies uses in the construction industry witnessed the introduction of decision support tool in their selection. DST ensures that clients have adequate knowledge of the functionality and performance of relevant procurement options, and because the utility of these strategies interwove, it became necessary to adopt scientific criteria in distilling their merits to benefit project delivery. Although, several studies have been initiated to examine varying contexts of construction procurement and case studies of DST in the global perspective and Nigeria in particular (Love *et al*., 2010; Ekung *et al.,* 2013), the extent to which stakeholders in procurement implement procurement selection using DST, issues affecting their implementation are yet limitedly theorized.

Against this backdrop, this study is conducted to evaluate the use of decision support tools in procurement strategies selection with a view to ensuring efficiency in choice of project delivery methods in Imo State, Nigeria.

1.1 Research Objectives

The objectives of this study are as follows:

I. To assess Imo State construction stakeholders' level of knowledge of Decision Support Tools (DSTs) available for the selection of procurement strategies.
II. To determine the level of use of these decision support tools in the selection of procurement strategies in the study area.
III. To assess the barriers to the adoption of decision support tools in the selection of procurement strategies in the study area.

1.2 Research Questions

The following research questions guided the study.

I. What is the level of stakeholders' knowledge regarding the decision support tools available for the selection of procurement strategies in the study area?
II. To what level are decision support tools used in procurement strategies selection decision making in the study.
1II. What are the barriers to the adoption of decision support tools in the selection of procurement strategies in the study area?

1.3 Scope and Delimitation of the Study

Geographically, the interest of the study focused on Imo State, Nigeria. The economy of Imo State has significant impact on the activities of the construction industry. Complex infrastructures ranging from roads, and state of the art buildings are being developed. DST uses across building, civil engineering, services and heavy engineering construction, are considered in the study.

1.4 Research Hypothesis

The following null hypothesis was designed to guide and validate the objective 3 of the study:

Ho: The implementation of Decision Support Tools during procurement strategy selection in the research environment is not constrained by established significant problems.

2.0 LITERATURE REVIEW

2.1 Nature of Construction Project Delivery

The successful delivery of projects is at the heart of infrastructure and urban development across the world. Odeh and Battaineh (2002) asserted that project delivery is about the global value proposition of the construction industry, going beyond time and budget performance. Some of the major challenges facing this sector is to create certainty about delivery on time, on budget and to the targeted quality. This involves improving productivity in the industry, to cut the time and cost of delivery as well as the process inputs into construction delivery.

The impetus for change is underscored by the industry's alarming performance record; more than 90% of mega projects are above budget or behind schedule, leading to pressure from project owners, investors and tax payers alike (Flyvbjerg, Bruzelius, and Rothengatter, 2003). The construction industry across the globe litters with high profiled infrastructures that are either suspended or permanently abandoned due to the lack of engagement with cost management services (Smith, 2014). The global survey of construction project performance in 20 countries revealed that 50-100% cost overrun cases occur in infrastructure projects, Tunnels and bridges lead with 34%, while roads trail with 20% cost growth (Flyvbjerg *et al.*, 2003). A study by World Bank also affirmed that cost growth is a major problem in construction projects across the globe (Kenny, 2010). Cost growths in road projects in India exceeded 25% with over 50% cost overrun. The listing of cost blowouts exists elsewhere including Flyvbjerg (2014). A Sri Lankan study also

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buttressed that 78% of contractors over budgeted their project costs (Malkanthi, Premalal, and Mudalige, 2017).

There are several reasons for such a bleak performance record, including: industry fragmentation, lack of cross-functional and value-chain cooperation, limited amount of knowledge transfers from projects of project, stagnant approach to project management, which has failed to evolve and address the rising complexity and disruptions from outside political or investor risks (Ashworth, Hogg, and Higgs 2013).In addition, the nature of this industry is facing continuous and rapid transformation. Some of these changes raise concerns about improving project delivery. Projects are getting bigger, public budget is becoming more challenging to secure, advancements in technological innovation (3D Printing, big data, analytics, virtual and augmented reality, drones, etc.) and process developments (public-private partnership, project financing, integrated project delivery, lean construction, etc.); and the rise of ineffective or inexperienced management teams in such a rapidly changing environment are other pertinent issues.

2.2 Procurement of Construction Projects

The term 'construction procurement method' has been given different definitions in the literature. For instance, Chan (2007) defined it as the system that represents the organizational structure adopted by clients for the implementation of project processes and eventual operation of the project. On the other hand, Molenaar, Sobin, Gransberg, McCuen, Korkmaz, and Horman (2009) defined procurement method as a comprehensive process by which designers, constructors and various consultants provide services for design and construction to deliver a complete project to the client. As this definition suggests, wide range of processes are involved in a procurement strategy. These processes are often interrelated and sequential in nature and their effectiveness and efficiency impact considerably on the success or failure of projects.
In addition, the last few decades have witnessed the proliferation of numerous different types of construction procurement for delivering projects. The most common types include: Traditional Method (also known as Design, Bid and Build (DBB) approach), Design and Build (DB), Management Contracting, Construction Management, Design and Manage, Specialist Task Organisation (STO), Public-Private-Partnership (PPP) /Project Finance. They differ from each other in terms of allocation of responsibilities, activities sequencing, process and procedure, and organisational approach in project delivery (Abdul -Rashid *et al*., 2006).

2.3 Procurement Selection Criteria

The criteria identified by participants are grouped into four separate clusters namely, 'project characteristics', 'client's objectives', 'internal environment' and 'external environment'. Unless these characteristics and requirements are clearly identified, it would be impossible to assess the benefits and weaknesses of a procurement approach for a project. This classification also conforms to the underlying themes portrayed by Ambrose and Tucker (2000) and Alhazmi and McCaffer (2000).

2.4 The Regulatory Framework of Public Procurement in Nigeria

To understand how construction stakeholders select procurement strategies, it is essential to examine the statutory frameworks that govern public contracts. In Nigeria, public procurement is heavily regulated to ensure transparency, accountability, competitiveness, and value for money. The primary driver of this regulatory environment is the Bureau of Public Procurement (BPP), which operates under distinct legislative mandates at both the Federal and State levels. (Jagboro and Aje, 2016**)**

A. The Bureau of Public Procurement (BPP)

The federal BPP was established by the **Public Procurement Act (PPA) of 2007**. Prior to this Act, public contracting in Nigeria was notorious for inefficiencies, corruption, and a lack of standardized guidelines, often operating under vague "Financial Regulations."

The Federal BPP acts as the regulatory oversight body for all federal ministries, departments, and agencies (MDAs). Its core mandates include:

i. **Harmonization of Policies:** Formulating and standardizing procurement policies, guidelines, and bidding documents across all federal projects.
ii. **Oversight and Certification:** Monitoring compliance and issuing "Certificates of No Objection" for contract awards that fall within specified monetary thresholds.
iii. **Procurement Audits:** Conducting post-procurement audits to ensure that the actual execution matches the approved strategies and budgets.

Under the PPA 2007, the selection of a procurement strategy (e.g., International Competitive Bidding, National Competitive Bidding, Restricted Tendering, or Direct Procurement) is not arbitrary. The Act explicitly prescribes strict criteria and monetary thresholds that dictate which strategy an MDA must adopt. The default and legally preferred strategy is Open Competitive Bidding, designed to maximize competition and minimize collusion (Federal Government of Nigeria, 2007)**.**

B. Imo State Bureau of Public Procurement and Price Intelligence (BPPPI).

Following the success of the Federal PPA 2007, international development partners (such as the World Bank) pressured sub-national governments to domesticate the procurement reforms. Consequently, various states enacted their own procurement laws to regulate state-level MDAs and Local Government Areas (LGAs).

BPPPI was established under the **Imo State Public Procurement Law No. 12 of 2010** (and its subsequent amendments).

The Imo State BPP is tasked with ensuring that state infrastructure projects, rural road networks to urban public buildings, are procured using strategies that optimize state resources. However, the enforcement of open competitive bidding at the state level often contends with alternative procurement methods like direct labor or selective tendering, which are sometimes favored for speed but carry higher risks of inefficiency (Imo State Bureau for Public Procurement and Price Intelligence, 2026).

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Table 2.1 The Nexus between BPP Mandates, Procurement Strategy Selection, and Decision Support Tools (DSTs)

Dimension	Federal BPP (PPA 2007)	Imo State BPP	Role of Decision Support Tools (DSTs)
Primary Focus	National/International mega-projects, strict threshold enforcement.	Localized infrastructure, regional economic growth, state MDAs.	**Optimizes selection** by balancing statutory compliance with project-specific constraints.
Default Strategy	Open Competitive Bidding (Highly formalized).	Open Competitive Bidding (Frequently adjusted by local thresholds).	**Simulates risks** of alternative strategies (e.g., Design-Build vs. Traditional) to justify deviations to the BPP.
Regulatory Hurdles	Rigid administrative bureaucracy; "Certificate of No Objection" bottlenecks.	Political interference; slower adoption of innovative methods	**Standardizes data** to create objective, audit-ready justifications that satisfy BPP queries.

Source: Compiled by the author (2026)

C. The Gap between Regulatory Compliance and Strategic Optimization

A critical critique within existing literature is that both the Federal and Imo State BPP frameworks treat procurement strategy selection primarily as a legal compliance exercise rather than a strategic management decision. The regulations dictate *what* threshold triggers *which* procurement method, but they rarely evaluate whether that specific method aligns with the project's technical complexity, environmental risks, or urgent timelines.

For instance, a complex, high-risk construction project in Imo State might benefit heavily from an integrated procurement system like Design-Build (DB) or Management Contracting. However, because the BPPPI heavily favors traditional Design-Bid-Build (DBB) to satisfy open-competition metrics, stakeholders are often forced into sub-optimal procurement paths.

D. The Intersection of Decision Support Tools (DSTs) and BPP Frameworks

This is where **Decision Support Tools (DSTs)** such as Multi-Criteria Decision-Making (MCDM) models, Analytic Hierarchy Process (AHP), or artificial intelligence-driven selection matrices become vital for construction stakeholders.

1. **Rationalizing Deviations:** When a construction stakeholder determines that a non-traditional procurement strategy is best for a project, a DST provides an empirically backed, objective justification. This data-driven output can be presented to the Imo State BPP to secure approvals or waivers for alternative procurement methods.
2. **Navigating Bureaucracy:** DSTs allow stakeholders to input the rigid constraints set by the Imo State BPP (such as budget caps, local content requirements, and mandatory timelines) alongside project-specific variables (site conditions, technical complexity). The tool then filters out non-

compliant strategies, ensuring that the selected approach satisfies both the BPP's legal requirements and the project's engineering requirements.

3. **Enhancing Transparency:** A core mandate of both federal and state BPPs is the elimination of subjective bias in contract administration. By embedding a formalized DST into the initial project planning phase, stakeholders can generate transparent, auditable records showing exactly *why* a specific procurement strategy was chosen, thereby aligning perfectly with the anti-corruption spirit of the BPP laws (Ogunsanmi, 2019; Okoye, 2020)**.**

2.5 Knowledge of Decision Support Tools

DST refers to structured procedures that limit personal judgment in decision making process. It consists of formal instructions maintained within an organization that mandates decision takers to adopt a procedural objective framework based on numerical utility ranking (Rahmani, 2016). In most decision tools used in the construction industry, utility ranking method is adopted. In this approach, weights are assigned to client strategic project/procurement objectives, while the suitability of each procurement method to satisfy the strategy objectives is scored. The product of both weights and score is obtained, and the procurement strategy with highest overall utility is selected for project implementation. This method is prevalent as supported by many industry reports (RICS, 2000) and academic researches (Cheung *et al.* 2001; Love *et al.*, 2010). The tools were primarily developed to assists procurement decision-makers to obtain most suitable procurement systems based on most objective-based tool (Love *et al.*, 2010). In other words, DST aims to eliminate the use of personal bias based on subjectivity. It is vastly acknowledged that the difficulty associated with selection of an appropriate procurement strategy is unconnected with lack of decision support tools. Rahmani (2016) enthused that despite the problems encountered in this regard, several decision-making tools have developed and deployed over the years: **the Simple Rating and Knowledge Based Expert-Systems, Multi-Attribute Decision and Discriminant Analysis, Procurement-Path Decision Chart, *Decision Matrix*, PROMA, Project Acquisition Strategy Consultant (PASCON), Multi-Attribute Decision Analysis, Analytical Hierarchy Process (AHP), etc.**

2.6 The Need for the Adoption of DSTs in Procurement Strategies Selection

Development projects anywhere in the world will never succeed and will not be successfully delivered to the clients (public or private) without strict compliance with the standard procedures for selecting effective procurement method. Thus the art and science of choice of decision support models should be employed to obtain best result in procurement strategy selection. Each project is unique with its own characteristics and requirements; therefore, for a project to be successful, the procurement strategy must be carefully selected to satisfy the technical needs or objectives of the project (Alhazmi and MaCaffer, 2000). This component of the framework consists of 7 rationales extracted from the literature. This component addresses the need for adoption of DST in procurement strategy selection. The extracted rationales and their sources adopted to evaluate the dimension of the third objective of the study is shown in table 2.2

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Table 2.2: Need for the Adoption of DST in Procurement Strategy Selection (Benefits)

S/N	Rationales	Sources
1	To point a direct route through the procurement debacle.	Ratnabapathy and Rameezdeen (2007) and Love et al. (2010a),
2	To analyse the procurement problem to be solved by the procurement strategy	Ratnabapathy and Rameezdeen (2007) and Love et al. (2010a),
3	To remove the clogs super imposed by competitive advantages; one strategy has over the other	Ekung, Siriwardena and Adeniran (2013)
4	To provide statistical basis for the decision making process	Ekung, Siriwardena and Adeniran (2013)
5	To ensure that the selection is done systematically and in a closely controlled manner.	Liu (1994).
6	To limit personal judgement in procurement strategy selection decision-making process	Rahmani, (2016).
7	To allow procurement managers to analyze, and then solve their problems by: identifying and prioritizing their needs with a list of identified criteria; evaluating, rating and comparing the different solutions, and selecting the best matching solution.	Ekung, Siriwardena and Adeniran (2013)

Source: Compiled by the author (2026)

2.7 Barriers to the adoption of DSTs in procurement strategies selection

It was earlier noted that the current procurement selection is based on personal bias and subjective pessimism. Therefore, inability to overcome personal bias and subjective pessimism to overcome the challenges met in the selection of procurement using DST. Personal bias refers to as personal judgment in a study by Rahmani (2016). The study noted that by the reason of the limited knowledge possessed by stakeholders about different procurement strategies, procurement system selection is influenced by decision taker's familiarity, bias and comfortability with selected method. This in fact informs the proliferation of idiosyncrasies experienced in most developing countries construction industry contexts. Rahmani (2016) headlined lack of adequate knowledge and experience with the use of tools. Luu, Ng and Chen (2005) revealed that DSTs are laden with inherent subjectivity despite providing basis for rationalizing procurement selection. A study by Ng *et al*. (2002) showed that only two criteria (cost and time certainty) were objective in the lists

of procurement selection criteria adopted in that region. The study further highlighted subjective criteria in adopted DST model as flexibility, responsibility, quality level, risk allocation, and price. These criteria are subject to the decision-takers perception (hence, the subjectivity). Rahmani (2016) noted that effort aimed at transforming subjective criteria into quantitative measures in studies (Ng et al., 2002; Love et al. 2010a, 2010b) have not assisted to improve inherent subjectivism. A study by Ng et al. (2012) also revealed that expert subjective judgment often leads to the selection of under-performing procurement system. On the other hand, clients reported in the study by Rowlinson and McDermott (2005) were also discontented with quantitative measures used in some of the DST. As result, no one cap is deemed most suitable for all conditions, stakeholders therefore recourse more to their subjective judgment about the performance of procurement systems in their selection (e.g., of respondents in Rahmani, 2016). Lack of documented evidences of success and failure in project where these tools were used is also a significant disincentive to the optimal use of procurement selection tools.

Institutional theory exposes a broad range of issues influencing the implementation of institutional rules and by extension the implementation of DST during procurement selection. Lai *et al.* (2006) asserted that institutional theory is objective to examining the role of external pressures on firm's disposition to implement certain practices. Glover *et al.* (2014) citing foundational literature institutional literature maintained that changes to institutional norms could be due to organizational practices as culture, social environment, regulation (legal and otherwise), tradition and history, economic incentives as well as resources. The study adopts these characterizations in developing critical influences on the use of DST in procurement method selection in the global construction industry settings. According to Glover *et al*. (2013), firms also could create expectations legitimatizing logics through which "laws, rules, taken-for-granted" behaviours appear normal and enforceable. Institutional norms could be jettisoned when they are taken-for-granted and naturalized as normal practice despite the normative concerns. Thornton (2004) explained that institutional logic affects the decision of organizations by directing the attention of top management to issues and solutions perceived as unswerving with the cultural practices of firms and society despite that such logics deviates from set-out rules and norms of practices. For instance, studies reported how public procurement rules are skewed to favour political class and certain consultants and contractors endorsed by decision-makers involved in the procurement institutions. Even though organizations are suited to design rules fitting acceptable behavior (Scott, 2007), other rules normative and mimetic concerns surrounding acceptable practices are discarded and non-acceptable that must be considered (DiMaggio and Powell, 1983). In other practice, the ground rules are partially implemented or distorted to avoid external stakeholders' attention. Overall, the strength of institutional logics depends on stakeholders' pressures (Herold, 2018). Institutional theory did not only explain the postulated relationship between institutional logic and external stakeholders' pressure, but queries the structure of social choices, their formation, mediated and moderated within the institutional environment (Wooten and Hoffman, 2008). Institutional logic therefore, explains social facts (practices) institutionalized and adopted as a template for actions (Herold, 2018).

Table 2.3: Barriers to the adoption of DSTs in procurement strategies selection

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S/N	Authors	Factors
1	Rahmani (2016)	1.Inability to demonstrate value for money by their underlying criteria 2.Unfamiliarity with procedure and guidelines 3.High cost of remunerating consultants 4.Unrealistic political time frame 5.It induces changes in conventional practices 6.Cultural barriers
2	Ekung *et al.* (2013)	1. Insufficient time for procurement planning 2. Politics in construction 3. Risk of implementing newer procurement option 4. Idiosyncrasies and indolence 5. Resistant to innovation

Source: Rahmani (2016) and Ekung et al. (2013).

3.0 RESEARCH METHODOLOGY

This research was carried out in Imo State, Nigeria using a survey method. The population of the study is 395, comprising 75 quantity surveyors, 115 architects, 120 engineers and 85 builders (drawn from Imo State chapters of Nigerian Institute of Quantity Surveyors, Nigerian Institute of Architects, Nigerian Society of Engineers, and Nigerian Institute of Builders) actively involved in construction projects in Imo State.

Simple random sampling was adopted for its ability to eliminate selection bias, ensuring that every individual in the population had an equal chance to be included.

The sample size was calculated using Taro Yamane's formula as shown in equation 1

$$n = \frac{N}{(1+N(e)^2}$$

Where:

n = sample size

N = Total population size

e = margin of error (5% or 0.05)

1 = constant value

$$n = \frac{395}{(1+395(0.05)^2}$$

$$n = \frac{395}{}$$

(1+395(0.0025)

$$n = \frac{395}{(1+0.9875)}$$

$$n = \frac{395}{(1.9875)}$$

n = 199

To measure the respondents' perceptions regarding the research variables, a structured questionnaire was utilized. The instrument employed a 5-point Likert scale to capture the intensity of responses. The scale is structured with a neutral midpoint to prevent forced choices and minimize bias. The responses are assigned the following weights for quantitative analysis:

5 – Strongly Agree (SA), 4 – Agree (A), 3 – Neutral (N), 2 – Disagree (D), 1 – Strongly Disagree

The research instrument was given to two experts for face-validation. These experts were requested to read and vet the instrument for clarity and suitability. The suggestions and corrections from these experts were incorporated in the final copy of the instrument that was used for the study to ensure the instrument measured what it was designed to measure.

To evaluate the internal consistency, stability, and reliability of the data collection instrument, a Cronbach's Alpha reliability test was conducted across the three (3) distinct objective clusters of the questionnaire using a sample size of 169 respondents (N = 199).

Table 3.1 Reliability test of instrument

S/n	Objectives	Cronbach's Alpha Value	Sum of Factors
OBJ1	To assess the level of stakeholders' knowledge regarding the decision support tools available for the selection of procurement strategies in the construction industry.	0.752	**7**
OBJ2	To determine the level of use of these decision support tools in the selection of procurement strategies in construction project delivery in the study area.	0.747	**7**

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S/n	Objectives	Cronbach's Alpha Value	Sum of Factors
OBJ3	To assess the barriers to the use of decision support tools in the selection of procurement strategies in the study area.	0.719	**11**

Source: Data analysis by the author (2026).

AS shown in Table 3.1, the field instrument was statistically validated as highly reliable, structurally stable, and capable of producing consistent replication. Consequently, the gathered data possessed the required metric integrity to proceed to descriptive ranking analysis and non-parametric inferential testing without the risk of scale distortion.

Descriptive statistics comprising frequencies, percentages, mean score analysis, and relative importance index were used to analyse the data. One-Sample Wilcoxon Signed-Rank Test was utilized to test the research hypothesis. This analytical framework ensured that the findings were both valid and actionable.

The Relative Importance Index (RII) was calculated using the formula:

RII = $\sum$**W/A***N

Where

W = the weight assigned to each variable by the respondents

A = highest weight (which is 5 in this research)

N = the total number of respondents

A significance baseline of 3.00 on 5-point Likert scale equates to an RII of 0.60 (3/5). In accordance with established academic framework thresholds, factors achieving an RII score of 0.60 or higher are classified as having moderate-to-high significance and are retained for further discussion, while factors below 0.60 are deemed scientifically insignificant and excluded.

ANALYSIS AND RESULTS

4.1 Questionnaire Distribution

Table 4.1 gives a breakdown of the questionnaire response rate. 199 questionnaires were distributed, 169 were retrieved (all fit for analysis), accounting for 84.92 percent of the total distributed questionnaires.

Table 4.1 Breakdown of distributed questionnaire

Questionnaire	Frequency	Percentage (%)
Number administered	**199**	**100**

Number retrieved	**169**	**84.92**

Source: Data analysis by the author (2026).

4.2 Respondents' Characteristics

Data related to 6 variables were evaluated to characterize the respondents' suitability to provide valid opinion about the use of Decision Support Tools. The result presented in Table 4.2 reveals that over 62 percent of the respondents are holders of first degree and its equivalent –Higher National Diploma (HND). In the sample also, over 37 percent have postgraduate degrees (MSc and above). This level of education is adequate, and showed that the respondents are educationally qualified in the areas of design, building, engineering and quantity surveying. The respondents are more of quantity surveyors than architects, while population of architects is also more than population of engineers, population of engineers is more than that of builders. The result portrays that more quantity surveyors participated in the study; this group of respondents possess the appropriate expertise for procurement management.

The result on the years of experience shows that over 78 percent of respondents have more than 10 years of experience, this number of years in the industry practices put the respondents in suitable position to advance useful knowledge in the research subject. 35.5 percent of the respondents are consultants, 29.6 percent are in the contracting sector, 26 percent represents public clients while 8.9 percent represent private clients. The data obtained from the survey are largely emanating from building projects (85.5 percent), and to some extent, civil engineering projects data contributed to the survey (14.2 percent)

Table 4.2 Characteristics of Respondents

Variables	No	Percent	Variables	No.	Percent
Level of education			**Professional bodies**		
HND	80	47.3	NIA	43	25.4
BSc	26	15.4	NIOB	37	21.9
Msc and above	63	37.3	NIQS	50	29.6
Total	169	100	NSE	39	23.1
			Total	**169**	**100**
Positions of respondents in projects			**Years of experience**		
Architects	43	25.4	1-5 years	5	3.0
Builders	37	21.9	6-10 years	31	18.3
Quantity Surveyors	50	29.6	11-15 years	35	20.7

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Engineers	39	23.1	16-20 years	68	40.2
Total	**169**	**100**	21 years and above	30	17.8
			Total	**169**	**100**

Category of firms			**Type of project**		
Consultancy	60	35.5	Building	145	85.5
Contracting	50	29.6	Civil Eng.	24	14.2
Private client	15	8.9	**Total**	**169**	**100**
Public client	44	26.0			
Total	**169**	**100**			

Source: Data analysis by the author (2026).

4.3 Stakeholders' Level of Knowledge of Decision Support Tools (Objective 1)

Descriptive Statistics

In accordance with the established methodology, a mean score threshold of **MS ≥ 3.00** was adopted as the benchmark for statistical significance. A mean score at or above 3.00 indicates a significant/high level of knowledge, while a score below 3.00 indicates an insufficient level of knowledge

Interestingly, the empirical evidence in Table 4.3 below contradicts the assertion of Rahmani (2016) that lack of adequate knowledge and experience of Decision Support Tools is the cause of low decision support tool adoption/usage. Since stakeholders' knowledge across all the seven identified DSTs is mathematically verified as significant (MS ≥ 3.00), the ongoing reliance on intuitive selection methods must be attributed to external operational or institutional barriers rather than technical ignorance. This directly supports the necessity of the subsequent analysis under Research Objective Two.

Table 4.3 Stakeholders' Level of Knowledge of DSTs

DSTs	N	Minimum	Maximum	Mean	Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic
Analytical Hierarchy Process (AHP)	169	1	5	3.60	1.241	1.540
PROMA - A Decision Support System	169	1	5	3.45	1.349	1.820
Multi-Attribute Utility Theory (MAUT)	169	1	5	3.60	1.250	1.562

Weighted Scoring System	169	1	5	3.60	1.156	1.337
Project Acquisition Strategy Consultant (PASCON)	169	1	5	3.43	1.271	1.616
Decision Matrix	169	1	5	3.69	1.151	1.324
Procurement Selection by the Application of Delphi Method	169	1	5	3.60	1.221	1.491
Valid N (listwise)	169					

Source: Data analysis by the author (2026).

4.4 Frequency Level of Usage of Decision Support Tools (Objective 2)

Descriptive Statistics

The descriptive analysis presented in Table 4.4 reveals an absolute trend of low DST utilization across the active research environment, evidenced by a poor Group Composite Mean of 2.24. Crucially, zero (0) out of the seven identified DSTs managed to cross the 3.00 significance benchmark, indicating that underutilization is systemic and completely uniform across all decision-making frameworks.

The empirical findings demonstrate a clean and undeniable **"Knowledge-Usage Gap"** within the study area. While stakeholders possess a statistically significant theoretical understanding of decision support architecture (MS = 3.57 from Objective One), their practical operational adoption rate is uniformly deficient (MS = 2.24).

This massive divergence is a mathematical validation for the first Null Hypothesis, confirming that there is no significant level of continuous usage of DSTs in active procurement strategy selection. Consequently, this bottleneck proves that the choice of project delivery methods within the study area is entirely reliant on intuitive, non-empirical, and unquantified parameters.

Table 4.4 **Frequency Level of Usage of DSTs**

DSTs	N	Minimum	Maximum	Mean		Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic
Analytical Hierarchy Process (AHP) 2	169	1	5	2.22	.096	1.251	1.565
PROMA - A Decision Support System 2	169	1	5	2.14	.088	1.141	1.301
Multi-Attribute Utility Theory (MAUT) 2	169	1	5	2.03	.085	1.104	1.219

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Weighted Scoring System 2	169	1	5	2.29	.092	1.202	1.445
Project Acquisition Strategy Consultant (PASCON) 2	169	1	5	1.97	.092	1.197	1.434
Decision Matrix 2	169	1	5	2.34	.098	1.277	1.632
Procurement Selection by the Application of Delphi Method 2	169	1	5	2.71	.108	1.399	1.957
Valid N (listwise)	169						

Source: Data analysis by the author (2026).

4.5 Barriers to the Adoption of Decision Support Tools (Objective 3)

Descriptive Statistics

11 perceived barriers to the use of Decision Support Tools were extracted from the literature section and presented to respondents for validation. The data shown in Table 4.5 proves that the underutilization of Decision Support Tools in Imo State is heavily driven by a combination of institutional, cultural, and operational barriers, evidenced by a high Group Composite Mean of **3.70**. Every single one of the 11 identified barriers scored well above the 3.00 significance baseline: changes in conventional practices (1st), Politics in construction (2nd). While the items were ordinally ranked based on mean scores, the averages fell within a highly narrow band (3.53 to 3.89) alongside a relatively high individual variance. Therefore, these rankings indicate slight descriptive trends rather than definitiveness.

The empirical evidence provided by this analysis systematically strengthens the positions of Ekung *et al.* (2013) who argued that politics in construction, idiosyncrasies and indolence, cultural barriers, phobia of non-performance risk, and insufficient time for procurement planning are constraints to the use of DSTs. This research result also absolutely aligns with the assertion of Cartlidge (2018)**,** that in most cases, projects are tailored to existing practices without due regards to the varying contexts and characteristics of individual projects, in order to avert the risk of failure in the use of emerging procurement system, thereby resolving the core paradox of this paper. While the stakeholders possess conceptual knowledge of these tools, they are structurally paralysed by the disruption these tools cause to convention (MS = 3.89) and the political realities of local construction execution (MS = **3.82)**.

Table 4.5: Barriers to the Adoption of DSTs

S/N	Identified Barrier Factor / Constraint	N	Min	Max	Mean	Std. Error	Std. Dev	Variance	RII	Rank
1	Inability to demonstrate value for money by their underlying criteria	169	1	5	**3.59**	0.089	1.157	1.339	0.718	**10th**
2	Unfamiliarity with procedure and guidelines	169	1	5	**3.67**	0.08	1.044	1.09	0.734	**7th**
3	High cost of remunerating consultants	169	1	5	**3.62**	0.09	1.165	1.357	0.724	**9th**
4	Unrealistic political time frame	169	1	5	**3.53**	0.093	1.205	1.453	0.706	**11th**
5	It introduces changes in conventional practices	169	1	5	**3.89**	0.089	1.162	1.35	0.778	**1st**
6	Cultural barriers	169	1	5	**3.71**	0.097	1.255	1.576	0.742	**4th**
7	Insufficient time for procurement planning	169	1	5	**3.79**	0.099	1.292	1.669	0.758	**3rd**
8	Politics in construction	169	1	5	**3.82**	0.094	1.228	1.508	0.764	**2nd**
9	Risk of Implementing newer procurement option	169	1	5	**3.69**	0.088	1.139	1.298	0.738	**5th**
10	Idiosyncrasies and Indolence	169	1	5	**3.69**	0.098	1.277	1.631	0.738	**6th**
11	Resistance to Innovation.	169	1	5	**3.67**	0.092	1.193	1.423	0.734	**8th**
	Valid N (listwise)	**169**								

Source: Data analysis by the author (2026).

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4.6 Inferential Statistics (Hypothesis Testing of Objective 3) – One-Sample Wilcoxon Signed-Rank Test

- **Null Hypothesis:** The implementation of decision support tools during procurement strategies selection decision making in the research environment is not constrained by established significant problems (i.e., the population median agreement score of the barriers is statistically equal to or less than 3.00).

To test this hypothesis, a One-Sample Wilcoxon Signed-Rank Test was conducted. The test compared the observed median agreement scores for the eleven (11) identified barrier variables against a hypothesized neutral threshold median of **3.00**, using data from the 169 surveyed construction professionals (N=169). The decision rule requires that the null hypothesis be rejected if the asymptotic significance value (p-value) is less than 0.05.

Table 4.6: One-Sample Wilcoxon Signed-Rank Test Results for Barriers to the Adoption of DSTs

S/N	Identified Barrier / Constraint Factor	Observed Median	Standardized Test Stat. (Z)	Asymp. Sig. (p-value)	Statistical Decision (p<0.05)
1	Inability to demonstrate value for money	4.00	5.578	.000	Reject Null (Significantly Higher)
2	Unfamiliarity with procedure and guidelines	4.00	6.868	.000	Reject Null (Significantly Higher)
3	High cost of remunerating consultants	4.00	5.832	.000	Reject Null (Significantly Higher)
4	Unrealistic political time frame	4.00	5.063	.000	Reject Null (Significantly Higher)
5	It introduces changes in conventional practices	4.00	7.755	.000	Reject Null (Significantly Higher)

S/N	Identified Barrier / Constraint Factor	Observed Median	Standardized Test Stat. (Z)	Asymp. Sig. (p-value)	Statistical Decision (p<0.05)
6	Cultural barriers	4.00	6.469	.000	Reject Null (Significantly Higher)
7	Insufficient time for procurement planning	4.00	6.679	.000	Reject Null (Significantly Higher)
8	Politics in construction	4.00	7.097	.000	Reject Null (Significantly Higher)
9	Risk of Implementing newer procurement option	4.00	6.519	.000	Reject Null (Significantly Higher)
10	Idiosyncrasies and Indolence	4.00	6.322	.000	Reject Null (Significantly Higher)
11	Resistance to Innovation	4.00	6.184	.000	Reject Null (Significantly Higher)

Source: Data analysis by the author (2026).

- **Results / Interpretation**:

As shown in Table 4.6, every single one of the 11 identified barriers returned an asymptotic significance value (p-value) of **.000**. Because these values are far below the standard academic threshold of 0.05, SPSS issued a definitive decision to ***"Reject the null hypothesis"*** **across all test fields.**

The **Standardized Test Statistics (Z) are entirely positive and exceptionally high**, spanning from +5.063 up to +7.755. Combined with an observed sample median of **4.00** (Agree) across all rows, this confirms that the population medians sit significantly and heavily above the neutral 3.00 baseline.

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The inferential statistical test provides clear proof that the implementation of decision support tools is actively blocked by severe structural, organizational, and behavioural issues.

Therefore, the Alternative Hypothesis is accepted, and the Null Hypothesis is rejected. It is mathematically concluded that the deployment and institutional integration of decision support tools during procurement strategy selection within the study area is significantly and uniformly constrained by these established industry problems.

5.0 SUMMARY, CONCLUSION AND RECOMMENDATON

5.1 Summary of Findings

i. Since stakeholders' knowledge across all the seven identified Decision Support Tools is mathematically verified as significant, as seen in table 4.3, there is a significant level of knowledge/awareness of decision support tools for procurement strategies selection decision making among construction stakeholders in Imo State.
ii. Stakeholders in Imo State possess statistically significant theoretical understanding of Decision Support Tools, but their practical operational adoption rate, as seen in table 4.4, is uniformly deficient.

iii. Eleven identified factors affecting the use of Decision Support Tools were extracted from the literature section and presented to respondents for validation, every single one of the 11 identified barriers was validated, as shown in table 4.5, confirming instead that the practical implementation of decision support tools in the research environment is heavily constrained by established, statistically significant problems. The study identified Introduction of Changes in Conventional Practices as the most critical factor, followed by Politics in Construction.

5.2 Conclusion

In conclusion, this research highlights a significant divide between knowledge of Decision Support Tools and actual industry practice among construction stakeholders in Imo State. Procurement system selection is influenced by decision taker's bias, conformity, and comfortability with conventional method. Stakeholders have the necessary knowledge of the available Decision Support Tools, yet adoption remains deficient due to personal bias, institutional preference for conventional strategies and underlying political factors.

Moving forward, the state's construction sector must actively transition from theoretical consensus to practical deployment by enforcing transparent, tool-based strategies that successfully counter personal bias, political interference and outdated traditional methods.

5.3 Recommendations

The following recommendations will address the key finding of the research:

i. Imo State House of Assembly should review and amend the Imo State Public Procurement Law to explicitly codify the mandatory use of objective DSTs in state high-value infrastructural projects procurement decision making to avoid political subjectivity.
ii. Imo State Bureau of Public Procurement (IMSBPP) should establish phased mandatory thresholds for high value projects.
iii. Professional institutions (like NIQS, NIA, NSE, NIOB) should organize mandatory training workshops to help stakeholders unlearn rigid conventional methods and transition to the adoption of DSTs in procurement strategies selection decision making.
iv. The state ministry of works should intitutionalise these existing tools, bypassing intuitive and politically vulnerable selection methods.

5.4 Contribution to Knowledge

Although there are several studies on procurement methods, this study significantly advances knowledge in construction procurement management by demonstrating that numerous Procurement Decision Support Tools exist, but they have practical limitations in the face of socio-political realities in the research area.

It highlights that the rigid adherence to traditional and 'rule-of-thumb' methods in Imo State acts as a powerful counterforce to existing DSTs.

5.5 Suggestions for Further Studies

i. Comparatively analyse the barriers to Decision Support Tool (DST) adoption between public and private construction clients in Southeast Nigeria.
ii. Develop a framework for embedding construction procurement Decision Support Tools (DSTs) into Imo State Procurement laws.
iii. Evaluate change management strategies for overcoming socio-political limitations in the use of Decision Support Tools in procurement methods selection among construction stakeholders in Imo State.

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