

# CAUSES AND EFFECTS OF DELAYS IN CONSTRUCTION PROJECTS IN AKURE, ONDO STATE, NIGERIA

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## **Abstract**

*Construction is an everlasting activity across the globe. Likewise, the problem of delay in the construction industry is a global phenomenon. There are several reasons that may be responsible for delay during construction, these reasons may vary from place to place and such delays can be reduced to the minimum when its causes are identified. This study considered the major causes and effects of delay in the execution of construction projects in Akure, Ondo State, Nigeria. Using literatures, a total number of 30 causes of construction delays were identified. Purposive sampling technique was used to select sixty respondents for the survey. The respondents comprise twenty-two (22) clients, eighteen consultants (18) and twenty (20) contractors. The analyses of the primary data revealed that the three most important causes of delay in construction projects in Akure, Ondo State Nigeria are poor site management and supervision, contractor inexperience and client's financial difficulties. Based on the findings of this study, recommendations were given on how the causes and effects of delay in construction can be mitigated.*

**Keywords:** causes, construction projects, effects, site management, supervision

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## **1. Introduction**

Ever since the dawn of civilization, man has indulged in some form of construction activity. In most countries, construction activity constitutes 6-9% of the gross domestic product (GDP) and more than half of the fixed capital formation as infrastructure and public utilities required for economic development (Chitkara, 2009). Like most developing countries such as Saudi Arabia, Libya and Malaysia, a major criticism faced by the Nigerian construction industry is the growing rate of delay in project delivery (Assaf, Alkhalil and Al-Hazmi, 1995; Saleh, 2009 and Yong, 1988). Majority of the construction projects in Nigeria experience delays which in turn lead to disputes, arbitration, litigation and sometimes the total abandonment of the project.

In construction, the term “delay” refers to something happening at a later time than planned, expected and specified in a contract or beyond the date agreed upon for the delivery of a project (Pickavance, 2005). Research has shown that timely delivery of projects within budget and to the level of quality standard specified by the client is an index of successful project delivery (Chan and Kumaraswamy, 1994). The investigation of Odeyinka and Yusuf (1997) shows that seven out of ten projects surveyed in housing projects in Nigeria suffered delay in their execution. The motivating factor for this study is the need for awareness on the causes and the effects of these delays on construction projects in Akure, South-West Nigeria. The study area represents an area of rapid construction development observed in the number of on-going projects in the city. The question of how the problem of delays can be solved are considered and addressed in this study.

The paper will provide insight and understanding into the causes of delays occasioned by the main project players: clients, contractors and consultants. It is expected that findings from this study will guide efforts to improve the performance of construction industry in addition to providing better ways and methods of delivering construction projects by minimizing the major causes of delay and consequently, its effects. Construction projects investigated in this study include administrative buildings, school buildings, medical centres, communication facilities and civil engineering projects. The target respondents for the study are the principal actors in the Akure construction industry namely: the clients, consultants and contractors.

## **2. Literature Review**

Lo, Fung and Tung,(2006) define delay as the slowing down of work without stopping construction entirely, which can lead to time over-run either beyond the contract date or beyond the date that project parties have agreed upon for the delivery of the project. Delay occurs in every construction project and the significance of this delay varies considerably from project to project. Although there are differences in perception of researchers on the causes of delay and its relative significance, extensive review of literatures shows that the causes of delay in the construction industry of developing economies can be classified into three:

- i. Shortages or inadequacies in industry infrastructure, mainly supply of resources;
- ii. Problems caused by clients and consultants; and
- iii. Problems caused by incompetence of contractors (Ogunlana, Prokuntong, Jearrkjirm, 1996, Kumaraswamy and Chan, 1998 and Maura, teixeira and Pires, 2007).

In the same vein, Mansfield, Ugwu and Doran, (1994) addressed the causes of delays in Nigeria building projects. The important causes of delay identified by Mansfield et al. (1994) include: financing of and payment for completed works, poor contract management, changes in site condition and shortages in materials. Mezher and Tawil, (1998) conducted a survey on the causes of delays in the construction industry in Lebanon from the perspective of the clients, contractors and architectural/engineering firms. It was found that clients are more concerned with financial issues; contractors considered contractual relationships as the most important, while consultants considered project management issues as the major cause of delays. In evaluating the progress reports of 164 building and 28 highway projects constructed during the period of 1997 to 1999 in Jordan, Abdullah and Battaineh (2000) revealed that delay is extensive: with the average ratio of actual completion time to the planned duration being 160.5% for road projects and 120.3% for building projects. Al-Momani (2000) conducted a quantitative analysis of construction delays by examining the records of 130 public building projects constructed in Jordan between 1990 and 1997. The analysis showed that the main causes of delay in construction projects were designing, user changes, weather, site conditions, late deliveries, economic conditions and increases in quantities.

### **2.1 Classification and Causes of Delay**

There are different categories of delays in construction identified in the literature. Specifically, Bolton (1990) classified construction delay as follows:

- i. Excusable but non-compensable delay, caused by occurrences which are not attributable to any of the parties;

- ii. Compensable delay, resulting from acts or omissions of the owner or someone for whose acts an owner is liable.
- iii. Inexcusable delay resulting from a contractor or his subcontractors' fault or from suppliers of materials

## 2.2 Causes of Delay

Some of the causes of construction delay found in the literature are described in this section. K oushki and Kartam, (2005) identified the client's lack of experience in construction projects as a cause of delay. A fresh developer may face a problem and not know how to solve it immediately because of his lack of experience. While the tries to find ways to solve the problem, work may stop. Similarly, Chan and Kumaraswamy (1994) identified a client's financial difficulties as another cause of delay. If a client encounters financial difficulties arising from unanticipated emergencies or financial mismanagement, funds may be unavailable when needed for the construction work. Client interference can also cause delay in construction projects (Long, Ogunlana, Quangand Lam, 2004). When a client instructs contractors to carry out additional work without recourse to the architect, the time spent carrying out additional work means time away from the original, thereby causing delay.

Contractor inexperience may also cause delay (AbdMajid and McCaffer, 1998). Some problems may arise during the construction period that some contractors cannot solve expeditiously because of inadequate experience. This causes some of the construction activities to be put on hold, causing the entire project to be affected by the delay.

Aibinu and Jagboro (2002) studied the effects of construction delays on project delivery in the Nigerian construction industry. Six major effects of delays were identified: time over-run, cost over-run, dispute, arbitration, litigation and total abandonment.

## 3. Methodology

The data collection for the study involved two stages. The primary data was gathered through a questionnaire survey targeted at some contractors, clients and consultants in construction projects in Akure. The secondary data was obtained from the literature. Using this approach, some of the causes for delays that may be encountered in a construction project were identified. A questionnaire was then developed to assess the perceptions of clients, consultants, and contractors on the relative importance of causes and effects of delay in the Akure construction industry.

**Table 1: Distribution of respondents' type of organisation**

	Frequency	Percent	Valid Percent	Cumulative Percent
Contractors	20	25.0	25.0	25.0
Consultants	18	33.3	33.3	58.3
Clients (Public Private)	22	41.7	41.7	100.0
Total	60	100.0	100.0	

Source: Field work (2015)

Table 1 shows the distribution of respondents' organisations. Sixty (60) respondents comprising twenty-two (22) clients, eighteen (18) consultants and twenty (20) contractors were selected using purposive sampling, based on predetermined parameters (see Table 2). The questionnaire developed for the study was divided into three parts. The first part elicited background information of the respondents. The second part focused on

the causes of construction delay while the third part focused on the effects of construction delay in the Akure construction industry.

**Table 2: Respondents' Professional background (Consultant and Contractor only)**

	Frequency	Percent	Valid Percent	Cumulative Percent
Architect	11	22.9	22.9	72.9
Civil Engineer	16	33.3	33.3	33.3
Electrical Engineer	8	16.7	16.7	50.0
Quantity Surveyor	13	27.1	27.1	100.0
Total	48	100.0	100.0	

Source: Field work (2015)

#### 4. Data Analysis and Discussion

The data gathered was analyzed using both descriptive and inferential statistics. Coded broad sheets were thereafter used for extracting data from returned questionnaires. These were analyzed by Statistical Package for Social Science (SPSS) having carefully completed the variable view and imputed the extracted data appropriately on the data view. The inferential statistical technique including the use of relative importance index (RII) and Spearman's rank correlation was used for empirical analysis and testing of the hypothesis.

The method adopted by Kometa, Olomolaiye and Harris, (1994) to determine the relative importance of the various causes and effects of delays was used in this study within various groups (i.e. clients, consultants or contractors). The five-point scale ranging from 1 (not important) to 5 (extremely important) was adopted and transformed to relative importance indices (RII) for each factor as follows:

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

Where: RII= Relative Index; W= Weighting given to each factor by the respondents (ranging from 1 to 5); A= The highest weight (i.e. 5 in this case); N= Sample size (i.e total number of respondents).

Furthermore, the Spearman's rank correlation was used to measure the relationship among different parties or factors and the strength and direction of the relationship. In particular, it was used to show the degree of agreement between the different parties. This was achieved using the formula:

$$r_s = 1 - 6 \frac{\sum d^2}{N(N^2-1)}$$

Where r is the Spearman rank correlation coefficient, d is the difference between ranks assigned to variables for each cause and n is the number of pairs of rank.

As shown in Table 3, below indicating the ranking of causes of delay in Akure, the clients rated the five most important factors in the following order:

- i. Poor site management and supervision (RII=0.940);
- ii. Inadequate contractor experience (RII=0.910);
- iii. Problems with subcontractors (RII=0.870);
- iv. Inaccurate time estimation (RII=0.850) and
- v. Delay in payments to suppliers and contractors (RII=0.830).

Table 4 shows that the consultants ranked as the five most important causes of construction delays to be:

- i. Poor site management and supervision (RII=0.913);
- ii. Client's financial difficulties (RII=0.900);
- iii. Inadequate contractor experience (RII=0.887);
- iv. Shortage of construction materials (RII=0.875), and
- v. Inaccurate time estimation (RII=0.863).

**Table 3: Clients' ranking of the causes of delay**

	N	Mean	RII	Rank
Poor site management and supervision	20	4.7000	0.9400	1
Inadequate contractor experience	20	4.5500	0.9100	2
Problems with subcontractors	20	4.3500	0.8700	3
Inaccurate time estimation	20	4.2500	0.8500	4
Delay in payments to supplier	20	4.1500	0.8300	5
Clients' financial difficulties	20	4.1000	0.8200	6
Shortage of skilled workers	20	4.0000	0.8000	7
Improper equipment	20	3.9000	0.7800	8
Inaccurate cost estimation	20	3.9000	0.7800	9
Insufficient number of equipment	20	3.8500	0.7700	10
Escalation of material prices	20	3.8000	0.7600	11
Shortage of Construction materials	20	3.7500	0.7500	12
Frequent equipment breakdown	20	3.7500	0.7500	13
Poor quality of construction materials	20	3.7500	0.7500	14
Shortage of equipment parts	20	3.6500	0.7300	15

Source: Field work (2015)

**Table 4: Consultants' ranking of the causes of delay**

	N	Mean	RII
Poor site management and supervision	16	4.5625	0.9125
Inadequate contractor experience	16	4.5000	0.9000
Problems with subcontractors	16	4.4375	0.8875
Inaccurate time estimation	16	4.3750	0.8750
Delay in payments to supplier	16	4.3125	0.8300
Clients' financial difficulties	16	4.2500	0.8500
Shortage of skilled workers	16	4.1875	0.8375
Improper equipment	16	4.0000	0.8000
Inaccurate cost estimation	16	4.0000	0.8000
Insufficient number of equipment	16	3.9375	0.7875
Poor quality of construction materials	16	3.9375	0.7875
Labour productivity	16	3.8125	0.7625
Unrealistic contract duration/requirement	16	3.8215	0.7625
Client interference	16	3.8125	0.7625
Lack of experience of client in construction	16	3.8125	0.7625

Source: Field work (2015)

The five most significant causes of construction delays as ranked by contractors were:

- i. Client's financial difficulties (RII=0.869);
- ii. Poor site management and supervision (RII=0.850);
- iii. Problems with subcontractors (RII=0.833);
- iv. Insufficient number of equipment (RII=0.816), and
- v. Inadequate contractor experience.

**Table 5: Contractors’ ranking of the causes of delay**

		Mean	RII	Rank
Clients’ financial difficulties	12	4.3333	0.8666	1
Poor site mgt. and supervision	12	4.2500	0.8500	2
Problems with subcontractors	12	4.1667	0.8333	3
Insufficient no of equipment	12	4.0833	0.8166	4
Inadequate contractor experience	12	4.0000	0.8000	5
Inaccurate time estimation	12	3.9167	0.7833	6
Delay payment to supplier	12	3.8333	0.7666	7
Shortage of construction material	12	3.7500	0.7500	8
Frequent equipment breakdown	12	3.6667	0.7333	9
Insufficient number of equipment	12	3.6667	0.7333	10
Late delivery of materials	12	3.5833	0.7166	11
Inaccurate cost estimation	12	3.5833	0.7166	12
Labour productivity	12	3.5000	0.7000	13
Poor quality of construction materials	12	3.3333	0.6666	14
Escalation of material prices	12	3.2500	0.6500	15

Source: Field work (2015)

**Table 6: Rank of Delay Factors in Akure, (based on all respondents)**

	N	Mean	RII	Rank
Poor site management and supervision	48	4.5417	0.9083	1
Inadequate Contractor experience	48	4.3750	0.8750	2
Client’s financial difficulties	48	4.2917	0.8583	3
Problem with sub-contractors	48	4.2500	0.8500	4
Inaccurate time estimation	48	4.1875	0.8375	5
Insufficient number of equipment	48	4.0417	0.8083	6
Delay payments to suppliers& subcontractors	48	4.0208	0.8041	7
Shortage of Construction materials	48	3.9583	0.7916	8
Inaccurate cost estimation	48	3.8542	0.7708	9
Frequent equipment breakdown	48	3.7917	0.7583	10
Poor quality of construction materials	48	3.7083	0.7416	11
Unrealistic contract duration & requirements	48	3.6875	0.7375	12
Labour productivity	48	3.6667	0.7333	13
Shortage of skilled workers	48	3.6250	0.7250	14
Late delivery of materials	48	3.6042	0.7208	15
Improper equipment	48	3.5833	0.7166	16
Escalation of material prices	48	3.5625	0.7125	17
Lack of experience of client in construction	48	3.5000	0.7000	18
Incomplete drawing and detailed design	48	3.3542	0.6708	19
Client Interference	48	3.3333	0.6666	20
Inadequate consultant experience	48	3.3125	0.6625	21
Change orders	48	3.1875	0.6375	22
Poor design and delay in design	48	3.1875	0.6375	23
Contractor’s financial difficulties	48	3.1250	0.6375	24
Changes in drawing	48	3.1250	0.6250	25
Shortage of equipment parts	48	3.1250	0.6250	26
Regulatory changes	48	3.0625	0.6125	27
Organisational changes	48	3.0417	0.6083	28

Source: Field work (2015)

There are minor differences in the ranking of important factors according to the clients, consultants and contractors. The ranking of the causes of delays in Akure based on all respondents (i.e., clients, consultants and contractors) are indicated in Table 6 below.

The only cause of delay common between all parties in their top three causes of delay is “poor site management and supervision”. This is the most common cause of construction projects delay in Akure, with RIR=0.908. It refers to the lack of adequate supervision of site by the contractors. The ten most highly ranked causes of delays (based on all respondents) as shown in the table are:

- i. Poor site management and supervision (RII=0.908);
- ii. Inadequate contractor experience (RII=0.875); referring to incompetence of contractors in construction projects.
- iii. Client’s financial difficulties (RII=0.858);
- iv. Problems with sub-contractors (RII=0.850);
- v. Inaccurate time estimation (RII=0.837);
- vi. Insufficient number of equipment (RII=0.808);
- vii. Delay in payments to suppliers and subcontractors (RII=0.804);
- viii. Shortage of construction materials (RII=0.792),
- ix. Inaccurate cost estimation (RII=0.771), and
- x. Frequent equipment breakdown (RII=0.758).

### Correlations

The values of the Spearman’s rank correlation coefficients show that there is relatively good agreement between two groups of construction stakeholders in ranking of the importance of the causes of delay. The highest degree of agreement is between contractors and consultants, (89.7%), followed by 76.2% agreement between clients and contractors while the lowest rank order correlation coefficient is between clients and consultants (69.3%) between clients and consultants. Due to the high degree of agreement between each pair of parties in the ranking of the causes, the result of this study is dependable.

**Table 7: Spearman’s rank correlation coefficients of the ranking of clients, consultants and contractors for causes of delay (30 causes)**

Spearman’s rho				
		Clients	Consultants	Contractors
Clients	Correlation Coefficient	1.000	.693**	.762**
	Sig. (2-tailed)		.000	.000
	N	30	30	30
Consultants	Correlation Coefficient	.693**	1.000	.897
	Sig. (2 tailed)	.000	.	.000
	N	30	30	30
Contractors	Correlation Coefficient	.762**	.897**	1.000
	Sig.(2-tailed)	.000	.000	
	N	30	30	30

Source: Field work (2015)

The significance probabilities for the three set of relationships (clients/consultants, clients/contractors, consultants and contractors) are .000, .002 and .003 in that order. Since correlation is significant at the 0.01 level (2-tailed) for this research and all the significance

probabilities values are less than this 0.01, the null hypotheses ( $H_0$ ) are rejected , hence the acceptance of alternate ( $H_0$ ) hypotheses.

### **Effects of Delay**

The analysis of data from the questionnaire survey shows that the three most important effects of delays (based on all respondents) as shown in Table 8 above are: time overrun (RIR= 0.8417), cost overrun (RIR=0.808) and disputes (RIR=0.787)

**Table 8: Ranking of effects of delay (based on overall response)**

	N	Mean	RII	Rank
Time Overrun	48	4.2083	0.84166	1
Cost Overrun	48	4.0417	0.80834	2
Disputes	48	3.9375	0.78750	3
Litigation	48	3.6250	0.72500	4
Arbitration	48	3.2917	0.65834	5
Total abandonment	48	3,2500	0.65000	6

Source: Field work (2015)

Time overrun refers to the late completion or late delivery, from the time specified or agreed by all parties in the construction project. The main causes of this include financial problems, late payments for completed and on-going work, change orders, organisational changes etc. Cost overrun refers to increased costs of labour, working force, materials and equipment, etc. The main causes of this are change orders, mistakes in the contract documents, changes in drawings etc. Dispute refers to the minor problems between different parties in the construction project. The main causes for disputes are slow or late payments for completed or on-going work, client interference etc.

### **5. Conclusion/Recommendations**

This research study was conducted to examine the causes of delays in construction projects in Akure, Ondo State South West Nigeria. The effects of these delays were also considered. It can be concluded from this study that there is a general relationship between the perception of clients, consultants and contractors on the importance of factors causing delay in building construction projects in Akure. The major causes of delays in Akure construction projects are poor site management and supervision, inadequate contractors' experience and clients' financial difficulties. The major effects of delays found in this study are time over-run, cost over-run and dispute. The recommendations below are to be adopted for this research. They have been divided into three groups and are made to all parties involved in construction in order to minimize and control delay:

#### **a. Recommendations to Clients**

- i. Clients should select contractors with sufficient experience, technical capability and man-power for their projects, and not base their selection on lowest bid considerations only
- ii. Clients should not interfere frequently during the project execution so as to reduce the changes to requirements.



- iii. Clients should pay progress payment to contractors on time as delay in payment impairs the contractor's ability to carry out work.

**b. Recommendations to Consultants**

- i. Consultants, while drawing the contract between client and contractor, should include items such as duration of contract, mechanism to resolve disputes and mechanisms to assess the causes of delay.
- ii. Consultants should prepare, review and approve drawings and design documents on time because any delay caused by the consultant engineer in checking, reviewing and approving the design submittals prior to construction phase, could delay progress of work.
- iii. Consultants should monitor the work closely by making inspections at appropriate times and be flexible in evaluating contractor works.

**c. Recommendations to Contractors**

- i. Contractors should not take up a project in which they do not have sufficient expertise.
- ii. Contractors should engage competent site-managers for smooth execution of work.
- iii. Contractors should plan their work properly and make the entire schedule available.
- iv. Contractors should provide enough equipment to execute their work and also have a maintenance plan for their equipment to prevent frequent breakdowns.

**d. Recommendations for future studies**

Similar study on causes and effects of delay can be performed in other states or cities of Nigeria. Another study can be done for a specific type of construction project, such as utility projects, highway construction projects, dam construction projects, etc.

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