

EFFECT OF SELECTED PROCUREMENT SYSTEMS ON BUILDING PROJECT PERFORMANCE IN NIGERIA

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Abstract

Every client at the beginning of any project aims at having value for the money spent via a quality structure delivered on time and within budget by the contractor. However, researches have shown that in most cases this aim is not met. Therefore, this study examines the effect of procurement systems on building project performance in Nigeria, with a view to assess their effect on cost and quality. The data for this study were collected with the aid of structured questionnaires which were administered to actors in the construction industry in Lagos state being the major hub of construction activities in Nigeria. The questionnaires were related to the variants of procurement systems common to the Nigerian construction industry. Data analysis was done using descriptive statistics. The result revealed that the traditional system of procurement is the most adopted option in project execution in Nigeria. Meanwhile, design and build system performs better in cost, but lag construction management system in quality achievement. The study concluded that no procurement system is a do it all in that a procurement system may perform better than the other in an instant and fail in others as revealed in the findings. The study finally recommends that consultants and other stakeholders in the construction industry and particularly those in the building sector should be up to date as to be able to suitably advise clients when it comes to building procurement, and that before choosing a procurement system the main objective and even supporting objectives should be established.

Keywords: *Building project, Construction management, Design and build, Nigeria, Procurement*

1.0 Introduction

Project procurement has been described as an organized methods or process and procedure for clients to obtain or acquire construction products [1]. The procurement of construction project is vast in scope because it involves the gathering and organizing of myriads of separate individuals, firms and companies to design manage and build construction products such as houses, office buildings, shopping complex, roads, bridges etc. for specific clients or “customers”. Masterman [2], described project procurement as the organizational structure needed to design and build construction projects for a specific client. It is in a sense very true because the process of “obtaining” a building by a client involves a group of people who are brought together and organized systematically in term of their roles, duties, responsibilities and interrelationship between them.

Apart from the traditional approach, there are now other “fast-tracking” or innovative procurement systems used by the construction industry worldwide. The different procurement systems differ from each other in term of allocation of responsibilities, activities sequencing, process and procedure and organizational approach in project delivery. These differences have invariably affected the project performance. Project performance has been defined as “the degree of achievement of certain effort or undertaking” [3]. It relates to the prescribed goals and objectives which form the project parameters [4]. From project management perspective, it is all about meeting or exceeding stake holders’ needs and expectations from a project. It invariably involves placing consideration on three major project elements i.e. time, cost and quality [3].

There are many other factors that determine project success, but the focus of this research is on the two critical parameters of project performance i.e. cost and quality. The aim of this research is to assess the effect of the different procurement systems on project performance. Since there are many different project procurement systems, it is appropriate for the purpose of this research to limit it to the common ones practiced here in Nigeria i.e. traditional system, design and build, management contracting, and construction management.

2.0 Literature Review

The Nigeria construction industry is modeled after the British system being our colonial master, although, since independence in 1960, it has incorporated the styles of other European countries, such as Italy, Germany and France [5]. This industry is of paramount importance for employment and economic growth [6]. The Nigerian construction industry forms nearly 70% of the nation's fixed capital formation [7], yet its performance within the economy has been, and continues to be, very poor. For example, the Nigerian construction industry's contribution to employment has remained consistently at 1.0% over the last decade against the World Bank's average observation of about 3.2% in developing countries [8]. The traditional design-bid-build system of procurement is still dominant in the Nigerian construction sector and this may likely continue to be the trend. In addition, the Nigerian construction sector comprises the clients, contractors, subcontractors, suppliers, and key professional actors responsible for design and supervision of projects. The professionals includes architects, engineers (structural and services), and Quantity Surveyors. There are professional bodies that regulate the activities of these professionals.

Delay in project execution is a major problem in the Nigerian construction industry. This occurs both in small and large projects. Virtually, all the projects executed over the years in Nigeria were faced with problem of delay in delivery. Odeyinka and Yusuf [9] observed that seven out of every ten projects suffer delay in Nigeria. Nigerian construction industry is faced with problem of cost overrun. Ogunsemi and Jagboro [6] noted that one of the most serious problems the Nigerian construction industry is faced with is the project cost overrun, with attendant consequence of completing projects at sums higher than the initial sum. Therefore, working with realistic project estimate is necessary at the outset of a project work, which would eliminate uncertainty and as well provide a platform for project success. Idrus and Sodangi [8] also observed that the last decade has however exposed the declining level of clients' satisfaction from the built facilities as a result of poor quality performance in addition to the perennial problems of time and cost overruns in the Nigerian construction industry.

The Nigerian construction industry continues to occupy an important position in the nation's economy even though it contributes less than the manufacturing or other service industries, [10]. This industry plays an important role in the economy, and the products of its activities are so vital to the achievement of national socio-economic development goals of creating job opportunities and social amenities and infrastructures [11].

2.1 Construction Project Performance

Performance has been described as "the degree of achievement of certain effort or undertaking" [3]. It relates to the prescribed goals or objectives which form the project parameters [4]. From project management perspective, it is all about meeting or exceeding stake holders' needs and expectations from a project. It invariably involves placing consideration on three major project elements i.e. time, cost and quality [3]. Yates and Eskander [12] defined a successful project as a project that has been completed on schedule, within budget, within scope and satisfied the required quality.

Project performance remains a prominent issue in project delivery because projects involve defined objectives which must be achieved and numerous resources which need to be efficiently

utilized. Robinson, Anumba, Carillo & Al-Ghassani, [13] emphasized the need to develop and use tools for performance measurement and Ling & Chan [14], Thomas, Macken, Chung, & Kim, [15], Naoum, Fong, & Walker, [16] and Josephson & Lindstrom [17] developed numerous parameters for measuring project performance. Josephson and Lindstrom [17] identified 250 parameters while Ling [18] evaluated 70 potential factors for measuring project performance. These parameters can be classified into two broad categories namely: subjective and objective parameters. Ling [18] stated that the performance of a project is multifaceted and may include unit cost, construction and delivery speeds and the level of clients' satisfaction. Pinto and Slevin (1998) classified project performance parameters into (1) internal factors which are project variables namely: schedule, cost and quality and (2) external factors which are concerned with stakeholders' satisfaction with the performance of a project and the perceived impact on organisation's effectiveness. Ling, Chan, Chong, & Ee, [19] identified two categories of indicators of project success namely: product success which consists of measures of achievement of quality standards and process success which is made up of variables that measure the achievement of time and cost.

On stakeholders' satisfaction, clients remain the most important stakeholder when considering project performance. Neto, Mourao, Ferreira de Freitas & Aves, [20] stated that matching or exceeding the client's expectations result in a satisfied client. They opined further that this can reflect on how loyal a client becomes to a provider or a brand and result in higher sales volumes, lower levels of sensitivity to price and generates positive comments about the provider and the brand. Clients' satisfaction can be measured from several perspectives [21], however time, cost and quality have remained the most prominent in research studies. Josephson and Lindstrom [17] maintained that project goal which considers clients' goals, is measured from several perspectives but the main aim is to stimulate clients to identify and clearly present their goals and to stimulate all managers involved to inform and remind all individuals of the goals. Hatush and Skitmore [22] maintained that success in a project is generally operationalized into time, cost and quality.

Michell, Bowen, Cattell, Edward & Pearl, [23] remarked that the primary concern of construction clients is that their projects are completed within budget, on time and at the required level of quality. On objective measurement of project outcome, two parameters namely: schedule and cost: are common with research studies. Michell, Bowen, Cattell, Edward & Pearl, [23] identified time and cost as the principal factors. The third parameter (quality) is not a common objective parameter in research studies because as Vincent and Joel [24] put it: stakeholders see the goal of quality management as customer satisfaction. From the perspective of previous studies, two parameters namely: time-overrun and cost-overrun remain the prominent indicators of objective measurement of project outcome. However, these two parameters have their limitation because their values rely on the initial contract period or cost of a project.

Construction project performance is influenced by many factors due to the interactions and interrelationships of the stakeholders. A construction project is commonly acknowledge as successful, when it is completed on time, within budget, profitability to contractors, absence of claims and court proceeding and "fitness for purpose" for occupiers have also been used as measures of project [25]. In developing countries, poor project performance has been attributed to inadequate mechanisms and systems for: Land allocation, funding, mortgage institutions, infrastructure, procurement systems etc. Project delivery is also affected by the poor performance of the construction industry as reported in literature [26-29, 5].

The poor performance associated with small to medium sized indigenous contractors include protracted delay in payment for work done, lack of capital, high fluctuations in work load, inadequate resources, technical expertise, managerial skills and other items. According to Yng, Lean, Wai, Ping and Min [30], project owners', contractors', and consultants' characteristics, procurement systems and other factors affect project performance. Cost and quality are among the major consideration throughout the project management life cycle and can be regarded as one of the most important parameters of a project and the driving force of project success. Morris and

Hough [31] examined the records of more than 4000 construction projects and found that projects rarely finished within the allocated budget and to specification. Despite their proven importance, it is not uncommon to see a construction project failing to achieve its objective within the specified cost and quality. Cost overrun can be simply defined as when the final cost of the project exceeds the original estimates [32]. Most of the significant factors affecting project costs are qualitative such as client priority on construction time; contractor's planning capability, procurement methods and market conditions including the level of construction activity [33].

2.2 Factors Influencing Choice of Procurement System

The following criteria were used to examine client requirements and experts preferences for the performance of each procurement method as cited in [34-37] suggest employing the following criteria to establish a profile of the clients requirements: speed (during both design and construction); certainty (price and the stipulated time and knowledge of how much the client has to pay at each period during the construction phase); flexibility in accommodating design changes; quality (contractors reputation, aesthetics and confidence in design); complexity (client may specify particular subcontractor, or buildability analysis); risk allocation/avoidance; responsibility (completion of program, price, product quality, design and construction); price competition (covering such issues as value for money, maintenance costs and competitive tendering); and disputes and arbitration.

Similarly, Arazi I., Mahmoud S. and Mohamad H.H. [38] analyzed project performance criteria using severity index method as follows; Construction cost; Construction time; Quality of finish project; Occupational health and safety; Level of technology; Environment friendliness; Contractor's flexibility; Labour dependency; Quality of coordination by construction team; Contractor's project management and Contractor's capacity of manpower.

2.3 Project Procurement Systems

Procurement systems have become an important issue in the construction industry because of two reasons. Firstly, the procurement of construction projects involves a series of processes that are interrelated and sequential. The effectiveness and efficiency of the processes have considerable impact on the success or failure of projects. Secondly, there are several procurement methods that are available for a developer to adopt in procuring a project. For this reason, one major challenge that the project developer faces is the method to adopt among the available procurement options [1]. Ogunsanmi and Bamisele [39] and Ashworth and Hogg [1] defined procurement method as the management of the total process involved in construction project delivery. It is also ways in which a client or a sub-client may procure a building or other construction work varied and complex. According to [1], different variants of procurement are available for meeting different clients' needs and projects specifics. A number of factors have to be taken into account in determining the best method for a specific project. The variants of procurement methods available today metamorphosized from the need to improve construction project delivery, that is, project completion within budget and time.

Daniel [40] emphasized that procurement methods is on optimizing all parameters involved in project delivery namely, time, cost and quality. Procurement of projects within these constraints has continued to be a challenge to the design team, the contractors, and managers of investments [41]. Traditionally, construction projects starts with the client's brief on which designs are based. The Architect and engineers prepare designs, in collaboration with quantity surveyor who advises on the cost implications of design variables. Tender process afterwards produces the contractor for the execution of the work. On the award, the successful contractor executes the work as designed under the supervision of the consultants. Thus, the approach separates the design, tendering process and construction as separate tasks. This separation of

activities also led to sequencing of activities in which design is completed before construction commences.

This became the traditional' sequence and it is now referred to as Design-Bid-Build [40]. Other variants of procurement method not following this format became the 'non-conventional' procurement method. Concepts of project delivery have been developed to compress the time required to realize a constructed facility which focuses on simplifying the project delivery process, with emphasis on optimizing the parameters (e.g. quality, cost, time of completion, meeting market needs, and safety among others). In non-conventional procurement methods, the grounds are gradually shifting from just meeting clients' needs into apportionment of risk, as the contractors are gradually taking their stance as business organizations with the aim of making optimum profits at the minimum risk, and this has led to the development of integrated methods of procurement which are hybrids of both traditional and non-conventional procurement methods [1, 42-44], classified construction procurement methods into two broad categories as: traditional procurement method, and non-conventional procurement method.

2.4 Traditional Procurement System

According to Seeley [43]; and Kadiri and Odusami [45] The main variants of traditional procurement method are: bills of firm quantities; bills of approximate quantities; drawings and specification; schedule of rates; cost reimbursement; and labour only. The traditional method as the name implies, is a project procurement method where the three sequential phases of design, bid and build are identified as separate tasks. It is traditionally referred to as the competitively bid contract. This method allows for all contractors that fill competent to bid for projects in a free and competitive atmosphere similar to competitive market environment. In a typical traditional approach, the client initiates the project and produces a written scope statement, identifying the project's objectives and verifying the scope definition by the architect. The architect is responsible for defining the project scope in order to facilitate a clear assignment of responsibilities and to monitor the scope change control with the project team. The design team produces complete design documents before engaging the contractor, often affecting the quality by not taking into consideration build- ability, constructability and life-cycle costing.

Certain conditions warrant the use of Traditional procurement as opined by Turner, [46] these include when:

- A programme allows sufficient time;
- Consultant design is warranted;
- A client wishes to appoint designers and contractors separately;
- Price certainty is wanted before the start of construction;
- Product quality is required; and
- A balance of risk is to be placed between the client and constructor.

2.5 Design and Build

This approach gives the client a single point of contact. However, the client commits to the cost of construction, as well as the cost of design, much earlier than with the traditional approach. In this method, the contracting organization is responsible for design and construction [44]. In this system of procurement, all phases of a project, from conception through design and construction are handled by the same organisation. This form of procurement has been used for the majority of process-oriented heavy industrial project. Projects using a design-build approach are designed and constructed by a single company or a partnership of companies. Several varieties of Design-Build have evolved including Design-Build-Maintain, Design-Build-Operate-Maintain, and Design-Build-Operate-Maintain-Warrant. Each version of Design-Build provides the government or owner with one source of responsibility for the project. Design-build can be specified in many different ways based on the magnitude of the project.

2.6 Management Contracting

According to Seeley [19], Management contracting is a system whereby a main contractor is appointed, either by negotiation or in competition, and works closely with the team of professionals. Also, Oyegoke [47] opined that “in a management contract, the permanent works are constructed under a series of construction contracts placed by the management contractor after approval by the client.” All physical construction is undertaken by sub-contractors selected in competitive bidding. This system usually has the main contractor called the management contractor who provides the management expertise in the construction of the project for a fee. This Manager is appointed at the inception or better still feasibility stage to join the client’s team of consultants, to help work out the design programme and site operations. He manages and coordinates the work packages to individual sub-contractors and equally provides on the site service, plant and equipment, amenities etc for the work. The fee paid to the management contractor depends on the nature and extent of the work done and not on the cost of the work.

However, management contracting system is most appropriate for large and complex projects which exhibit particular problems that militate against the employment of fixed price contract procedures. Typical examples of which are: Projects for which complicated machinery and / heavy equipment are to be installed concurrently with the building works; Projects for which the design process will of necessity continue throughout most of the construction periods; Projects on which construction problems are such that it is necessary or desirable that the design and management team includes a suitably experienced building contractor appointed on such a basis that his interests are largely synonymous with those of the employer’s professional consultants.

Though, there is a wide range of views as to the best procedures to be adapted in management contracting [43], but they usually incorporates the following activities and requirement: The management contractor is precluded from carrying out any of the physical works using directly employed labour; His role is primarily that of a planner, manager and organizer; The works are divided into packages agreed by the professional team and the management contractor as being most appropriate for the particular projects; The management contractor provides from his own resources the following: Site supervisor, technical and administrative staff to run the contract.

2.7 Construction Management

Construction management is that group of services over and above the normal Architectural and Engineering services related to the construction programme executed during the pre – design, design and construction phases, that contribute to the control time, cost and quality of new facility. Professional construction management treats the project planning, design, and construction phases as integrated tasks. This approach unites a three –party team consisting of owner, designer, and construction manager in a non-adversary relationship, and it provides the owner with an opportunity to participate fully in the construction process [41]. Construction Management is a fee-based arrangement in which the construction manager is responsible exclusively to the owner and acts in the owner’s interest at every stage of the project. He offers advice on: the optimum use of the available funds, control of the scope of work, project scheduling, avoidance of delays, changes and disputes, enhancing project design and construction qualities, and optimum flexibilities in contracting and procurement [48]. A prime construction contractor or funding agency may also be part of the team. The team works together from the beginning of design to project completion, with the common objective of best serving the owner’s interest.

Construction Management Under a construction management approach, professional expertise in the specialized areas of systems analysis, value engineering, "construct-ability" review, activities scheduling, procurement systems, and construction coordination and supervision is added to the capabilities of the traditional project team of client and architect. The involvement of a Construction Manager during the entire design process as a collaborative yet independent

member of the professional team helps ensure that every major design decision is balanced by proper analysis of its cost consequences, and impact on project schedule [48].

The role of the construction manager on a building project may vary substantially, and can be performed under a variety of contractual terms. The most traditional or purest form of construction management is that where the Construction Manager acts as the client's agent as a professional consultant, providing estimating, cost control and scheduling services and undertaking administrative responsibilities during construction. Under this arrangement, all construction contracts are executed directly between the owner and contractors. The approach permits the construction work to be broken down into a number of trade contracts thereby eliminating the need for one or more "general" contractors. The elimination of the general contractor avoids a duplication of fees, cost mark-ups and general conditions costs otherwise incurred by the client.

2.8 Project Cost and the Effect of Certain Procurement System

Cost has been defined as the degree to which the general conditions promote the completion of a project within the estimated budget [49]. It covers overall costs incurred from project inception to completion. This highlights the importance that has to be attached to every project management activity carried out through every stage of the project development up to completion. [50] also argues that cost is not only confined to the tender sum and that it is the overall cost that a project incurs from inception to completion, which includes any cost arising from variations, modifications during construction period. These cost variables give indication of certain additional practices that when engaged in during the project management process would have both direct and indirect implications for the project cost performance.

The number and manner in which variation orders are issued by consultants during construction is an important practice to look at. Clients who often engage in the habit of agitating for numerous design changes before practical completion also play great role in the influences on project cost. The way contractors respond to variation orders may also have implications for the project performance. In predicting the performance of design-build and design-bid-build projects, [19] identified certain variables that affect cost performance. These include: the number of repetitive elements contained in a project, the extent of design completion when bids are invited, and the level of paid up capital of contractors engaged. These variables bring to bear certain related practices that may affect the performance of project cost. For instance the kind of procurement method usually adopted by clients; traditional procurement or design and build will determine the extent of completion of designs to be used for bidding. Moreover the kind of project consultants selected by clients for design of a particular kind of project will also have influence on the way the design will be made (i. e. whether repetitive elements will be brought into the design or not).

The attitude of client towards the project cost will also determine whether he or she will adhere to the advice given by designers concerning the cost advantage of having repetitive elements in designs. How contractors are usually selected (i. e. always selecting through competitive tendering or negotiated tendering) will also determine the kind of contractors that are employed to execute the projects. The presence of certain features within a particular contract also goes a long way to determine the kind of contractors that would tender for the job and eventually win. For instance the availability of certain facilities (such as payment of advance mobilization by client) within a given building contract may attract contractors who have low level of paid up capital or low level of ability to pre-finance a project. The level of financial capability of the winning contractor would have bearing on project performance.

2.9 Project Quality and the Effect of Certain Procurement System

Construction quality is defined as “the totality of the features required to satisfy a given need; fitness for purpose. The extent to which projects are monitored, the experience of project consultants, quality and past performance record of contractors and the number of variation orders issued all have effect on quality. How all these factors can be competently coordinated would be relevant to achieving satisfactory quality performance. The project management team leader has the responsibility to ensure that these factors combine well to yield good quality performance.

Quality performance has been considered as a function of the procedures adopted during the construction process [51]. Those procedures comprise the concept of procurement form and the method of tendering. The fragmented nature of the construction industry and the fact that every building project is unique places great responsibility on the project management team in setting up the building process that will bring the project to a successful conclusion. The emphasis here is on process and procedures having influence on quality of a building project. The subsequent issue that arises is how often project managers, having a sense of the uniqueness of every project, tailor certain procurement practices to correspond with the uniqueness of a project in order to yield good quality performance. Some of the procedures to be given recognition may therefore include the selection procedure of organizations required to perform the design and supervision and those responsible for the construction of the particular project too. Usually, the construction team would be appointed under competition through competitive tendering process. Sometimes, a contractor may be appointed by negotiation on the basis of a fee. In cases where the design and construction is done as a complete package, both may be let by competition.

The selection procedures applied to contractors are therefore by no means always the same. Different methods have different levels of impact on project success. For instance it was noted from previous research that “competitive tendering can adversely affect the outcome of major projects and the number of separate contracts is related to the chances of success; different selection methods will pose different levels of risk to the project team members” [52]. The selection procedures adopted by clients for project consultants should also not be overlooked since less attention has been given to this aspect of project management by several research works.

Quality is considered as a very crucial issue in project development. [53] opined that the importance of quality performance and safety at times surpass cost and time of delivery in civil engineering projects although, these factors are interrelated and interdependent. [54] maintained that the issue of quality performance of construction projects in Nigeria has resulted in colossal waste of human and material resources and in most of the cases, the indigenous contractors are found culpable. The degree to which a project’s quality objective is attained which is subjectively measured on a ranking scale. In view of the numerous parties and factors whose requirements should be met, the several activities, actions, processes and techniques involved in meeting these requirements and the many individuals and bodies concerned with planning and implementing them, [55] maintained that quality management is far more difficult to achieve in construction than in other industries.

3.0 Methodology

The data used for this study were collected via well structured questionnaires which were self administered to construction professionals involved in the usage of various procurement systems in Lagos state, Nigeria. Lagos state was chosen for the study because of its characteristic as the major hub of construction activities in Nigeria. A total of 100 (one hundred) questionnaires were distributed and administered to the targeted professionals using decisive convenient sampling technique out of which 76 numbers were returned and suitable for analysis.

The questionnaires were of two parts: the first part identified the demographic features of the respondents, and the second part related to the performance of selected procurement methods available in the Nigerian construction industry and peculiar factors that affect cost and quality

achievement. Eight major factors relating to assessment of procurement methods, fourteen and eleven factors relating to cost and quality performance respectively were identified from literatures and some were added having established them through pilot survey. The respondents were asked to rank these factors accordingly. The respondents were asked to rate on a 5-point Likert scale rating with 5 being the highest of the rating, for example 1= very low, 2= low, 3= neutral, 4= high 5= very high. The mean rank for a group of respondents is obtained as follows:

$$M_s = \frac{\sum (F * S)}{N}$$

Where, MS = Mean score

F = Frequency of responses

S = Score given to the criteria which ranges from 1-5

N = Total number of respondents.

4.0 Results and Discussions

The results obtained from the analysis of gathered data are presented in this section where table 1 shows the back ground of the respondents who participated in survey.

Table 1: Professional Background of Respondents

Respondents	Distribution	Responses	% of Response
Quantity Surveyors	35	30	39.50
Architects	25	19	25.00
Builders	30	22	28.90
Civil Engineers	10	5	6.60
Total	100	76	100

From the table above, the majority of the respondents i.e. 39.5% have Quantity Surveying as their professional background, 25% of the respondents are of Architectural background, while Building technology is 28.9% and Civil engineering has the least with 6.6%. The result expressed the generation of adequate opinion of the construction industry in the study area as majority of construction professionals are represented

Table 2: Professional Qualification of Respondents

Respondent Professional Body	Frequency	Percentage %
MNIQS	21	27.60
MNIA	10	13.20
MNIOB	17	22.40
MNSE	3	3.90
Others	7	9.20
None	18	23.70
Total	76	100

Among the professionals in the table above who responded to the questionnaire, 27.6% are members of the Nigeria institute of Quantity Surveyors (NIQS), 13.2% belong to Nigeria institute of Architects (NIA), and 22.4% belong to the Nigeria institute of Builders (NIOB), while 3.9% are members Nigeria society of Engineers (NSE), those who belong to other professional body other than those above are 9.2% of the respondents and 23.7% of the respondents are not registered with the professional bodies thus expressing their position as able to supply reliable data for the study. Table 3 shows the experience of the respondents where about 37% of the respondents have 1 to 5 years of experience, 33% had between 6 to 10 years of experience, and 29% had 11 to 16 years of experience and 1% of the respondents have above 20 years of experience in the construction industry indicating that these professionals are of current experiences and training in the examined systems. The assessment of procurement system is presented in Table 4.

Table 3: Years of Experience of Respondents

Years of Experience	% of Response
1 – 5	37.00
6 – 10	33.00
11 – 15	29.00
16 – 20	0.00
Above 20	1.00
Total	100

Table 4: Assessment of the Procurement Systems

Assessment Criteria	Mean score	Ranking
Client Satisfaction		
Construction Management	4.51	1
Management Contracting	4.28	2
Traditional System	4.12	3
Design and Build	3.31	4
Cost Effectiveness		
Design and Build	4.29	1
Construction Management	4.14	2
Traditional System	3.98	3
Management Contracting	3.71	4
Extent of Usage		
Traditional System	4.67	1
Design and Build	3.78	2
Management Contracting	3.47	3
Construction Management	3.01	4
Level of Awareness		
Traditional System	4.59	1
Design and Build	4.11	2
Management Contracting	3.87	3
Construction Management	3.74	4
Level of Competition		
Traditional System	4.51	1
Management Contracting	3.56	2
Construction Management	3.36	3
Design and Build	2.98	4
Price certainty		
Design and Build	4.45	1
Traditional System	3.76	2
Construction Management	3.71	3
Management Contracting	3.37	4
Quality Assurance		
Construction Management	4.44	1
Design and Build	4.33	2
Traditional System	4.13	3
Management Contracting	4.04	4
Quality Sacrifice		
Design and Build	4.34	1
Traditional System	4.19	2
Construction Management	3.86	3
Management Contracting	3.81	4

From the table above, assessing the selected procurement systems on the listed criteria, it was discovered that the traditional procurement system rank highest with mean score of 4.59 and 4.67 in their level of awareness and usage respectively. This means that Traditional system is the most patronized system of procurement in Nigeria due to its highest level of awareness. Construction management system with mean score 3.74 and 3.01 rank least in the level of awareness and extent of usage respectively. Design and build top the ranking for price certainty with a mean score of 4.45, followed by the traditional system with a mean score of 3.78 while management contracting rank least. Also considering the quality assurance and client satisfaction, construction management rank highest with mean score of 4.44 and 4.51 respectively, while management contracting ranked least in quality assurance; design and build ranked least in the client satisfaction criteria.

Table 5 presents means of the various procurement systems as they are individually investigated under various cost criteria. The analysis shows that design and build has the least mean of 3.218 while traditional system has the highest mean of 3.898 which implies that Traditional system is the most flexible procurement system in terms of cost.

Table 5: Selected procurement systems as they affect project cost

Assessment Criteria	C.M Mean	D & B Mean	M.C Mean	TS Mean
Accident / Delay	3.40	2.82	2.76	3.04
Claims	3.42	3.01	3.03	3.78
Contingencies	3.46	3.11	3.26	3.55
Cost related to Environmental issues	2.91	4.34	2.85	4.01
Cost related to Insurance	3.17	2.98	3.43	3.67
Dispute	3.87	3.18	3.55	3.84
Legal Costs	4.26	2.99	3.16	4.19
Managerial Cost (Consultancies)	3.36	2.98	3.86	4.44
Variation between contract sum and final account	3.10	3.52	3.87	4.00
Variation in Design / Change orders	3.80	3.49	3.71	4.14
Retention	3.12	2.91	2.71	4.09
Rework	3.75	3.28	3.49	4.03
Total mean score of each on the Cost criteria	41.62	38.61	39.68	46.78
Average Mean of the Procurement systems	3.47	3.22	3.31	3.90

* C.M = Construction Management, D & B = Design and Build, M.C = Management Contracting and TS = Traditional System.

Table 6 presents mean of various procurement systems as they are individually investigated under various quality criteria. The analysis shows that construction management has the highest rank of (3.722), follow closely by management contracting with mean 3.697, while traditional system came third with a mean of (3.627) and lastly the design and build has the lowest mean score (3.482). Thus Construction Management is the most suitable procurement system whenever quality becomes the most prioritized objective of the construction project in Nigeria.

Table 6: Effect of procurement systems on quality of work

Assessment Criteria	C.M Mean	D & B Mean	M.C Mean	TS Mean
Adherence/Compliance to specification	3.97	3.66	4.10	3.64
Competence of contractor and his team	3.50	3.76	3.61	3.29
Inconsistency of variation / change orders	3.62	2.91	3.42	3.88

Insistence on specification	4.04	3.20	3.63	3.33
Major Variation between Original Design and the actual completed work	3.75	3.80	3.87	4.08
Material test	3.64	3.43	3.84	3.45
Number of Rework	3.99	3.89	3.93	4.07
Number of Variation / Change Orders	3.27	3.35	3.19	3.41
Supervision of works	3.72	3.34	3.68	3.49
Total mean score of each on Quality criteria	33.50	31.34	33.27	32.64
Average Mean of each Procurement systems	3.72	3.48	3.70	3.63

* C.M = Construction Management, D & B = Design and Build, M.C = Management Contracting and TS = Traditional System.

4.1 Discussion on Findings

The aim of this research work was to investigate the effect of the selected procurement systems on the cost and quality performance of building projects in the Nigeria construction industry. The result of the data retrieved from the questionnaires indicates in table 1 that majority of the respondents are Quantity Surveyors, followed closely by the Builders, and then the Architects and the Civil Engineers were the least. Table 2 reveals that majority of the respondents are Qualified with NIQS, followed by those with none, also those with Qualified Certificate of NIOB. Table 3 indicates that among the selected procurement systems as used in Nigeria, the Traditional system is and still remain the most popular and frequently use system, despite its shortcomings, which is in agreement with Adedokun [56] and Babatunde, Opawole and Ujaddughe [57] that approximately half of construction projects are executed using traditional procurement system which is presumably due to long existence of the traditional procurement systems, less awareness of other procurement systems available, little or less information available on the systems and Nigerians and the construction industry adamant to changes.

It was discovered from this research that none of the selected procurement systems can provide all the cost and quality performance criteria always required by the clients, supported by the submissions of Adedokun [56] who posited that there is nothing like ‘the best’ procurement system and that the best we could say is that this procurement is better than this if this or that is the objective of the project. Also it was discovered from the general assessment of the procurement systems that the traditional system gives and provides the clients a good competition from contractors for the work which is also one of the rules in the new procurement acts as enacted by the federal government of Nigeria while the design and build system does not give room for that. Again the analysis shows that design and build system is highly cost effective as it ranked first while the cost effectiveness of the management contracting is low in the face of quality sacrifice. The design and build system top the ranking with the traditional system follow closely and the construction management ranked third and lastly is the management contracting in this regard.

Finally, the result obtained from the average mean rankings of the selected procurement systems against cost criteria as shown in table 5 shows that all the cost criteria listed are cost burden to the clients and or contractors and since the economic purpose of all investment and project is to maximize profit and avoid loss and or expenses as much as possible then the system with the least mean ranking is considered the most cost effective, while that with the greatest or highest mean ranking will be less cost effective so going by the result of the analysis (Traditional system = 3.898, Design and Build = 3.218, Management Contracting = 3.307, Construction Management = 3.468) and comparing it with that obtained in table 3 under cost effectiveness, it is discovered that both results proved that the design and build system performs better in terms of cost. Also comparing the level of satisfaction enjoyed by the client, quality assurance guaranteed

the client and less quality sacrifice suffered by client as presented in table 4 under headings; client satisfaction, quality assurance and quality sacrifice it shows that Construction Management with the mean score of 4.51, 4.44 and 3.81 respectively and this also agree with [30] that the choice of variants of the non-conventional procurement system is made in order of consideration of quality assurance; and a consideration of project been completed at the estimated budget, Management Contracting is next in client satisfaction with 4.28 mean score, traditional system is next to the least is client satisfaction with mean score of 4.12, and Design and Build system satisfy client the least with its lowest mean score of 3.61. it is also discovered and thereby established that the construction management system of procurement has the highest mean of 3.722 to rank first and thereby pass to be said that it performs better in quality among the selected procurement systems.

5.0 Conclusions

Based on the findings of this study, the following conclusions are drawn:

- a. That despite its problems and shortcomings which includes long and bureaucratic processes, lots of variation and change orders and the resultant disputes, the traditional system of procurement still remain most popular, prevalent and frequently used system.
- b. That none of the selected procurement systems could be called 'the best' but one can be better than the other the other in term of specific performance.
- c. Finally that among the selected procurement systems which are Construction management, Design and Build, Management contracting and Traditional system, the Design and Build is most cost effective as it gives no room to claims, extra and external managerial cost in form of consultancies on the part of both the client and contractor, legal cost is minimal because the procurement is single source. Also from the findings on quality, if quality slippage must be curtail the Construction Management system is the most appropriate as it ranked highest from the field survey.

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