AN APPRAISAL OF CONSTRUCTION MANAGEMENT PRACTICE IN NIGERIA

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ABSTRACT

Construction industry is complex in nature because it contains large number of parties such as clients, consultants and contractors. The factors that influence construction management practice differ from country to country, due to prevailing conditions. The objective of this project is to identify factors that influence construction management practice in Nigeria construction industry and elicit perceptions/ranking of the severity using relative importance index of the various factors. A comprehensive literature review was conducted to generate a set of factors believed to influence construction management practice in Nigeria. A questionnaire survey was conducted and fifty-seven (57) factors were identified, grouped into nine (9) categories, evaluated and ranked from the construction actor's perspectives. 108 questionnaires were distributed to the key construction actors as follows: 45 to contractors, 33 to consultants and 30 to clients. Out of these questionnaires distributed, 92 were received (85%) as follows: 40 (88.9%) from contractors, 28(84.8%) from consultants and 24 (80%) from clients as respondents. The enlarged features included those from both previous Nigerian studies and other related international studies represented in the literature. The degree of agreement between parties regarding the ranking of factors was determined according to Kendall's Coefficient of Concordance and the survey findings indicate from three target groups (contractors, consultants and clients) agree that the most important factors that influence management of construction projects are as follows: conflicting design information, effective co-ordination of resources, critical path method, materials availability, setting timeliness, civil strife of riots, sense of belonging & identification with the project team, lack of construction management knowledge and known work progress.

Keywords: *Construction Project, Management tools, Project delivery, Construction Industry, Nigeria.*

1. INTRODUCTION

The construction sector in Nigeria plays an important role in the development of our nation's economy. The construction industry is said to have contributed about half of the total stock of fixed capital investment in the Nigeria economy [1]. During the last decades, the Nigerian construction sector has experienced some rapid changes and advancement in construction practices as well as the management of the construction works.

The term construction is no longer limited only to the physical activities involving men, materials and machinery but covers the entire gamut of activities from conception to realization of a construction project [2]. While management is a social process by which a co-operative group (superiors) directs the action of others (subordinates) towards accomplishing a common goal [3].

Construction projects in Nigeria are worth Billions of Naira, it is of great importance that construction management practice is given great attention, including the best practice methods of construction and it challenges. Moreover, construction management makes adequate provision of necessary leadership and motivates employees to complete their tasks within a particular time frame.

Serious concerns has been expressed about construction projects which have not been delivered in various parts of the country after huge financial mobilizations has been made. The practice of construction management requires appropriate skills and techniques that go beyond technical expertise only. It encompasses good and sound management skills to manage resources within the budget, monitor the progress of work, prepare job schedule and unpredicted outcomes, while at the same time dealing

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with people and organizational issues [4]. The application of construction management practice is an efficient approach which would aid in improving management capabilities and enable the construction sector to efficiently deliver projects and attain developmental objectives [5].

The need for professionalism in the practice of construction management assumes special significance in order to ensure that the huge resources invested in the construction industry are deployed efficiently for the benefits of Nigerians [2]. The application of modern construction management method in practice has a great effect in the construction sector.

When construction management is practiced efficiently, it would result in tangible benefits in all aspects of planning, scheduling, monitoring the time, cost and specification of the project.

In the practice of construction management, experience, quality of the materials used in the project will be of great importance amongst others. Quality can be defined as the totality of characteristics of an entity that bear on its inability to satisfy stated or implied needs [6]. The special conditions affecting the project are reflected during the planning and organizing stage of the construction to ensure that quality is fully built in even before the actual construction takes off [7].

In construction management, the level of competency of a project manager may directly or indirectly affect the project. The information flow process determines the nature, quality and timeliness of project execution. The findings from this study can provide information to guide the Federal and State governments, including private companies and international agencies in responding to the challenges of construction management practice in Nigeria.

Similarly, [4] explored the management tools and techniques used by the public sector in Jordan by surveying 50 individual public firms. The study found out that the use of management tools and techniques among the public sector companies was very low.

Studies have recognized social and political systems, cultural blocks and lack of financial support as barriers to successful project planning and execution in Nigeria [8].

There has been a profound change in the construction sector and practice of management by organizations over the past years. The customer focused marketplace and fierce competitive service positioning have demanded attention to practice improvement and value addition in delivery.

In order to ensure that quality is paramount and customers are therefore satisfied, personnel must be carefully placed and managed with effective management tools.

Government and organizations usually embark on different projects with the aim of creating new service or improving the functional efficiency of the existing ones. All these projects require appropriate skills and techniques that go beyond technical expertise only but combines good and sound skills to manage resources and unpredicted outcomes whilst at the same time dealing with people and organizational issues [4].

Information technology is now routinely used in the construction industry as a tool to reduce some of the problems generated by fragmentation [9]. The use of information technology improves collaboration and co-ordination between the stakeholders participating in the construction project, leading to better communication and good practices. Its benefits include speedy progress of work, quality work, better financial control, communications, simpler and faster access to common data as well as decrease in documentation errors.

The objectives of the study are as follows:
▪ To investigate the level of construction management practice in Nigeria.
▪ To identify, study, evaluate the factors that influence's construction management practice in Nigeria and examine their relative importance.

2. MATERIALS AND METHODS

The research adopted field survey methodology to un-cover the practice of construction management in Nigeria. Survey through questionnaires was adopted to elicit the attitude of clients, consultants and contractors towards construction management practice, the factors were ranked in various categories.

2.1 Study Area

The results used in this study were obtained from six (6) states in Nigeria covering the six geopolitical zones of Nigeria including the Federal Capital Territory.

2.2 Data Collection

The instrument used for this research was questionnaire. In order to choose a suitable method for analysis of this work, the level of measurement of data must be identified. In this study, ordinal scales were employed. Based on Likert Scale, the following

table indicates values assigned to different options used in the questionnaires [10, 11]:

Table 1: Ordinal scale for data measurement

Item	Scale
No extent	1
Moderate extent	2
Medium extent	3
Large extent	4
Very large extent	5

Table 2: Distribution of Questionnaires to the target groups.

Category	No. of questionnaires distributed	No. of questionnaires returned	% of questionnaires returned
Contractors	45	40	88.9%
Consultants	33	28	84.8%
Clients	30	24	80.0%
Total	108	92	85.0%

Questionnaires were distributed to randomly selected target groups based on their sample sizes. This implies that questionnaires were distributed to 45 contractors, 33 consultants and 30 clients. Out of these questionnaires distributed, 40 contractors (88.9%), 28 consultants (84.8%) and 24 clients (80%) returned their questionnaires.

2.3 Method of Analysis
2.3.1 Relative Importance Index (RII)
The procedure used in the analysis of this work was Relative Importance Index, which is a measure of determining the relative importance of factors considered in this study. To do this, scores for each factor were calculated by summing up the scores by the various respondents. The Relative Importance Index, as given by [10, 11], is computed using equation (7). Relative Importance Index (RII) is given by:

$$RII = \frac{\sum_{j=1}^{5} a_j m_j}{a_5 N} \qquad (7)$$

Here N is the total number of respondents in a given group, a_j = constant expressing the weight given to the jth response, j = 1, 2, 3, 4, 5. For a response of 'no extent' a_1 = 1, For a response of 'moderate extent' a_2 = 2. For a response of 'medium extent' a_3 = 3, For a response of 'large extent' a_4 = 4, For a response of 'very large extent' a_5 = 5, m_j = frequency associated with response j, j = 1,2,3,4,5. The Relative Importance Index (RII) computed for all factors in each category were ranked in their order of magnitude.

2.3.2 Kendall's Coefficient of Concordance or Agreement (W)
Kendall's Coefficient of Concordance is a measure of the degree or extent of agreement or concordance amongst responses from groups in a certain population. Kendall's Coefficient of Concordance (W) can be determined using Equation (8) as given by [12,13].

$$W = \frac{12U - 3m^2 n(n+1)^2}{m^2 n(n^2-1)} \qquad (8)$$

In (8),

$$U = \sum_{i=1}^{n}\left(\sum_{k=1}^{m} R_k\right)^2 \qquad (9)$$

R_k is the ranking for group k, k=1,2,3………m, n is the number of factors, m is the number of groups and i is the factors, 1, 2, 3……n.
$\sum_{k=1}^{m} R_k$ is the sum of ranks in all the groups for each factor. Kendall's Coefficient of Concordance (W) is used to determine the agreement in response of the target groups concerning the factors that influence management of construction in Nigeria.

2.3.3 Test for the Null Hypothesis
In order to test the hypothesis of agreement or disagreement among these three groups on the ranking of factors, chi-square (X^2) test approximation of sampling distribution of W was used, since n = 58 was too large for the table of critical value of W.
The X^2 approximation of W is given as expressed in:

$$X^2 = m(n-1)W \qquad (10)$$

for (n – 1) degrees of freedom
The decision rule is that if the computed value of X^2 is greater than the tabulated value of X^2, H_0 is rejected; otherwise accepted.

2.4 Test of Hypothesis
Kendall's Coefficient of Concordance (W) is calculated as follows:

$$U = \sum_{i=1}^{n}\left(\sum_{k=1}^{m} R_k\right)^2 = 561597$$

m= 3 and n = 58
Therefore the Kendall's coefficient of concordance is:

$$W = \frac{12 \times 561597 - 3(3)^2(58)(59)^2}{(3)^2(58)[(58)^2 - 1]} = 0.7337$$

Chi-square approximation of W is: $X^2_{(n-1)}$ = m (n – 1)W
= 3 x 57 x 0.7337 = 125.485
Therefore X^2 computed = 125.485
X^2 tabulated = $X^2_{(n-1)}$ = X^2_{57} = 79.08

DECISION: Since X^2 computed (125.485) is greater than X^2 tabulated (79.08), Ho is rejected.

There is a significant agreement among the three target groups in respect of their responses.

3. RESULTS AND DISCUSSION

This section presents results and analyses of factors that influence Construction Management practice in Nigeria.

Table 3: Relative Importance Index and Rank for Quality Management during Design.

Factors	RII	Rank
Conflicting design information	0.8739	1
Timeliness of revised drawing issue	0.6826	3
Missing information	0.8	2
Dimensional inaccuracies	0.5696	4

Table 4: Relative Importance Index and Rank for Quality Management during Construction

Factors	RII	Rank
Analysing resources movement to and on site	0.515217	7
Forecasted planning date such as activity duration and resource quantities required	0.782609	3
Monitoring and updating of plans to appropriately reflect work status	0.736957	4
Work sequencing to achieve and maintain workflow	0.636957	5
Effective co – ordination of resources	0.895652	1
Inspection of construction	0.621739	6
Development of appropriate structure to maintain workflow	0.815217	2

Table 5: Relative Importance Index and Rank for Management Tools and Techniques

Factors:	RII	Rank
Work Breakdown Structure	0.645652	3
Critical Path Method	0.726087	1
PRINCE 2	0.393478	8
Cost Benefit Analysis	0.541304	4
Programme Evaluation & Review Technique	0.367391	9
Project Sensitivity Analysis	0.469565	5
Bar Chart	0.673913	2
Graphical Evaluation & Review Technique	0.413043	7
Line of balance	0.445652	6

The results from Table 3 indicates that conflicting design information is ranked 1st in the category of quality management during design. This might be due to the process it will take to correct a mistake. It may require checking the design from the beginning, which

may take longer time thereby affecting the success of the project.

Missing information was ranked 2nd. This factor may lead to delays as a result of carelessness or incompetence in design. Missing design information will influence the smooth flow of operations on site, thereby causing some setbacks to the scheduled project completion date. Dimensional inaccuracies is ranked 4th in this category. However, it does not mean that its influence is negligible because the duration it takes to clarify inaccuracies may influence success of the project.

The results are presented in Table 4. These indicate that Effective co-ordination of resources was ranked 1st in this category because the lack of effective control of resources such as plants, materials and human resources may lead to disorder on construction sites. Development of an appropriate organization structure to maintain workflow was 2nd. Construction activities are carried out by issuing instructions and providing guidance. The labourers and supervisors must know whom to take instructions from and to whom to report to. A situation where these are not well defined may lead to poor performance on the project.

Analyzing resources movement to and on site was ranked 7th in this category. The various times resources are required on site should be estimated so as to avoid idleness.

From the results in Table 5 Critical Path Method was ranked 1st in this category due to the fact that it enables the identification of critical activities which when executed sequentially leads to the success of the project.

The Bar Chart is ranked 2nd after the CPM. It's a simple tool to use, understand and interpret by most construction workers but do not really have an advantage over CPM.

Table 6 presents the respondents perceptions of relative importance index (RII) and ranking regarding the influence of economic policy in construction management practice. Availability of materials was ranked 1st in this category because when other resources for construction are available and there is lack of materials, then no work can be executed.

Availability of equipment is ranked 2nd. This may be as a result of the fact that equipment are required for some critical tasks on site. There is hardly any task that does not require the use of equipment. There are different kinds of equipment, namely powered and

mechanical. Powered equipment makes delivery of work faster while mechanical equipment takes a longer time.

Table 6: Relative Importance Index and Rank for Economic Policy

Factors	RII	Rank
Equipment availability	0.771739	2
Materials availability	0.882609	1
Indirect impact of interest rates	0.495652	5
Bankruptcy	0.547826	4
Supervision / management staff availability	0.656522	3

Table 7: Relative Importance Index and Rank for Management Style

Factors	RII	Rank
Providing specific direction	0.71087	4
Setting specific goals people are to achieve	0.86087	2
Setting timelines	0.893478	1
Seeking peoples opinion	0.454348	8
Involving team members	0.641304	5
Provide support and encouragement	0.576087	6
Organizing work situation for people	0.497826	7
Conducting regular updates on progress	0.758696	3

Table 8: Relative Importance Index and Rank for Socio – Political Consideration

Factors	RII	Rank
Civil strife or riots.	0.852174	1
Influence of protest action-groups	0.704348	2
Disruption due to environmental concerns	0.636957	3

Table 9: Relative Importance Index and Rank for Motivation of Workers

Factors	RII	Rank
Pay and allowances.	0.545652	6
Job security.	0.771739	2
A sense of belonging and identification with the project team.	0.9	1
Recognition of contribution	0.695652	4
Opportunity for extending skills and experience through learning as a means of job satisfaction & higher productivity.	0.75	3
Equitable reward relative to others input to the project	0.528261	7
Exercise of power.	0.46087	8
Opportunity to career advancement for future benefit	0.6	5

Table 7 shows that Setting timeliness is ranked 1st in this category. In order to achieve meaningful progress construction managers need to define the number of tasks to be performed within a specific time. The lack of specification of timelines for the performance of activities may have an adverse effect on the success of projects. There are measures such as setting time lines which need to be applied for meaningful output to be achieved.

Specifying the goals people are to accomplish is ranked 2nd in this category. Construction project consist of activities and these activities need to be specified to workers and supervisors through information given by the management team for monthly, weekly and daily task execution completion of the project. This is partly the reason for the need to provide a work schedule and cash flow for a particular project.

Seeking people's opinion is ranked 8th in this category. It's a managerial tool used for success in projects which is not often utilized. Workers are very skillful in contributing ideas for improvement of work execution. Most of the workers are not opportune to speak to their supervisors.

Table 8 shows that civil strife and riots is ranked 1st in this category. The basic initiator of civil strife and riots is agitation for higher wages. Agitation for higher wages by workers is applicable to all industries. Strike in the construction sector may affect construction workers in that they may not have access to and from sites. Disruption due to environmental concern such as fire and flood is ranked 3rd. Construction sites could be considered safe from fire occurrences.

From the results in Table 9 sense of belonging and identification with the project team is ranked 1st in this category. The word belonging means to be part of the project issues while identification with the project team comes from recognizing every efforts and contributions. A worker that is made to understand he / she belongs to a team will not look elsewhere to find a sense of belonging rather he / she does all in his / her own ability to ensure the objectives of the team are achieved. This is applicable to identification with the project team. The next factor in this category is job security and it was ranked 2nd. When workers have an understanding that they have a bright future with an organization, it motivates them to high productivity at all times. The factors motivating such a reaction are satisfaction with wages, the ability to sustain family, train children and opportunity for postgraduate studies.

The factor with the lowest influence is exercise of power and its rank 7th in this category. Every human being wants to be treated with respect and to be recognized. Commanding attitude at work may have moderate influence on achieving high productivity.

Table 10: Relative Importance Index and Ranks for Obstacles facing Construction Management Practice

Factors	RII	Rank
Lack of professional training	0.726087	3
Lack of construction management knowledge	0.91087	1
Bribery and corruption	0.815217	2
Lack of leadership commitment	0.508696	6
Incessant change of authority	0.573913	5
Rigid organization structure	0.684783	4

Table 11: Relative Importance Index and Rank for benefits of applying management tools in practice

Factors:	RII	Rank
Better communication	0.786957	3
Good management of resources	0.791304	2
Known work progress	0.88913	1
Defined goals and objectives	0.523913	6
Better quality	0.580435	5
Better work organization	0.519565	7
Better time utilization	0.693478	4

Table 10 shows that lack of construction management knowledge is ranked 1st in this category. This implies that most of the construction managers are not well trained in the art of construction management. Therefore to apply construction management tools in project life cycle becomes a serious problem to these untrained managers.

Table 11 reveals that Known work progress is ranked 1st in this category because the respondents believed that if management tools are well applied, it will lead to high productivity and success of the project, thereby affording the opportunity of tracking the project progress. This in line with the study of [4] that discovered that among other benefits, known work progress is a highly perceived benefit of applying construction management tool.

Good management of resources was ranked 2nd. The respondents believed that if construction management tools are well applied it will enhance better communication.

4. CONCLUSION AND RECOMMENDATION

The management of construction projects is influenced by clients, contractors, consultants, stakeholders, national economies and others.

(i) Lack of motivation of workers is of great importance in management of construction project in Nigeria. The result of the analysis shows that the important factors relative to motivation of workers are a sense of belonging and identification with project team, job security, opportunity to extend skills and experience, recognition of contribution, opportunity to career advancement. There are two factors that can be classified as poor indicators of motivating workers, which are exercise of power and paying of allowance.

(ii) Critical path method, Bar chart, Work breakdown structure, Cost benefit analysis are some of the applied tools and techniques by the respondents because of their simple and understanding nature, however lack of in-depth knowledge of this tools and techniques still form a crucial obstacle facing construction management practice. Among the management tools and techniques used in practice, CPM is the most critical and it has the advantage of revealing critical activities of a project from start to end. This affords good control of project activities and enhances prompt delivery of infrastructure.

(iii) Thus, from the analysis two of the three factors associated with socio-political conditions which are civil strife or riots and influence of protest action groups are of great importance more than environmental concerns. This may be as a result of incessant strikes by construction workers.

(iv) In terms of economic policy, material and equipment availability are very important. If there are no materials despite the availability of other resources it will result in no progress on the project. Also, the availability of equipment assists in getting job done quickly while lack of equipment leads to non-delivery of infrastructure on time.

(v) In terms of benefits, it has been observed that applying management tools efficiently will help in knowing work progress, good management of resources, better communication etc.

(vi) Also, both quality management during design and construction has a great influence in the management of construction project and project delivery time.

4.1 Recommendations:

Based on the findings of this research work, it becomes imperative, therefore to make the following recommendations:

(i) A proper motivation and safety systems should be established for improvement of productivity and success of construction projects.

(ii) Contractors are recommended to be more interested with sequencing of work according to schedule.

(iii) Contractors should come up with a clear plan and strategy before starting a project. Early project planning and scheduling of labour, equipment and cash, will help to ensure success and sustainable infrastructure.

(iv) There should be proper coordination and communication among various parties working on the project in order to improve management and a better control of the project.

(v) The construction industry should provide quality management guidelines and should be enforced by the consultants on projects. Stakeholders should be committed to quality management and adequate motivation should be given to workers.

(vi) It is recommended to develop human resources in the construction industry through proper and continuous training programs about management of construction projects. These programs can update their knowledge and can assist them to be more familiar with construction management techniques and processes. In addition, it is preferred to develop and improve the managerial skills of engineers in order to improve success of construction projects. These courses will lead to success delivery of construction projects such as availability of resources as planned through project duration, availability of personals with high experience and qualification, proper quality of equipment and raw materials used in project.

(vii) Adequate construction management training should be given to employee in charge of projects; this would increase the knowledge of employees about different construction management tools and techniques available for appropriate choice.

Also construction management professionals should be employed for proper and adequate application of construction management tools and techniques.

viii) Clients should evaluate the quality performance of contractors before awarding a contract.

ix) For sustainability of construction project, the quality of materials used in construction projects must not be compromised.

x) To ensure competence of the professionals in construction industry, the Council for Regulation of Engineering in Nigeria (COREN), the Nigeria Society of Engineers (NSE), the Nigeria Institution of Architects (NIA) and the government should jointly work together.

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