A STUDY OF FACTORS INFLUENCING OVERRUNS OF CONSTRUCTION PROJECTS IN NIGERIA

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ABSTRACT

The impact of cost and time overruns on construction projects is an undesirable experience both to the clients and stakeholders in the industry. This has regularly led to dispute, unfriendly working relationship, abandonment, low quality and environmental nuisances. This paper evaluated factors contributing to overruns of construction projects and their impact on projects performance in Nigeria. Data were collected through questionnaire administration on professionals in the industry. Mean Item Score (MIS) and Relative Significant Index (RSI) were employed to analyse data collected. Increase in material cost, inaccurate materials estimation and underestimating of project costs among others are the most significant cost factors while the most significant time factors include unexpected site condition, increase in project scope, lack of timely progress payment and inadequate planning. It becomes obvious that giving adequate consideration to factors contributing to construction overruns would minimize their ugly consequences on project performance and efficiency. Among recommendations made are that, cost estimators should improve on methods of cost determination, designers to make the full designs available at every stage in construction process and contractors should also carry out adequate site visit for better understanding of site conditions before pricing and cost forecasting.

Keywords: influencing factors, overruns, construction cost, construction time, project performance, construction process, cost forecasting, Nigeria

INTRODUCTION

The construction industry in Nigeria is of paramount importance for employment and economic growth (Ogunsemi and Jagboro, 2006). Kaize (1987) affirmed that construction expenditure accounts for about 50% of the Nigerian government expenditure. Time, cost, quality and satisfaction have been identified as the main criteria for measuring the overall success of construction

projects (Dissanayaka and Kumaraswamy, 1999). Chan and Kumaraswamy (1996) also established that a project is usually regarded as successful if it is completed on time, within budget and to the level of quality standard specified by the client at the beginning of the project. Balogun (2005) emphasized that the ultimate goal of any construction is to be delivered in the shortest possible time, at the lowest possible cost, with the highest quality while for many projects, this goal seems unachievable. He further affirmed confirmed that the Nigerian construction industry is faced with many problems and among those identified are late completion and cost overruns. Hence, improving construction efficiency by means of cost effectiveness and timeliness would certainly contribute to cost savings for Nigeria (Kaming et al., 1997).

Mbachu and Olaoye (1999) equally opined that the Nigerian construction industry today is bedeviled by the fact that almost all projects are completed after duration much longer than initially planned. Odusami and Olusanya (2000) also concluded that project executed in Lagos metropolis experienced an average delay of 51% of the planned duration for most projects. Jagboro (1987) in a Nigerian Institute of Quantity Surveyors (NIQS) survey conducted in 1981 showed that construction costs in Nigeria were about 40% more expensive than the same type of construction project in Kenya and Brazil; 35% more than in Britain and 30% more as compared with United State of America (USA). In this regards, most of the studies in Nigeria have focused on either cost or time overruns with very few examined cost and time overruns of building projects. Ogunsemi and Jagboro (2006) developed time-cost for building projects in Nigeria, Ojo and Dada (2005) assessed factors influencing contract period in the southwestern Nigeria, Otunola (2006) examined the perception of builders on time and cost overruns among others. In this regards, most of the studies in Nigeria have focused on either cost or time overruns with very few examined factors contributing to cost and time overruns of building projects. Therefore, with the prevalence of cost and time overruns of building projects and its ugly consequences on construction industry and Nigeria economy at large, this study attempts to appraise holistically factors contributing to cost and time overruns

of construction project by assessing the view of the professionals in the Nigerian construction industry.

LITERATURE REVIEW

The problem of overruns in construction industry is an international phenomenon, although the situation varies from nations. The rate of variation is influenced by lots of factors based on general economy and construction environments in those nations. Overruns to construction project could be multi-faceted ranging from cost, time, etc. This study investigated factors influencing cost and time overruns of construction projects in Nigeria and further described below:

Cost overruns

There is no action without a cause. Cost overruns in construction projects abound and factors contributing to cost overruns are numerous which have been brought to limelight by the outcome of many researches and studies. A study by Mansfield et al. (1994) on causes of delay and cost overruns in Nigerian construction projects investigated the important factors responsible for delays and cost overruns in highway construction project in Nigeria; inaccurate estimating was identified as one of the main reasons for excessive project overruns. Hackney (1997) study on control and management of capital projects raised three explanations for cost overruns, including technical, psychological and political-economic. Technical explanations account for cost overruns in term of imperfect forecasting techniques, inadequate data and so on. Psychological explanations account for overruns in terms of optism-bias with forecasters while political-economic explanation see overruns as the result of strategic misrepresentation of scope and/or budgets.

In another study by Kaming, Olomolaiye, Garry and Harris (2006) on factors influencing construction time and cost overruns on high rise projects in Indonesia attributes inflationary increases in materials cost, inaccurate material estimating and project complexity as the main causes of cost overruns. On the other hands, Merrow, Edward, Kenneth and Christopher (1981) in numerous studies found out that the greatest causes of cost growth was poorly defined scope at the time the budget was established.

Jackson and Gillian (1981) equally identified two major sources of construction cost overruns, that is, construction elements and operating expenses. Construction elements include construction materials (cement, aggregates, reinforcement etc), labour (payroll, taxes and all union dues), subcontractors and other direct cost (equipment and machine). While operating expenses include advertising, auto and truck expenses, bad debt, communications, office stationeries, taxes, travel and entertainment, salaries and other utilities.

Nwosu (2003) evaluated the factors responsible for high cost of building in Nigeria and the study revealed the importance of knowledge and experience with its effective utilization by the clients, consultants and contractors for project delivery within the client cost limit as very essential. The study also observed that inflation as a factor created a lot of social and economic problems including economic instability, low productivity, unemployment, rise in crimes, imperfect competitive market system and ineffective risk management. Otunola (2008) evaluated the perception of builders on contributory factors to construction cost and time overruns. The study showed that cost overruns could be traced to ineffective management of pre-contract as well as the post-contract stages of the project. However, among the causes or factors influencing cost overruns identified by Otunola (2008) are inflation, fluctuation in material and labour cost, government policy, delay in approving claims, variation/additional works, delay in sub-contractors works, bad estimation, poor planning, poor financial control and underpricing of tender.

Time overruns

Studies on time overrun or delay include Morris (1990), Chan and Kumaraswamy (1996), Proverbs, Holts and Olomolaiye (1998), Izam and Kolawole (1998), Ojo and Dada (2005), Kaming et al (2006), Otunola (2007) and Otunola (2008). Time factors identified by various researchers have been identified and factors contributing to time overruns by Morris (1990) include poor project design and implementation, bureaucratic in decision, inadequate funding of projects, lack of coordination, inclement weather, lack of resources, changes in scope of work, force majeure and on-sites/off-site dispute. The factors by Chan and Kumaraswamy (1996) study are project environment, the roles

and responsibilities of participants, managerial arrangements, human aspects, contract forms, planning and control system. Proverbs, Holts and Olomolaiye (1998) identified numbers of supervisory personnel and allowance for daily relaxation/rest times as factors impacting time overruns. In Nigeria, inadequate time escalation technique, satisfactory client and consultant, sufficient tender return date, qualified manpower and adequate database were identified by Izam and Kolawole (1998).

Ojo and Dada (2005) in Nigeria equally identified availability of resources, type and scope of work, topographic and climatic conditions, inadequate weather, location and access to site, civil commotion or strike etc as factors influencing time overruns.. Factors identified by Kaming et al (2006) comprised of design changes, poor labour productivity and inadequate planning. Otunola (2007) categorized delay into three: those caused by contractors, employers and those outside controls of parties. Otunola (2008) further identified earthquake, government legislation, tenement requirement, town and regional planning, lack of resources, design changes, changes in scope and specification, unpredictable weather conditions, errors and omission in design, poor site/soil condition, subcontractors as factors impacting time overruns.

The review of previous studies on overruns i.e. cost and time overruns of construction projects have been examined holistically and thoroughly explored. This gave a comprehensive list of probable factors influencing or impacting overruns (cost and time) of construction project. For the purpose of this study, a list of twenty-five (25) factors was made (Table 1) which was further grouped into pre-contract, post-contract and general factors. The pre-contract factors are those factors that most emanate at the early stage of any project and post-contract factors are those occurring at the construction process while general factors are those affecting project at both the early stage and construction process. The gap in knowledge from the previous studies is that most have not adequately explored those factors influencing overruns of construction projects in Nigeria. The paper therefore holistically assessed those factors impacting overruns and examined the impact of those factors on construction projects in Nigeria.

METHODOLOGY

Review of literature was carried out to establish those factors influencing overruns of construction projects in Nigeria. A total of 26 factors were identified and grouped into pre-contract factors, post-contract factors and general factors. The scope of this study was limited to construction projects in some selected states in Southwestern Nigeria including Lagos, Oyo and Osun. The respondents include architects, engineers, builders; quantity surveyors and others related professionals. Their lists were obtained from the directories of their professional bodies (Nigerian Institute of Architect, Nigerian Institute of Building, Nigerian Institute of Quantity Surveyors among others). The primary data for this study were collected by the administration of a well-structured questionnaire which was divided into two sections accompanied by a covering letter to introduce the topic and instructions to be followed by the respondents. Section A comprised the description of the study area and demographical information of the respondents. Section B contained the specific questions addressing the objectives of this study. The respondents' opinions on these questions were examined using five-point Likert scale from 5(strongly agree) to 1(strongly disagree) and three-point Likert scale from 3(often) to 1(never). A total of 110 copies of questionnaire were administered using random sampling technique out of which sixty (60) copies were retrieved and used for analysis which gave a response rate of 55%. The data collected were analysed using Mean Item Score (MIS). This method of analysis has been employed by other construction management studies (Akintoye, 2000; Wang et al., 2001 and Odeyinka, 2003) and considered adequate although designated as Mean Response Analysis (MRA). The mean item score was determined as follow:

Mean Item Score:

$$\frac{5n_5 + 4n_4 + 3n_3 + 2n_2 + 1n_1}{(n_5 + n_4 + n_3 + n_2 + n_1)}$$

Where $n_{5=}$ number of respondent who picked 5
$n_{4=}$ number of respondent who picked 4
$n_{3=}$ number of respondent who picked 3
$n_{2=}$ number of respondent who picked 2
$n_{1=}$ number of respondent who picked 1

RESULTS AND DISCUSSIONS OF FINDINGS

Tables 1-2 show the distribution of questionnaire in the study area and among organizations in the study area. The study area was Lagos, Oyo and Osun in Southwestern Nigeria. The Table 1 shows that 16(46%), 11(31%) and 8(23%) were distributed in Osun, Oyo and Lagos states respectively. This is considered adequate because Oyo and Lagos are oldest states in Nigeria with ancients' cities as the state capitals where there is high concentration of construction activities and construction professionals in the country. In another word, Lagos was the former Nigeria federal capital territory. Table 2 also indicates that 10(29%), 13(37%) and 12(23%) were distributed to contracting firms, consulting firms and government establishments/parastatals. This is adequate because it gives a due representation of both the public and private sector in the assessment process.

Table 1: Distribution of Questionnaire in the study area

State	Number of Respondent	Percentage (%)
Osun	16	46
Oyo	11	31
Lagos	8	23
Total	**35**	**100**

Table 2: Distribution of Questionnaire by organizations

S/N	Number of Respondent	Percentage (%)
Contracting	10	29
Consulting	13	37
Government parastatals	12	34
Total	**35**	**100**

Tables 3-6 below gave the demographic information of the respondents who are the professionals in the construction industry in Nigeria. The socio-economic characteristics assessed include their designation, highest academic qualification, professional qualification and years of work experience. Table 3 indicates that 10(29%) were architects, 13(37%) quantity surveyors, 9(26%) engineers and 7(20%) were builders. The result from Table 4 shows the highest academic qualification of the respondents, none of them has PhD, 5(14%) are holders of Master of Science, 19(54%) hold Bachelor of Science and 11(32%) hold Higher

National Diploma. The respondents are considered to have adequate academic qualifications which made the outcome of their responses reliable information.

The level of professionalism of the respondents was appraised by Table 5, the result obtained indicates that 4(11%), 9(26%), 7(20%) and 5(14%) were members of Nigerian Institute of Architect, Nigerian Institute Quantity Surveyors, Nigerian Society of Engineers and Nigerian Institute of Building. 10(2%) indicated that they were not yet a qualified members of their professional bodies. This shows that more than 70% of the respondents are registered members of various professional bodies. Those not-qualified are either under training or awaiting professional induction by the various professional institutes. Another major factor that could influence the reliability of their responses is their years of works experience. Table 6 illustrates that 9(26%), 13(37%), 5(14), 6(17%) and 2(6%) had 0-5yrs, 6-10yrs, 11-15yrs, 16-20yrs and Above 20yrs respectively. The mean of year of experience of the respondents was estimated at 10 years. With the percentage distribution and mean estimated, the respondents had adequate years of work experiences.

Table 3: Designation of Respondents

S/N	Number of Respondent	Percentage (%)
Architect	6	17
Quantity Surveyor	13	37
Engineer	9	26
Builder	7	20
Total	**35**	**100**

Table 4: Highest Academic Qualifications of Respondents

Qualification	Number of Respondent	Percentage (%)
PhD	-	-
M.Sc.	5	14
B.Sc.	19	54
HND	11	32
Total	**35**	**100**

Table 5: Professional Qualifications of Respondents

S/N	Number of Respondent	Percentage (%)
MNIA	4	11
MNIQS	9	26
MNSE	7	20
MNIOB	5	14
Non-Qualified	10	29
Total	**35**	**100**

Table 6: Respondents' Work Experience

S/N	Number of Respondent (F)	Percentage (%)	Mid-Point (X)	FX
0-5yrs	9	26	2.5	22.5
6-10yrs	13	37	8	104
11-15yrs	5	14	13	65
16-20yrs	6	17	18	108
Above 20yrs	2	6	23	46
Total	**35**			**345.5**

Mean = 10

Table 7 shows the RSI of factors contributing to cost overruns of construction projects in Nigeria. A total of 26 factors identified were further grouped into pre-contract with 6 factors, post-contract with 11factors and 7 general factors. Pre-contract factors are those mostly occurred at the early stage of construction project while post-contract factors are those factors influencing construction activities at the early stage of project. General factors are those that could influence construction activities either at the early stage or late during the construction processes. All factors at the pre-contract, post-contract and those general were all significant. But at the pre-contract stage, the result obtained shows that the most significant factors influencing overrun of cost of construction in Nigeria include inaccurate materials estimation with RSI (0.9143), underestimating of project costs (RSI = 0.9143) and incomplete projects information (RSI = 0.8476) and

the least significant include bureaucratic in design (0.6762), contingencies estimating practices (RSI = 0.7333) among other. The result depicts that cost overrun of construction projects in Nigeria often emanate from poor estimating practices among cost engineers/cost estimators and poor or late preparation of project information by the designers in the industry. At the post-contract stage, the research outcome indicates that all factors identified were significant but the results obtained categorized inflationary increase in material cost (RSI = 0.9238) as the most significant followed by increase in project scope (RSI = 0.9048), unexpected site conditions (RSI = 0.8857) and design changes during construction (RSI = 0.8857) while the least significant include number of subcontractors (RSI = 0.7238) and lack of communication between the client and contractor (RSI = 0.7810). The result shows that factors influencing overrun of construction cost at the construction stage are associated with economy policy like inflation, variations in both the site conditions and clients' taste and requirements. Assessment of factors associated with both the pre-contract and post-contract stages of construction projects i.e. general factors ranked poorly defined scope as the most significant with RSI 0.8476 followed by inadequate planning (RSI= 0.8190), project planning location (RSI= 0.8190) and poor risk analysis (RSI= 0.8190) while timeliness of project information and project complexity and project type with RSI 0.7048, 0.7810 and 0.8000 among other were ranked low among the list of factors. This shows that the general problems related to the construction projects cost were associated with poor definition of project scope, poor planning, site characteristics and poor risk evaluation. The general assessment of all factors show that the most significant are inflationary increase in material cost, inaccurate materials estimation, underestimating of project costs, increase in project scope among others.

TABLE 7: RELATIVE SIGNIFICANT INDEX (RSI) OF FACTORS CONTRIBUTING TO COST OVERRUNS OF CONSTRUCTION PROJECTS IN NIGERIA

S/N	Factors	MIS	RSI	Rank	Overall Rank
A	**PRE-CONTRACT FACTORS**				
A1	Poor project design and implementation	2.51	0.8381	4	11
A2	Bureaucratic in design	2.03	0.6762	6	25
A3	Inaccurate materials estimation	2.74	0.9143	1	2
A4	Contingencies estimating practices	2.20	0.7333	5	22
A5	Underestimating of project costs	2.74	0.9143	1	2
A6	Incomplete project information	2.54	0.8476	3	7
B	**POST-CONTRACT FACTORS**				
B1	Inadequate funding of project	2.54	0.8476	5	7
B2	Lack of coordination between enterprises	2.51	0.8381	7	11
B3	Unexpected site condition	2.66	0.8857	3	5
B4	Increase in project scope	2.71	0.9048	2	4
B5	Poor labour productivity	2.43	0.8095	8	16
B6	Design changes during construction	2.66	0.8857	3	5
B7	Inflationary increase in material cost	2.77	0.9238	1	1
B8	Lack of timely progress payment	2.37	0.7905	9	18
B9	Number of subcontractors	2.17	0.7238	12	23
B10	Inclement weather	2.54	0.8476	5	7
B11	Poor working relationship between client and contractor	2.37	0.7905	9	18
B12	Lack of communication between the client and contractor	2.34	0.7810	11	20
C	**GENERAL FACTORS**				
C1	Inadequate planning	2.46	0.8190	2	13
C2	Project complexity	2.34	0.7810	6	20
C3	Project type	2.40	0.8000	5	17
C4	Project location	2.46	0.8190	2	13
C5	Poorly defined scope	2.54	0.8476	1	7
C6	Poor risk analysis	2.46	0.8190	2	13
C7	Timeliness of project information	2.11	0.7048	7	24

Table 8 describes the RSI of factors contributing to time overrun of construction projects in Nigeria. At the pre-contract stage, the highest ranked factors are poor project design and implementation (RSI = 0.8762) and underestimating of project costs (RSI = 0.8762). Other factors include incomplete project information (0.8286), bureaucratic in design (0.7714), contingencies estimating practices (0.7524) and inaccurate materials estimation (0.7238). This implies that factors influencing time overruns at pre-contract stage are associated with poor design and cost estimating and insufficient project information. At the post-contract stage, unexpected site condition (RSI = 0.8857), increase in project scope (RSI = 0.8857) and lack of timely progress payment (RSI = 0.8857) were ranked highest. Other time factors include inadequate funding of project, inclement weather and poor working relationship between client and contractors with RSI 0.8762 among others. Inadequate planning was ranked highest with RSI 0.8857. This indicates that factors contributing to time overrun at the post-contract stage were associated with differential site condition, changes in scope and poor payment structure of construction projects. Other time factors include poorly defined scope (0.8667), project complexity (0.8381), and timeliness of project information (0.8095) among others. This shows that factors contributing to time overrun were associated to nature and project information. From the overall ranking, the highest significant factors influencing time overruns include unexpected site condition, increase in project scope, lack of timely progress payment and inadequate planning. Others include poor project design and implementation, underestimating of project costs, inadequate funding of project, inclement weather, poor working relationship between client and contractor.

TABLE 8: RELATIVE SIGNIFICANT INDEX (RSI) OF FACTORS CONTRIBUTING TO TIME OVERRUNS OF CONSTRUCTION PROJECTS IN NIGERIA

S/N	Factors	MIS	RSI	Rank	Overall Rank
A	**PRE-CONTRACT FACTORS**				
A1	Poor project design and implementation	2.63	0.8762	1	5
A2	Bureaucratic in design	2.31	0.7714	4	19
A3	Inaccurate materials estimation	2.17	0.7238	6	23
A4	Contingencies estimating practices	2.26	0.7524	5	21
A5	Underestimating of project costs	2.63	0.8762	1	5
A6	Incomplete project information	2.49	0.8286	3	15
B	**POST-CONTRACT FACTORS**				
B1	Inadequate funding of project	2.63	0.8762	4	5
B2	Lack of coordination between enterprises	2.60	0.8667	7	10
B3	Unexpected site condition	2.66	0.8857	1	1
B4	Increase in project scope	2.66	0.8857	1	1
B5	Poor labour productivity	2.49	0.8286	10	15
B6	Design changes during construction	2.60	0.8667	7	10
B7	Inflationary increase in material cost	2.03	0.6762	12	25
B8	Lack of timely progress payment	2.66	0.8857	1	1
B9	Number of subcontractors	2.09	0.6952	11	24
B10	Inclement weather	2.63	0.8762	4	5
B11	Poor working relationship between client and contractor	2.63	0.8762	4	5
B12	Lack of communication between the client and contractor	2.57	0.8571	9	13
C	**GENERAL FACTORS**				
C1	Inadequate planning	2.66	0.8857	1	1
C2	Project complexity	2.51	0.8381	3	14
C3	Project type	2.26	0.7524	7	21
C4	Project location	2.31	0.7714	6	19
C5	Poorly defined scope	2.60	0.8667	2	10
C6	Poor risk analysis	2.34	0.7810	5	18
C7	Timeliness of project information	2.43	0.8095	4	17

CONCLUSION AND RECOMMENDATIONS

The construction project overruns is a great concern to both the clients, professionals and other stakeholders in the industry. In Nigeria, cost overrun of construction projects at pre-construction stage often emanate from poor estimating practices and poor or late preparation of project information by the professional in the industry. At the construction stage, cost overrun was associated with economy policy like inflation, variations in both the site conditions and clients' taste and requirements. In general, overrun related to the construction projects cost were associated with poor definition of project scope, poor planning, site characteristics and poor risk evaluation. The general assessment of all factors also illustrated that the most significant cost overrun factors are inflationary increase in material cost, inaccurate materials estimation, underestimating of project costs, and increase in project scope among others.

Moreover, factors influencing time overruns at pre-contract stage are associated with poor design, poor cost estimating and insufficient project information. Also, factors contributing to time overrun at the post-contract stage were associated with differential site condition, changes in scope and poor payment structure at construction stages. In general terms, factors contributing to time overrun were associated with the nature and project information. From the overall ranking, the highest significant factors influencing time overruns include unexpected site condition, increase in project scope, lack of timely progress payment and inadequate planning. Others include poor project design and implementation, underestimating of project costs, inadequate funding of project, inclement weather, poor working relationship between client and contractor.

Having identified those factors contributing to cost and time overruns of construction project, it becomes obvious that giving adequate consideration to them at both design and construction stages would help to reduce their ugly consequences on construction project performance, effectiveness and efficiency. The paper recommends that;

- It is expedient that all professionals in charge of construction costs must improve on the methods of cost determination, forecasting and management. They should

also be kept abreast of government policy as it affects construction costs.

- Designers should also get all project information ready at the design and construction stage of any projects.
- Contractors should as well ensure that adequate site visit and assessment is carried out before embarking on construction project pricing and makes sure that necessary cost data are provided to the estimator for the purpose of cost efficiency and adequacy. Constructors should also understand the possible long-term effect of site conditions on overall construction cost and time. This will invariably reduce the level of cost and time overruns and their ugly consequences on construction project delivery in Nigeria.

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