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CONSTRUCTION MANAGEMENT AS AN EFFECTIVE PROCUREMENT SYSTEM IN SOUTH-EAST, NIGERIA

Godswill Mark Ogbaragu[1]*, Kalu Oguchi Ofuche[2], Uchendu Emeka Ndukwe[3] and Ajike Victor Onu[3]

[1]Department of Building Technology, Akanu Ibiam Federal Polytechnic Unwana, Ebonyi State, Nigeria.
[2]Department of Building Technology, Nigerian Army College of Environmental Sciences and Technology, Makurdi, Nigeria.
[3]Department of Civil Engineering Technology, Akanu Ibiam Federal Polytechnic Unwana
*smart.godswill@yahoo.com

Abstract

The paper is on assessment of construction management as an effective procurement system in view of remedying the problem associated with use of the traditional procurement methods on building construction project in the South-East, Nigeria. Purposive sampling technique was used to deliberately select a population of 2010 among building construction professionals from three selected state of South-East to whom questionnaires were administered. A sample size of 334 was obtained using Taro Yamane formula. Data obtained from the questionnaire survey was analysed using descriptive and quantitative statistics such as simple percentages, frequency tables, content and narrative analysis, relative importance index (RII), mean score index (Mx) and component factor analysis to compliment a successful data analysis and presentation. It was revealed from the result of the study that among all the procurements methods considered, construction management is the least widely practiced in the South-East and in Nigeria at large. It is also found that the use of construction management as a procurement system has had positive results on projects objectives, which therefore suggest it can lead to positive results on attainment of client's project objectives. The research concluded that use of construction management actually improves client satisfaction levels on construction project. It was therefore recommended that since the use of construction management as procurement system has had positive results on some projects objectives, for construction professionals in Nigeria to continually use construction management to promote a non-adversary, cohesive contractual relationship, targeted at a common goal to best serve the owner's needs of time cost and quality.

Keywords: Builders, Building project, Construction management, Construction industry Project management, procurement system

Introduction

Unlike other products of the manufacturing industry that the customer can buy directly from the market, construction projects are usually procured by a chain of processes, which is known as the procurement system. In line with Chan (2000) several options exist whereby a project can be procured, among which include; the traditional procurement method; design and build methods; management contracting and construction management systems. However, in recent years, large projects such as power stations, airports, oil refineries and similar complex utilities in Enugu, Anambra and Imo States have proved difficult to manage in total. This could be attributed to various factors but in essence the expertise of the design oriented professions has proved insufficient to manage; as opposed to merely supervise the numerous specialized and technically sophisticated contractors during construction. Several other factors inherent in the existing procurement methods also contribute.

As a developing country, Nigeria faces a number of socio-economic challenges. These include, inter alia, poverty, lack of housing, unemployment, lack of infrastructure, massive disparities between the poor and the rich, etc. More so, the exposure of Nigerian companies to international competition has also had impact on the Nigerian construction industry, particularly in the South East region as clients now require their projects completed faster, meet the best quality standards and at the lowest cost. This has, to a certain extent, resulted in the search for a more effective and efficient alternative building procurement systems to improve chances of meeting these challenges in these states. Hence, the need to search for an alternative procurement system to remedy the problem of cost, time and low quality performance levels obtained when using traditional contracting

The aim of this study is to assess the effectiveness of the use of construction management as a procurement system in attainment of cost, time and quality performance objectives in building construction project delivery in South-East, Nigeria. In line with the stated aim, the following objectives will be pursued:

i. To examine types of procurement methods used on building construction projects.

ii. To assess the effects of construction management in attainment of cost, time and quality performance objectives on building construction projects.

iii. To investigate the factors which enhances attainment of main project objectives using construction management.

Types of Construction Procurement SYS Methods

Kohtso, Clinton and Anyodeji (2018) see procurement system as a condition and way of successfully undertaking a project in order to achieve the objectives of the client. Kohtso, *et al* (2018) defines procurement system as organizational structures used to execute construction management projects. Benett and Grice (1992) identify four categories of building procurement system as: traditional; design and build; design and manage and management systems.

i. Traditional System: In traditional system, clients rely on the architect and/or consulting engineers to design and supervise construction. The project is designed and detailed up to a point where the various elements of the design can be taken off and worked up into a bill of quantities. A main contractor is invited to bid for the work and if successful, starts as soon as possible. Main

contractors, in turn, use domestic, nominated and/or selected subcontractors. Since inception, this system has generally worked satisfactory.

The traditional system management structure shown in Figure 1 as cited in Waldron (1993) has been criticized by Rowlinson (1987) for its slowness, due to the sequential nature of the work and the incidence of time and cost overruns attributed, in part, to the lack of input from the main contractor during the design phase. Although variants of this system include the use of a project manager but it utilizes a main contractor to carry out the work.

ii. **Design and Build Systems:** With this type of system the client gives responsibility for design and construction of a building to one entity. It is suitable on a project where the client's needs are clearly defined. In some instances, clients also require this entity to completely equip, provide staff and commissioning of a building. This is called a "turnkey" contract. Three variants of this system exist as: Direct; Competitive and Develop and Construct.

iii. Design and Manage Systems: In this, the client appoints a single firm to design and deliver the project but specialist contractors are appointed to undertake the construction work by negotiation or in competition. The project design and manage firm may either take a contractual risk to deliver the project to an agreed price and on time (contractor) or may act as the client's agent only and other contractors enter into direct contracts with the client, who takes the time and price risks (consultant). Variants of this system include: Build Operate and Transfer (BOT); Build Operate Own (BOO); Build Operate Own and Transfer (BOOT) and Design Build Finance and Own (DBFO).

iv. **Management Systems:** On this type of construction procurement system the client appoints the design team for the project as well as a separate entity (consultant or contractor) to focus on the management of the construction process in return for a certain fee. Specialists or trade contractors are therefore appointed to undertake construction works and are selected by negotiation or through competitive pricing. This construction procurement system category has two variants namely: management contracting and construction management.

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Construction Management

Ben (2024) contends that clients may now need to engage construction managers to supervise and coordinate various aspects of their projects on account of the intricate nature of construction projects undertakings which demand meticulous planning, coordination, and execution to guarantee effective outcomes. This has led to the industry's growing acceptance of construction management, CM as an alternative procurement system on account of its adaptability and customized approach to project delivery.

In line with Okolie (2016) although, construction management, CM may mean different things to different people, however in the context of this study, construction management refers to a specific type of building procurement system. Kweku et al (1987) define construction management as "a fusion of old established construction practices with current technological advances and latest management methods into one completely integrated working system to control time, cost and quality in the design and construction process." According to the same authors, construction management unites a three party team of an owner (client), an Engineer/Architect (including

quantity surveyor) and a professional construction manager into a non-adversary, cohesive contractual relationship, all with the common goal to best serve the owner's needs.

Bennett and Grice (1 990) define CM system as a project delivery method where "the client appoints design and cost consultants and a contractor or consultant to manage construction for a fee. Adding to this, Construction Industry Research and Information Association, CIRIA (1983) gives a similar defines, viz: "CM systems are arrangements in which the client appoints an external organization to manage and coordinate the design and construction phases of a project. In this, specialist contractors are appointed to undertake the construction by negotiation or in competition". The CM organization may provide specified common user and service facilities but does not normally execute any of the permanent works, which are undertaken by construction contractors."

Ben (2024) confirms that construction management contracts offer numerous advantages, including early involvement, single-point responsibility, flexibility, risk management, and cost transparency. However, they also come with inherent disadvantages, such as increased administrative burden, potential for disputes, cost variability, conflicts of interest, and complexity of contractual relationships.

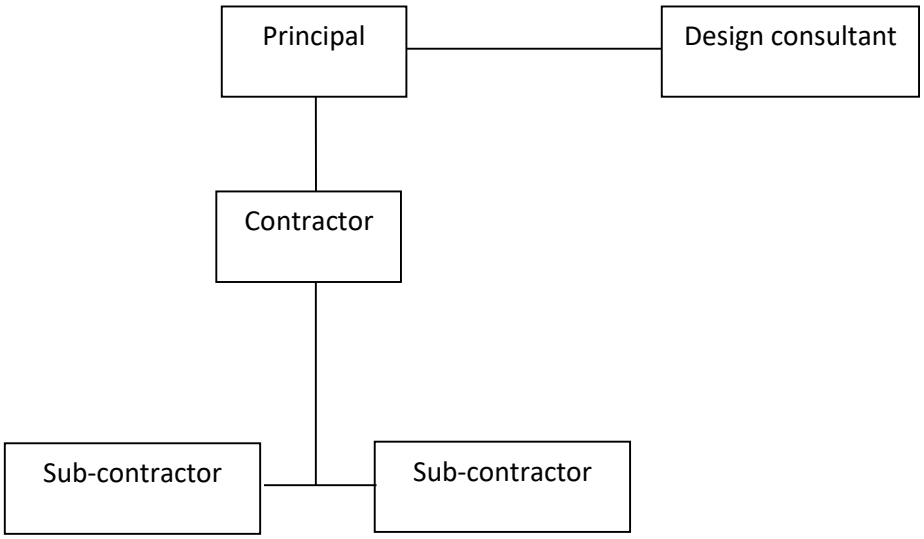

Figure 1 showing traditional management structures (Adapted from Waldron, 1993)

Effects of Construction Management on Cost, Time and Quality Performance Objectives on Building Construction Projects

Various reasons for the prominent use of this system, instead of more traditional procurement systems as shown in Table 1 support Shor, Nkado and Herbst (1998).who assert that construction management has been found to increase the confidence of clients as it meets the increasing demand for improved construction industry performance. Shor, *et al* (1998).opines that construction management provides such services as value engineering, value management, project feasibility study, project budgeting, bid packaging, parameter estimating, time and cost control system etc. These are aimed at optimizing client’s value for money.

Shor et al (1998) citing McKinney (1983) and Moore (1984) outline the following advantages of construction management over other building procurement systems as:

i. Use of a construction manager: Construction management allows for the use of a construction manager as a professional agent of the client who is placed on a retained fee basis, and works in the client's interest. This overcomes the contrast barrier and removes the traditional adversarial relationship that often exists between the contractor and other members of the team.

ii. Involvement of an experienced contractor: Construction management system allows for the involvement of an experienced contractor in the role of a construction manager at the design and planning stages of the project. This provides the client and designers with a source of information on matters concerning cost, buildability, productivity, programs, schedules, market conditions, and labor and materials availability; thus designers can design to suit the prevailing conditions.

iii. Competitive tenders: Competitive tenders can be obtained for one hundred percent of the work, because the construction manager, from his own training and experience, knows how to sub-contract work on the basis of quality as well as price.

iv. Construction manager control the tendering: Construction management places the construction manager in a position to control the tendering for work elements, thus obtaining maximum price benefit by recognizing market conditions and influences. There are also no unwanted markups on subcontractors who constitute a large portion of the work on traditional contracts.

v. Cost savings: Use of construction management may allow for savings in the overall time, from the initial brief to completion, due to the omission of time spent on preparing design/tender documentation and long tendering periods. It is argued that such reductions in time also reduce total costs, while the client has the use of the facility sooner.

Table 1 Comparative analysis between construction management and the traditional building procurement system, (Kweku et al 1987) as cited in (Siyabonga 2003).

Construction management	**Traditional procurement system**
1. Several prime contractors contract directly with owner.	One Main Contractor contracts with owner.
2 .Design and construction are handled as one single effort.	Design and construction are two separate efforts – no continuity.
3. Cohesive team effort between professional design team and the construction manager professional design team and the main contractor.	Adversarial relationship between professional design team and the main contractor.
4. Reduces layering of bonding (surety) .	Layering occurs.
5. Value management and cost control during design.	Usually none during design.
6. No guaranteed costs at onset of project.	

7. Integrated system but permits phased construction. 8. Construction manager has incentive to reduce costs through value management. 9. Client retains control of budget. At planning and design phases construction manager provides client with source of independent information about probable costs and schedules.	Usually a guaranteed lump sum bid at the beginning of the project. Fragmented and sequential approach. Main contractor has no incentive to reduce costs. Owner has little or no control. At planning and design phases construction manager provides client with source of independent Owner depends solely on the professional design team

(Adapted from Siyabonga Mbanjwa, 2003)

In the light of the above, it could be said that construction management offer cost and time savings. These are two of the three major client objectives. It can, therefore, be agreed that, where adequately implemented and managed, construction management can lead to the improvement of client satisfaction levels.

Factors Enhancing Attainment of Main Project Objectives Using Construction Management

i. Organizational Structure and Contractual Relationship: The use of CM results in significant alterations to the contractual arrangements between the project team members.(See Figure 2).. In this procurement system, the client enters into direct contracts with various trades or works contractors that are directly accountable to a construction manager for all construction works. This is in lieu of the client entering into a direct contract with the main contractor only, whilst subcontractors enter into contracts with the main contractor. A typical contractual relationship in construction management, as a building procurement system, is outlined in shown in Fig.2.

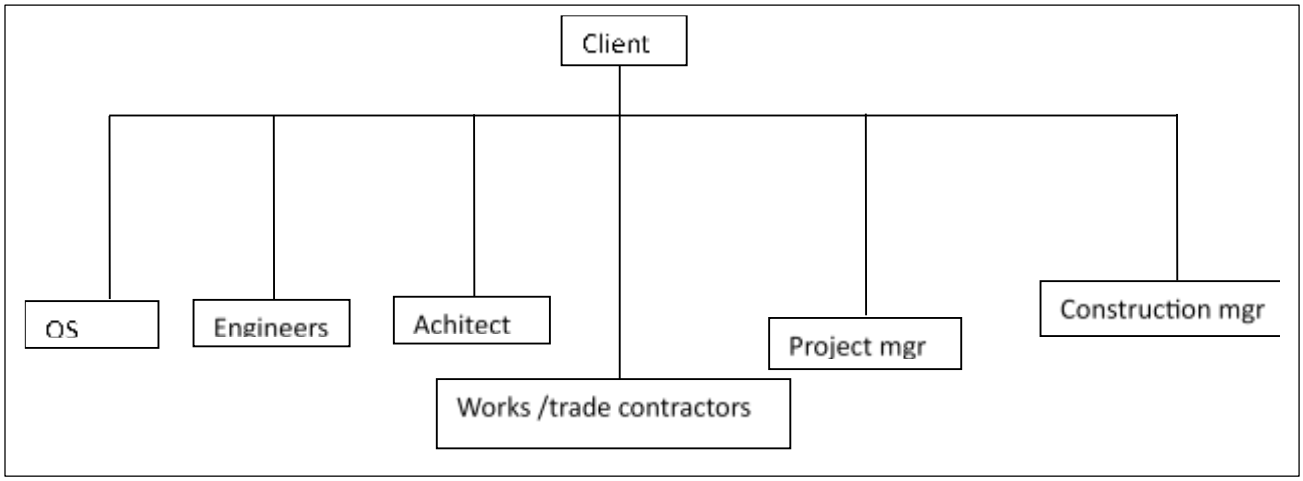

Fig.2. showing contractual relationships using construction management (adapted from Siyabonga Mbanjwa, 2003).

ii. Early Appointment of Construction Manager: The traditional procurement methods engage the main contractor only after the design and specification is complete, involving a lengthy tender process. CM's different contractual arrangement allows the appointment of the Construction Manager at or during the design stage. This results to a more cost efficient design; "Hands-on" experience of actual costs; time considerations and construction procedures due to the construction manager's greater knowledge of buildability (Chan, 1993).

Careful pre-construction planning of building methodology should result in a quicker site start-up period.(CIRIA, 1984; Collins, 1987; Masteman, 1992; Naoum, S.G., Langford and D.A. 1991; Turner, 1990; Curtis, B., Ward, S., Chapman, C. 1991)). The owner's interests are usually best served in this instance, because the greatest benefits are realized when the design and construction phases are integrated (Rawlinson, 1984**).**

iii. Fast-Track Construction: CM allows the concept of "fast-tracking" to be used on a project due to the early involvement of the Construction Manager (Kwakye, 1991). This method is opposed to traditional linear project development, where each stage of the project is reliant upon the successful completion of the previous phase. Traditional tendering requires almost c completed design when it is sent out to tender. Construction therefore commences at the earliest possible time, with the object being to shorten the overall project time (NEDO, 1985).

Methodology

The research design adopted was a field survey study in order to assess on construction management as an effective procurement system in view of achieving cost, time and quality performance objectives in building construction project. This study was conducted in the South-East geopolitical zone of Nigeria. This is due to the fact that there are many building construction sites in the zone among which levels of cost, time of project delivery and quality performance obtained did not meet expectations.

The study population consisted of registered building professionals and contractors from three chosen states in the South-East. A sample size of 334 was determined using the Taro Yamane formula from a total of 2010 participants who were given questionnaires. Utilizing this sample size is essential since it has a direct bearing on the validity and generalizability of the research's conclusions. A smaller margin of error may result from estimations that are more precise due to a bigger sample size.

In order to achieve the aim of the study, a well structured questionnaires were prepared and sent out electronically and by hand to gather information from construction project professionals and clients on assessmen**t** of construction management as an Effective procurement system in view of achieving cost, time and quality performance objectives in building construction project. Clients were among because they initiate projects and are directly affected by the outcome of projects. Construction project professionals were also chosen because they are the most accountable to the client in terms of the outcome of projects and are also believed to have the most appropriate training and experience to offer construction management services.

This survey tool was chosen based on its suitability, simplicity, and clarity. It was also built in the language the respondents understand. The dependability of the questionnaire utilized in this research study is further supported by the fact that comparisons of responses from correspondents on the same items, but at different times, seemed to be consistent.

Data obtained from the questionnaire survey were subjected to a quantitative analysis using frequency tables and percentages. The simple percentage formula is X/Y =100/1 where X and Y are operational variables, where X represents the number of responses from a group and Y represents the total number of responses from all groups. Also, mean score index (Mx) were used to analyse the data on a five (5) point Likert scale; Where 1 stands for Strongly Disagreed (SD), 2 stands for Disagreed (D), 3 stands for Not Sure (NS), 4 stands for Agreed (A) and 5 stands for Strongly Agreed (SA). Mean score index is mathematically represented in this work as; Mx = FXi/N Where Mx = the mean score of each variable; F = Frequency of response to each rating; Xi = score or rating assigned to each variable by the by the respondent = total number of responses desired for the variable.

Results

Note: As appeared in Tables 2 and 3, the terms SD=Strongly Disagree, D =Disagree, NS=Not Sure, A=Agreed and SD=Strongly Disagreed

Table 1: Responses of the respondents on the types of procurement methods used on building Construction projects.

Types of Procurement system	**Frequency**	**Percentage**	**Rank**
Traditional system (with or without project mgt.)	68	33.5	1st
Design & build (including Turnkey)	56	27.6	2nd
Construction management	38	18.7	3rd
Management contracting	30	14.8	4th
Design &manage (plus build, operate &transfer)	11	5.4	5th
Total	203	100	

Source: Field Survey, 2024

Table 2: Responses of the respondents on the effects of the use of construction management on the main clients' objectives.

Main Clients projects objectives	**SD**	**D**	**NS**	**A**	**SA**	**Na**	**Mx**	**Rank**
	1	2	3	4	5			
Time	0	0	25	109	69	203	4.22	1st
Quality	0	0	41	112	50	203	4.04	2nd

Affirmative procurement/ empowerment	8	21	30	84	60	203	3.78	4th
Overall satisfaction	15	30	7	101	50	203	3.69	5th
Cost/ Budget	5	12	32	89	65	203	3.97	3rd

Source: Field survey, 2024

Table 3: Responses of the respondents on factors enhancing attainment of main project objectives using construction management

Factors	**SA**	**A**	**NS**	**D**	**SD**	**Na**	**Mx**	**Rank**
	5	4	3	2	1			
Clarity of roles and responsibilities of professional team and construction manager	156	37	10	0	0	203	4.72	1st
Proper management of interfaces between trade contractors	69	87	47	0	0	203	4.10	6th
Development of a realistic schedule/program	59	96	31	11	6	203	3.94	8th
Cost control/value engineering during design	65	86	20	23	9	203	3.86	9th
Development of a realistic budget.	99	72	18	7	7	203	4.23	4th
Proper implementation of CM.	138	39	16	9	1	203	4.50	3rd
Application of critical chain techniques to further shorten project duration	73	91	17	14	8	203	4.02	7th
Development of adequate contracts for consultants and trade contractors	84	78	33	0	8	203	4.13	5th
Apply CM in its purest form ("without risk").	31	54	79	27	12	203	3.32	10th
Early and correct selection of construction Manager.	139	60	4	0	0	203	4.67	2nd

Source: Field survey, 2024

Discussion

Following the results of Table 1 which presents the types of procurement methods used on building construction projects, majority of the respondents which represented 68(33.5%) (See Table 1) have known and relied on Traditional Procurement method due to their long familiarity with its use. Design and Build System represented 56(27.6%) (See Table1). Whereas 38(18.7%) indicates number of the respondents who have known and used construction management (See Table 1). While 30(14.8) have used the Managing Contracting and the remaining 11(5.4%) (See Table 1) constituted other professionals that have used the Design and Manage System in Nigeria. This supports the assertion of Kohtso, *et al* (2018) that procurement system is a condition and way of successfully undertaking a project in order to achieve the objectives of the client.This indicates that among all the procurements methods considered, construction management is among the least widely practiced in Nigeria. This suggests an existence of progressive but low level of knowledge of construction management among construction professionals in the study area.

The mean score results of Table 2 presents the effects of the use of construction management on building construction projects. Among the highest influencing effect is the attainment of the project objective of time with the mean score (Mx) as 4.22, (See Table 2). On the other hand, project quality ranked 2nd, with a mean score (Mx) of 4.04, (See Table 2). Whereas attainment of the project cost/budget ranked 3rd, with a mean score (Mx) of 3.97, (See Table 2). While affirmative procurement/empowerment ranked 4th, with a mean score (Mx) of 3.78, (See Table 2). The clients overall satisfaction ranked 5th, with a mean score (Mx) of 3.69, (See Table 2).This in line with Kohtso, *et al* (2018) indicates that use of construction management can help achieve the main project objectives of time, quality and cost, on building construction projects.

Table 3 shows that one of the most critical success factors on construction management projects, is the clarity of roles and responsibilities between client, professional team and construction manager which is ranked 1st (See Table 3),with a mean score (Mx) of 4.72. This is followed by early and correct selection of construction manager which is ranked 2nd, (See Table 3) with the mean score (Mx) of 4.67. While proper implementation of CM is ranked 3rd, with a mean score (Mx) of 4.50 (See Table 3) and development of realistic project budget is ranked 4th, with a mean score (Mx) of 4.23, (See Table 2). In line with Siyabonga (2003) this is indicative of the need to define the relationship of the various professionals involved in offering construction management services in their various roles to reduce conflict and ensure proper coordination (See Fig.2). This also supports the view of Chan (1993) and Ben (2024) who maintain that construction management contracts offer numerous advantages, including early involvement, single-point responsibility, flexibility, risk management, and cost transparency and emphasize the need for early and correct selection of the right construction manager who will provide the necessary leadership and guidance to the rest of the professional team members that may not have been experienced in the use and application of construction management services.

Conclusion

In line with the pursued objectives, the following conclusions were reached in the light of the results:

i. Construction management procurement system is among the least widely practiced in Nigeria as low level of knowledge of it exists among construction professionals in the study area (See Table 1).
ii. On account of the non-adversary, cohesive contractual relationship that exist with the use of this procurement system, construction stake holders can achieve the main project objectives of time, quality and cost on their building construction projects (See Table 2).
iii. In the light of the literature reviewed and the analysis of the questionnaire results, clarity of roles and responsibilities among client, professional team and construction manager along with correct selection of the right construction manager leads to better performance and improved client satisfaction levels on construction project (See Table 3) and (Fig.2).

Recommendations

Based on the findings of this research, the following recommendations are made:

i. Construction industry and institutions of higher learning should regularly organize workshops for their students and conferences for their members on the importance and use of construction management to increase awareness and encourage its use.

ii. Construction stake holders and project managers should continually use construction management as procurement system to promote a non-adversary, cohesive contractual relationship, targeted at meeting the owner's needs of time cost and quality on their projects.

iii. Project stake holders should always come together and clarify roles and responsibilities among client, professional team and construction manager before commencement of works in order to reduce conflict. This will not only minimize conflict among the professionals but resolve problem of proper coordination.

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