
ASSESSMENT OF TIME LINE PERFORMANCE OF BUILDING PROJECTS IN NIGERIA

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ABSTRACT

Construction time line has been acknowledged as important performance criteria for measuring success across building projects. Delays are treating in construction industry, its magnitude being varied considerably from project to project. The aim of this research work was to assess the factors affecting time line performance of building projects in Nigeria and ways for improving them. To achieve this, data for the study was collected through a structured questionnaire survey which investigated construction professionals working in clients, consultants and contracting organizations to assess the effects of identified factors affecting time performance of building projects. In order to achieve the objectives, an extensive literature review was carried out. Thirty-six (36) factors that are likely to affect time performance were identified. Data collected were analyzed using relative importance index. Findings of the study revealed that ten (10) key factors as having stronger effect on the time performance of building project out of the thirty-six (36) different factors identified from reviewed literatures. Factors having critical effect on time performance of building projects among others includes ineffective planning and scheduling of project by contractors, change order by owners during construction and late in revising and approving design documents by owners, improper construction methods used by contractors. To improve the time performance of building projects, effective planning, progress payments, minimizing change orders and early review and approval of designs should be considered by clients, consultants and contractors.

Keywords: *Building projects, delays, time performance*

INTRODUCTION

Time is defined as the duration, considered independently of any system of measurement or part of duration, whether past, present, or future; a point or portion of duration; as, the time was, or has been; the time is, or will be (Brainy quote, 2009). Time is described as a basic component of the measuring system used to sequence events, to compare the durations of events and the intervals between them, and to quantify the motions of objects. It is also being described as a period of time considered as a resource under ones control and sufficient to accomplish something (Wikipedia, 2009). Construction time has been acknowledged by construction researchers and industry practitioners over the past three decades as one of the most important performance criteria of many successful building projects (Chan and Chan, 2003). Realistic construction time is now increasingly important because it often serves as a crucial benchmark for assessing the performance of a project. Time overrun over the last three decades has been an issue in the construction industry, it's been reported that there had been 50% to 80% delays on 1627 world bank sponsored projects between 1974 and 1988, together with an average of 23.2% time overrun on UK government construction projects from 1993 to 1994 (Chan & Kumaraswamy, 2002).

According to (Xiao and Proverbs, 2002) international comparisons of contractor performance can provide robust benchmarks for contractors in different countries and allow them to learn from one another. In the study, a survey-based approach that considered construction time, time certainty, extent of delay, and client satisfaction was used in evaluating and comparing the construction time performance of contractors in Japan, the UK and the US. In the survey, Japanese contractors performed significantly better than their UK and US counterparts. UK contractors were superior to US contractors in construction time and extent of delay, and inferior in time certainty and client satisfaction, but without any statistically significant differences. Clients or consumers are no longer content merely with minimal cost, adequate functional performance, increasing interest rates, inflation and other commercial pressures, among other factors but shows concern on shortest possible time of having building project completed (Nkado,1995). Morris & Hugh (1980) cited in (Koushki et al, 2005) examine the records of more than 400 construction projects and found that project were rarely finished on time.

There are number of unexpected problems and changes from original design arising during the construction phase, leading to cost and time overruns. 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 (Oseghale & Ata, 2008). Odeyinka and Yusuf (1997) cited in (Oseghale et al, 2008) observe that seven out of every ten projects suffer delay in Nigeria. It is therefore, very important to identify the factors responsible for time performance of building projects in Nigeria. Delays occur in every construction project and the magnitude of these delays varies considerably from project to project. So it is essential to define the actual causes of delay in order to minimize and avoid delays in any construction project (Alaghbari, Kadir & Salim, 2007). Therefore, exploring the reasons for delay is one of the prerequisites of keeping the cost within budget and of good construction time performance. It is against this background that the study of factors affecting time performance of building projects is significant. The main aim of this study is to assess the effects of factors affecting time performance of building projects in Nigeria with a view to minimizing or avoiding them. The objectives of the study are:

- i. To identify the factors affecting time performance of building projects.
- ii. To evaluate the effects of time performance of building projects.
- iii. To identify ways to improve the time performance of building projects.

The scope of the research will focus on time performance of building projects. Only residential building projects located in Kaduna state were considered. Projects studied are ongoing and completed projects for public and private building clients. The choice of residential buildings is because they are the commonest and the most demanded form of construction due to their strategic importance to the social and political status of the human race. The only limitation to this study was that some of the respondents may have a limited understanding of some factors and therefore could not provide all the information requested in the questionnaire.

MATERIALS AND METHODS

Data Collection Techniques

Data for this study was collected through the administration of questionnaire to the construction industry professionals working in client's organizations, consulting firms and construction companies. Data needed for the research was collected using a questionnaire designed to elicit relevant information from the respondent (sample of the questionnaire is attached in Appendix I). The questionnaire was divided into two parts. The first part requested background information about the respondents. The second part focused on the factors affecting time performance of building projects. These factors are classified into nine (9) groups: Factors related to project, client, contractor, consultant, design, materials, equipment, labour and external factors. The respondents were asked to highlight their recommendations through an open-ended question. A four point Likert scale ranging from 1 (always) to 4 (rarely) was adopted to capture the factors affecting time performance of building projects.

Population and Sample

In collecting data for this study, simple random sampling technique was adopted. This will give each element in the population an equal chance of appearing in the selection thereby eliminating bias.

Questionnaire Survey

A questionnaire survey was undertaken to assess the perceptions of clients, consultants and contractors on the factors affecting the time performance of building projects in Nigeria. Seventy five (75) sets of questionnaires were distributed randomly to potential respondents at all levels in the organizations within the construction industry. Twenty five (25) sets each were distributed to clients, consultants and contractors organizations respectively. A total of fifty (50) completed questionnaires were returned in a usable format, representing a 67% response rate. This was considered adequate for the analysis based on the assertion by Moser and Kalton (1971) that the result of a survey could be considered as biased and of little value if the return rate was lower than 30-40%.

Data Analysis Technique

Data collected from the respondents were analyzed using the following statistical techniques and indices.

Relative Importance Index (RII)

This method was adopted to analyze the data collected from the questionnaire survey. The four-point scale 1-4 mentioned earlier was transformed to relative importance indices for each factor affecting the time performance of building projects. The relative importance index (RII) was calculated for each item as follows:

$$RII = \frac{\sum W}{A \times N}$$

Where:

W = weighting given to each factor by the respondents (ranging from 1 to 4)

A = highest weight (i.e. 4 in this case)

N = total number of respondents.

RESULTS AND DISCUSSION

This chapter present and explain the results obtained in the study and interprets the analysis of the data collected.

Data Presentation

This section presents and explains the results obtained from a survey questionnaire. A total of seventy-five (75) questionnaires were administered and fifty (50) of them were returned completed.

Table 3.2 Profession of Respondents

S/N	Profession	Frequency	Percentage
i.	Architecture	10	20%
ii.	Building	8	16%
iii.	Engineering	12	24%
iv.	Project Management	2	4%
v.	Quantity Surveying	18	36%
Total		50	100%

Table 3.2 indicates that majority of the respondents are Quantity Surveyors (36%). This is followed by Engineers (25%), Architects (20%) and Builders (16%). The lowest response is that of the Project Managers (5%).

Table 3.3 Qualification of Respondents

S/N	Qualification	Frequency	Percentage
i.	HND	18	36%
ii.	B.Sc	18	36%
iii.	PGD	4	8%
iv.	M.Sc	10	20%
Total		50	100%

Table 3.3 indicates that 36% of respondents are HND and B.Sc holders. M.Sc 20% and PGD with 8%.

Table 3.4 Experience of Respondents

S/N	Experience	Frequency	Percentage
i.	Less than 5 years	15	30%
ii.	5 – 10 years	20	40%
iii.	11 – 15 years	8	16%
iv.	16 – 20 years	2	4%
v.	21 – 25 years	5	10%
Total		50	100%

Table 3.4 indicates that majority of the respondents (56%) have working experience ranging from 5 - 15 years in the building industry. It is reasonable to say that, respondents have adequate knowledge in his/her discipline; therefore, data obtained from these respondents can be deemed to be reliable.

Table 3.5 Type of Organization of Respondents

S/N	Organization	Frequency	Percentage
i.	Client	18	36%
ii.	Consultant	18	36%
iii.	Contractor	14	28%
Total		50	100%

Table 3.5 indicates that 36% of the respondents are from clients and consultants organizations, while the remaining 28% are from contracting organizations.

Table 3.6 Relative Importance Index and Ranking of Factors Affecting Time Performance of Building Projects

Factors	Index	Rank
<i>Project Related Factors</i>		
Original contract duration is too short	2.80	24
Inadequate definition of substantial completion	2.79	25
Type of construction contract	2.75	28
Type of project bidding and award	3.13	9

Client Related Factors

Delay in progress payment	3.23	6
Change order by owner during construction	3.40	2
Late in revising and approving design documents	3.40	2
Slowness in decision making process	3.15	8

Factors	Index	Rank
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Contractor Related Factors

Difficulties in financing project	3.16	7
Ineffective planning and scheduling of project	3.45	1
Delays in subcontractors work	3.29	4
Improper construction methods implemented	3.33	3

Consultant Related Factors

Delay in performing inspection and testing	3.03	13
Delay in approving major changes in the scope of work	3.27	5
Poor communication and coordination	3.03	13
Inadequate experience of consultants	2.80	24

Design Related Factors

Mistakes and discrepancies in design documents	3.16	7
Delay in producing design documents	3.10	11
Unclear and inadequate detailed drawing	3.12	10
Insufficient data collection and survey before design	3.00	15

Material Related Factors

Shortage of construction materials in the market	2.95	18
Changes in materials type and specifications during construction	3.01	14

Delay in materials delivery	3.13	9
Late procurement of materials	2.94	19

Factors	Index	Rank
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Equipment Related Factors

Equipment breakdowns	2.78	26
Shortage of equipment	2.89	22
Low level of equipment operator's skill	2.90	21
Low productivity and efficiency of equipment	2.91	20

Labour Related Factors

Shortage of labour	3.05	12
Unqualified workforce	2.99	16
Low productivity level of labour	2.97	17
Personal conflict among labours	2.61	29

External Factors

Effect of subsoil condition	2.91	20
Weather condition	2.75	28
Delay in obtaining permits from the relevant authorities	2.84	23
Change in government regulations and laws	2.76	27

A total of thirty-six (36) factors responsible for time performance of building projects were identified, analyzed and ranked. The ten (10) most important factors affecting time performance of building projects as shown in Table 3.6 were: ineffective planning and scheduling of project by contractors (RII = 3.45). Contractors often fail to come out with a practical and workable "work programme" at the initial planning stage. This failure is interrelated with lack of systematic site management and inadequate contractor's experience towards the project. The consultant only checks to review the work programme submitted by the contractors based on experience and intuitive judgment. Improper planning at the initial stages of a project manifests throughout the project and

causes delay at various stages and has been considered by respondents as the major factor affecting time performance of building projects. Change order by owner during construction and late in revising and approving design documents by clients (RII = 3.40). Frequent interference of clients by way of making major changes to the design requirements during execution can cause inordinate delays to a project. Client's inability to make necessary revision and approval of design documents in good time has been another source of concern to the contractors, all these were considered as the second most important factor contributing to the cause of delay in project execution. Improper construction methods implemented by contractors (RII = 3.33), contractors poor implementation of constructional methods is one of the most significant causes in causing the construction delay. The result of this research indicates that local contractors face deficiency in site planning, implementation and controls. Table 3.6 also reveals that delay in subcontractors work (RII = 3.29) affects time performance of building projects, this is because projects can be delayed if the subcontractor working under the main contractor underperforms because of inadequate experience or capability or even because he was not appointed by the client in good time. Delay in approving major changes in the scope of work (RII = 3.27), consultants inability to issue necessary approvals or instructions affects contractors progress thereby causing delay to the regular progress of work. Delay in progress payment (RII = 3.23).

The result of this research indicates that construction works involve huge amount of money and most of the contractors find it very difficult to bear the heavy daily expenses when the payments are delayed. Work progress can be delayed due to the late payment from the clients because there is inadequate cash flow to support construction expenses especially for those contractors who are not financially sound. Difficulties in financing project by the contractor and mistakes and discrepancies in design documents (RII = 3.16), this shows that many contractors do not have sound financial backing, they only depend on the client for advance payment and monthly progress payments. Progress of work on site is usually delayed because of the contractors' cash flow problems. The result also shows mistakes and discrepancies in design documents are common reasons for redoing designs and drawings and may take a long time to make necessary corrections as another important factor. Slowness in decision making process by client (RII = 3.15), the findings also shows that clients takes longer than necessary to make decisions on issues that are important and needs their input or clarification, this may cause unnecessary delay to the project. Type of project bidding and delay in materials delivery (RII = 3.13). This shows that the approach to award of contract by client in giving more priority to the lowest bidder and less to their capabilities can affect the time performance of projects. Delay in materials delivery can equally make some activities to be on hold due to lack of certain materials, which will in turn mean delaying the entire project time. Unclear and inadequate detailed drawings (RII = 3.12). Adequate details are not always readily available during the construction stage, contractors could not proceed where the consultants did not provide details and this could be a potential source of delay to the project. Furthermore, delay in producing design documents by consultants (RII = 3.10), shortage of labour (RII = 3.05), delay in performing inspection and testing and poor communication and coordination by consultants (RII = 3.03), change in materials type and specifications during construction (RII = 3.01), insufficient data collection and survey before design (RII = 3.00), unqualified workforce (RII = 2.99), low productivity level of

labour (RII = 2.97), shortage of construction materials in the market (RII = 2.95), late procurement of materials (RII = 2.94), and low productivity and efficiency of equipment and effect of soil condition (RII = 2.91). Others includes: low level of equipment operator's skill (RII = 2.90), shortage of equipment (RII = 2.89), delay in obtaining permits from the relevant authorities (RII = 2.84) and original contract duration is too short and inadequate experience of consultants (RII = 2.80) have been identified among other factors as being responsible for lack of time performance of building projects. The result also shows that the least important factors affecting time performance of building projects based on the overall rankings were: (1) inadequate definition of substantial completion (RII = 2.79), (2) equipment breakdowns (RII = 2.78), (3) change in government regulations and laws (RII = 2.76), (4) weather condition (RII = 2.75) and (5) personal conflict among labours (RII = 2.61).

SUMMARY, CONCLUSION AND RECOMMENDATION

Summary

Data for the research was collected using questionnaire. The information collected covered perception of clients, consultants and contractors regarding the factors affecting time performance of building projects and ways to improve them. Data obtained from the survey was analyzed using the importance index. The major factors affecting time performance of building projects were identified and ranked. The top five most important factors affecting time performance are: ineffective planning and scheduling by contractors, change order by owner during construction and late in revising and approving design documents, improper construction methods implemented by contractors, delay in subcontractors work and delay in approving major changes in the scope of work by the consultants. To improve the time performance of building projects, effective planning, progress payments, minimizing change orders and early review and approval of designs among others are some of the essential factors to be considered by clients, consultants and contractors.

Conclusions

The important issue focused on in this research is the delay of construction projects. Delays are considered to be serious problem in the construction industry for owners and contractors, this study examines the factors that are responsible for time performance or causes of delay in residential buildings in Kaduna state. The result of the analysis showed a total of thirty-six (36) variables examined. The main finding of this research is that ineffective planning and scheduling by contractors is the major factor affecting time performance of building projects. Change orders by owners during construction and late in revising and approving of design documents by clients, improper construction methods implemented by contractors are considered as second and third factors that affects the time performance of building projects respectively.

Recommendation

The following points are recommended to all parties (clients, consultants and contractors) in order to improve the time performance of building projects. Clients (owners) should give special attention to the following factors:

- i. Pay progress payment to the contractors on time because it impairs the contractors' ability to finance the work.
- ii. Minimize change orders during construction to avoid delays.
- iii. Clients should ensure that contractors are not selected based only on the lowest bid. The selected contractor must have sufficient experience, technical knowhow, financial capability and sufficient manpower to execute the project.
- iv. Clients must make quick decisions to solve any problem that arise during the execution.
- v. Avoid delay in reviewing and approving design documents than the anticipated. Consultants should consider the following factors:
 - i. Consultants should monitor the work closely by carrying out inspections and tests at appropriate times.
 - ii. Consultants should ensure early approval of major changes to the scope of the work.
 - iii. Proper communication channels between the parties must be established during the planning and execution stage.
 - iv. Early review and approval of design documents by the consultants.
 - v. Advise clients on early nomination and appointment of subcontractors to avoid causing delays to the main contractors work.

Finally, contractors should look to the following points:

- i. Contractors should manage their financial resources and plan cash flow by utilizing progress payments.
- ii. Contractors must plan their work properly and provide the entire schedule to the client.
- iii. Integration of subcontractors work schedule into the main contractors programme of work.
- iv. Contractors should adopt realistic and proper constructional methods.
- v. Early procurement of materials to avoid unnecessary delays.

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