Adekunle and Ajibola, J Archit Eng Tech 2015, 4:3
http://dx.doi.org/10.4172/2168-9717.1000150

Architectural Engineering Technology

Research Article Open Access

# Factorial Causative Assesments and Effects of Building Construction Project Delays in Osun State, Nigeria

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## Abstract

Delay in building construction project is a universal phenomenon that is not peculiar to Osun alone. In fact, all countries of the world are faced with this global issue. These delays are usually considered as costly to all parties concerned in the projects and very often results in total abandonment thereby slowing down the growth of the construction sector. The purpose of this study was to assess the causative factors of delays and their effects on building construction projects in Osun. A total of forty two (42) project delay attributes and seventeen (17) effect attributes were identified through detailed literature review. Questionnaire survey were conducted across stakeholders that included among others; consultants, contractors and clients cutting across the building professionals namely; Architects, Builders, Quantity Surveyors, Estate Surveyors and Engineers to gather their views on causes of delay in delivery of projects. The research categorized the causes of delay under four main groups of client related, consultant related, contractor related and delay caused by incidental factors and their effects assessed using relative importance index (RII) as a basis for analysis. The RII for all delay factors and group of categories was computed so as to rank the factors. A total of 260 questionnaires were distributed among the respondents from different building construction firm in Osun state. Out of 260 questionnaires distributed, 234 valid questionnaires were retrieved back from the respondents, representing a response rate of (90.0%). The validation of information in this study yielded a Cronbach's alpha of 0.891. The most significant factors of construction delays were identified as: cash flow problem (delay payment) with (RII=0.89), incomplete drawings (RII=0.84), improper planning and scheduling problem (RII=0.91), financial incapability (RII=0.89) and force majeure (Acts of God) with (RII=0.81). The study revealed that overall, contractor-caused delays ranked highest with (RII=0.91) and was attributed to improper planning and scheduling problem, followed by financial incapability (RII=0.89), while client-caused delay attributed to cash flow problem (delay payment) (RII=0.89) was observed as the second most common cause of delay in building construction project in Osun state. Furthermore, the study revealed increase in final cost of project (RII=0.88) and extension of time on project (RII=0.80), as the top two (2) effects of delays in building construction project in Osun state, while cash flow (RII=0.52) had the least effect. It is therefore believed that identification of the causes of potential delay factors that are likely to affect the timely delivery of projects can help to avoid extra costs through claims and disputes that arise among parties when delays are experienced.

**Keywords:** Causative factors; Construction delays; Effects of delay; Construction projects; RII; Osun state; Nigeria

## Introduction

Construction delays are a global phenomenon since one of the most important problems in the Construction industry is delay. Delays occur in every construction project and the magnitude of these delays varies considerably from project to project. In the construction context, the word "delay" refers to something happening at a later time than planned, beyond the date that the parties agreed upon for the delivery of a project. Delay is defined as the slowing down of work without stopping construction entirely and that can lead to time overrun beyond the date that the parties have agreed upon for the delivery of the project. Delays occur in every construction project and the significant of these delays varies considerably from project to project. Bramble and Callahan [1] have defined that; "a delay is the time during which some part of the construction project has been extended or not performed due to an unanticipated circumstance.

The delay in construction is a major problem facing the Nigerian construction industry and has become endemic in Nigeria. It is imperative to create awareness of the extent to which delays can adversely affect project delivery. According to Chan and Kumaraswamy [2], timely delivery of projects within budget and to the level of quality standard specified by the client is an index of successful project delivery. Majid opined that Projects are considered delayed when their stipulated completion durations have not been achieved. Delays are frequent occurrences in developing countries such as Thailand, Pakistan, Saudi Arabia, Nigeria and Vietnam respectively [3]. Pourrostam et al. [4], remarked that, project delays are the biggest challenges for the construction industry in developing countries. Delays are, however, not only experienced in the developing countries, they are global phenomena [5]. When projects are delayed, they are either accelerated or have their duration extended beyond the scheduled completion date. Carnell [6] defined delay as an event that causes extended time to complete all or part of a project. Delay may also be defined as the time overrun, either beyond the date for completion specified by the contract or beyond the extended contract period where an extension of time has been granted. It was found that electropulsing improved the microhardness dramatically, compared with the only ultrasonic-shocked sample [7].

A number of studies have been carried out to determine the causes

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**Received** May 06, 2015; **Accepted** August 20, 2015; **Published** September 05, 2015

**Citation:** Adekunle O, Ajibola WK (2015) Factorial Causative Assesments and Effects of Building Construction Project Delays in Osun State, Nigeria. J Archit Eng Tech 4: 150. doi:10.4172/2168-9717.1000150

of delay in construction projects. Sweis et al. [8]. Studied the causes of delay in residential projects in Jordan and concluded that financial difficulties faced by the contractor and too many change orders by the owner are the leading causes of construction delay. Faridi et al. [9] noted that delays in the completion of construction projects is one of the most recurring problems in the construction industry and it is a common global phenomenon. Pourrostam et al. [4] contested the conventional opinion that Delays have costly, risky and undesirable consequences on project success in terms of time, cost, quality and safety. These impacts are not only confined to the construction industry but they influence the overall economy of a country. Based on all this foregoing, the objectives of this study are:

1. To examine the socio- economic characteristics of the respondents (construction industry professionals) in Osun state.

2. To identify and assess the major causes of delay (causative factors) in building construction project in the study area.

3. To identify and assess the effects of construction delay in the study area.

4. To make recommendations for improving project delivery based on the findings of the study.

Osun is an inland state in south-western Nigeria. Its capital is Osogbo. It is bounded in the north by Kwara State, in the east partly by Ekiti State and partly by Ondo State, in the south by Ogun State and in the west by Oyo State. The state's current governor is Rauf Aregbesola, who was declared as the winner of 2007 election by Appeal Court in Ibadan on 26 November 2010. Ogbeni (Rauf Aregbesola) was also Reelected as Osun's Governor on August 9, 2014. Osun is home to several of Nigeria's most famous landmarks, including the campus of Obafemi Awolowo University, Nigeria's pre-eminent institution of higher learning. The university is also located in the ancient town of Ile-Ifẹ, an important early center of political and religious development for Yoruba culture. Other important cities and towns include the ancient kingdom-capitals of Oke-Ila Orangun, Ila Orangun, Ijebu-Jesa, Ede, Iwo, Ejigbo, Modakeke, Ibokun, Ifetedo, Esa-Oke and Ilesa. English was introduced to Osun state - land of the great lamp - in 1998 [10].

## Literature

Delay is one of the biggest problems often experienced on construction project sites. Construction delay is a critical function in construction projects. Construction industry in Nigeria is faced with a lot of problems, among which is delay in project execution. It has been researched, that delay is a major setback in the construction industry in Nigeria. The problem of delays in the construction industry is a global phenomenon. Many and various studies were carried to assess the causes of delay in construction projects and there is a wide range of views for the causes of time delays for engineering and construction projects. Mezher et al. [11] 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 concerns with financial issues; contractors considered contractual relationships as the most important, and consultants considered project management issues as the most important causes of delays. Abd El-Razek et al. [12] in a similar study in Egypt found that the most important causes of delay are financing by contractor during construction, delays in contractor's payment by owner, design changes by owner or his agent during construction, partial payments during construction, and non-utilization of professional construction/ contractual management. Factors causing construction delays in construction projects differ from country to country, due to different prevailing conditions. Now a day's construction industries are facing the problem of Delays and Disruptions while executing the construction project. Assaf and AlHejji [13] conducted a time performance survey of different types of construction projects in Saudi Arabia to determine the causes of delay and their importance according to each project participant (owner, consultant, and contractor). Assaf et al. [14] studied the causes of delay in large building projects in Saudi Arabia and their relative importance and reported that among the fifty-six (56) causes of delay included in the survey, the contractors, owners and architects/ engineers interviewed all ranked financing group delay factors the highest. According to the contractors, the most important delay factors were preparation and approval of shop drawings, delays in contractors' progress payment by owners, and design changes by owners. In the opinion of architects and engineers, the most important causes of delay were cash flow problems during construction, the relationship between different subcontractors' schedules in the execution of the project, and the slowness of the owners' decision-making process. Owners, on the other hand, attributed delays in construction projects to design errors, excessive bureaucracy inproject-owner organization, labour shortages, and inadequate labour skills. Furthermore, Ayman [15] investigated the causes of delays on 130 public projects in Jordan. The projects included residential, office and administration buildings, school buildings, medical centres, and communication facilities. The results indicated that the main causes of delay in construction of public projects relate to designers, user changes, weather, site conditions, late deliveries, economic conditions, and increase in quantity. Odeh and Battaineth [16] reported that among the top ten most important causes of delays in construction projects with traditional type contracts in Jordan were, from the view point of contractors and consultants: owner interference, inadequate contractor experience, financing and payments, labour productivity, slow decision making, improper planning, and subcontractors. Sambasvian and Soon [17] identified the delay factors and their impact on project completion in the Malaysian construction industry. The results indicated that the ten from a list of 28 different causes of delay were: (1) contractor's improper planning, (2) contractor's poor site management, (3) inadequate contractor experience, (4) client's inadequate financial resources and payments for completed work, (5) problems with subcontractors, (6) shortage in material, (7) labour supply, (8) equipment availability and failure, (9) lack of communication between parties, and (10) mistakes during the construction stage. A similar study in Malaysia by Alaghbari [18] indicated that from a list of thirty-one (31) factors, clients, contractors and consultants agreed that financial problems were the main factors and coordination problems were the second most important factor causing delay in construction projects in Malaysia. This review has underscored that the factors that cause delay in construction projects are many and vary from country to country and from one circumstance to another. However, in developing economies [19] have reported that there are distinctive problems that cause delays in construction. They have classified them into three groups: (a) problems of shortage or inadequacies in industry infrastructure (mainly supply of resources), (b) problems caused by clients and consultants, and (c) problems caused by contractor incompetence/inadequacies. The findings of these studies also provide significant insights to construction industry so that they may formulate strategies in order to avoid delay and its consequences.

## Classification of Construction Delay

- Excusable but non-compensable delay -these are delays

caused by occurrences which are not attributable to any of the parties.

- Compensable delay - these delays result from acts or omissions of the owner or someone for whose acts an owner is liable.

- Inexcusable delay - these delays result from a contractor's own fault or his subcontractors or material suppliers.

## Data Presentation and Analysis of Results from the Empirical Study

Table 1 presents the profiles of the respondents.

### Age group

Table 1 reveals that respondents who are 40 years and above accounted for the simple majority (41.5%) of the total respondents surveyed, followed by respondents in the age group 31-34 years, accounting for (29.1%), while respondents in the age group 35-39 years accounted for (28.2%).

### Profession

Table 1 also reveals that the builders constituted the simple majority (32.9%) of the total respondents surveyed. Architects account for (24.4%) and Quantity Surveyors (26.7%). The Estate surveyors accounted for the least proportion (12.8%) of the total respondents surveyed.

### Educational qualification

Majority (70.5%) of the building professionals surveyed hold Post Graduate Diploma (PGD) and Master's degree. (16.2%) holds Bachelor degree (B.Sc), while PhD holders accounted for just (3.8%) of the total respondents surveyed.

This implies that the respondents possess substantial academic qualification which could guarantee their understanding of the questions directed to them and subsequently established the originality of the data obtained for the study.

### Professional qualification

Table 1 also reveals that majority of the surveyed building professionals possess requisite professional qualification which serves as a valid basis and further justification of the suitability of the data collected for the study. For instance, of the sampled respondents, 80 (34.2%) were MNIOB/FNIOB members, 54 (23.1%) were MNIA/FNIA members and 39 (16.7%) are MNIQ/FNIQS members.

### Nature of firm

Simple majority 92 (39.3%) of the surveyed respondents were involved in consultancy service, while 51 (21.8%) were contracting firm.

### Types of project involved

Table 1 also reveals that 101(43.2%) of the respondents have been involved in residential buildings, 78 (33.3%) have been involved in institutional buildings. Industrial building 28 (12.0%) and civil buildings 19 (8.1%).

### Years of working experience

Professional practice experience is highly recognized as a measure of data originality in building environment and allied professions. In this study, 72 (30.8%) have been in building industry between 11 to 15 years, 58 (24.8%) between 1-5 years and 51 (21.8%) have been in the

| Features | Qualification | Frequency | Percentage |
|---|---|---|---|
| Respondents Age Group | No Response | 3 | 1.3 |
| | 31-34 years | 68 | 29.1 |
| | 35-39 years | 66 | 28.2 |
| | 40 years and above | 97 | 41.5 |
| | Total | 234 | 100.0 |
| Professional | Architect | 57 | 24.4 |
| | Quantity Surveyor | 39 | 16.7 |
| | Engineers | 31 | 13.2 |
| | Estate Surveyors | 30 | 12.8 |
| | Builders | 77 | 32.9 |
| | Total | 234 | 100.0 |
| Educational Qualification | No Response | 3 | 1.3 |
| | HND | 19 | 8.1 |
| | B.Sc | 38 | 16.2 |
| | PGD/M.Sc | 165 | 70.5 |
| | P.hD | 9 | 3.8 |
| | Total | 234 | 100.0 |
| Professional Qualification | No Response | 3 | 1.3 |
| | MNIA/FNIA | 54 | 23.1 |
| | MNIQS/FNIQS | 39 | 16.7 |
| | MNSE/FNSE | 31 | 13.2 |
| | ANIEV | 27 | 11.5 |
| | MNIOB/FNIOB | 80 | 34.2 |
| | Total | 234 | 100.0 |
| Nature of Firm | Not applicable | 91 | 38.9 |
| | Contracting | 51 | 21.8 |
| | Consultancy | 92 | 39.3 |
| | Total | 234 | 100.0 |
| Category of registration (Federal) | No Response | 187 | 79.9 |
| | Category B | 12 | 5.1 |
| | Category C | 9 | 3.8 |
| | Category E | 26 | 11.1 |
| | Total | 234 | 100.0 |
| Category of registration (State) | No response | 177 | 75.6 |
| | Category A | 11 | 4.7 |
| | Category B | 16 | 6.8 |
| | Category A,B,C | 24 | 10.3 |
| | Category B,C | 6 | 2.6 |
| | Total | 234 | 100.0 |
| Type of Project involved | No response | 8 | 3.4 |
| | Residential buildings | 101 | 43.2 |
| | Industrial buildings | 28 | 12.0 |
| | Institutional buildings | 78 | 33.3 |
| | Civil buildings | 19 | 8.1 |
| | Total | 234 | 100.0 |
| Years of working Experience | No response | 15 | 6.4 |
| | 1-5 years | 58 | 24.8 |
| | 6-10 years | 38 | 16.2 |
| | 11-15 years | 72 | 30.8 |
| | Over 20 years | 51 | 21.8 |
| | Total | 234 | 100.0 |

**Source:** Authors field survey and analysis (2014).

**Table 1:** Socio-Economic Characteristics of Respondents.

building industry for the past 20 years.

## Research Methodology

The study adopts a survey research technique. A self-constructed questionnaire titled "**An assessment of the causative factor and effect of delays in building construction projects in Osun state**" was developed in order to assess the perceptions of different parties involved in building construction process in Osun construction sector, for the evaluation of frequency of occurrence and importance of the identified factors. The research instrument was divided into three (3) major parts. The first part solicits information on the socioeconomic characteristics of the respondents. In the second part, the research instrument asked questions on causative factors of construction delays in building projects based on four identified factors namely: (1) Client-related delays, (2) Consultant-related delays, (3) Contractor-related delays and (4) Delays caused by incidental factors. In third part, the research instrument seeks information on the most important and frequent effects of building construction delay based on some identified factors.

The random selection technique was employed in the selection of respondents. A total of 260 questionnaires were distributed among the respondents from different building construction firm in Osun state. Out of 260 questionnaires distributed, 234 valid questionnaires were retrieved back from the respondents, representing a response rate of (90.0%).

## Data Analysis

The analysis of data collected was accomplished by the use of Statistical Package for Social Science (SPSS) software, where the scores assigned to each factor by the respondents were entered and consequently the responses from the 234 questionnaires retrieved were subjected to statistical analysis for further insight. The contribution of each of the factors to the identified causes of delay was examined and the ranking of the attributes in terms of their criticality as perceived by the respondents was done by use of Relative Importance Index (RII) which was computed using equation (1) below and the results of the analysis are presented in Tables 2-6.

To determine the relative ranking of the factors, these scores were then transformed to importance indices based on the next formula.

$$\text{Relative Importance Index (RII)} = \frac{\sum w}{AN} = \frac{4n_4 + 3n_3 + 2n_2 + 1n_1}{4N} \quad (1)$$

Where W is the weighting given to each factor by the respondent, ranging from 1 to 4, (n4=number of respondents for strongly agree, n3=number of respondents for agree, n2=number of respondents for strongly disagreed, n1=number of respondents for disagree). A is the highest weight (i.e. 4 in this study) and N is the total number of samples (respondents). The relative importance index ranges from zero to one.

## Result Presentation and Discussion of Research Findings

The validation of information in this study yielded a Cronbach's alpha of 0.891. Validation is internal consistency reliability measure via Statistical Packages for Social Sciences. This study has threefold objective: first, it examines the socio-economic characteristics of the surveyed building professionals. Second, it examines the factors causing delay in building construction project. Third, it examines the effect of delay in building construction project.

To achieve the first objective, a descriptive analysis of items under the socioeconomic characteristics was performed. The result is presented in Table 1.

To achieve the second and third objective, data were subjected to analysis using the Relative Importance Index (RII) to identified causes and effects of delay according to the ranking of the attributes in terms of their criticality as perceived by the respondents.

The second objective was to examine factors causing delay in building construction in Osun state. The factors identified were grouped into four categories namely: client-related delays, consultant-related delays, contractor-related delays and delay caused by incidental factors.

### Client related delays on building construction projects

Findings from the research undertaken established that with respect to client related delays, cash flow problem (delay payment) ranked highest with (RII=0.89), followed by inadequate project planning and budgeting (RII=0.87) and wrong choice of contractors/consultants (RII=0.85). Consequently, the research further established that delay in honouring certificate was the least identified cause of delay in building construction (RII=0.66) among the variables examined (Table 2).

However, Assaf, Al-Hejji [13], in their study, found out that the most important cause of delay was change order (as all participants surveyed agree to it). He further classified the four key causes of delay according to clients as contractor's improper planning, contractor's poor site management, subcontractor issues, and skilled labour shortage and productivity.

### Consultants related delays in building construction projects

In assessing the extent to which consultant related factors causes delay in building construction projects in Osun state, findings from the study revealed that incomplete drawings (RII=0.84), inadequate supervision of works (RII=0.82), poor contractors prequalification (R=0.81) and discrepancies and mistakes in design drawings and other contract documents (RII=0.79) ranked as the four top most consultants-caused delays (Table 3) in building construction project in Osun state. Subsequently, the study further identified slow decision

| Causative factors of construction delay | NR | SA | A | SD | D | Total | RII | Rank |
|---|---|---|---|---|---|---|---|---|
| | - | 4 | 3 | 2 | 1 | | | |
| Cash flow problem (delay payment) | - | 140 | 82 | 12 | 0 | 234 | 0.89 | 1 |
| Inadequate project planning and budgeting | - | 125 | 97 | 12 | 0 | 234 | 0.87 | 2 |
| Wrong choice of contractors /consultants | - | 97 | 137 | 0 | 0 | 234 | 0.85 | 3 |
| Lack of fund to finance the project | - | 129 | 63 | 42 | 0 | 234 | 0.84 | 4 |
| Delay in honouring certificate | - | 25 | 133 | 40 | 36 | 234 | 0.66 | 5 |

NR=No Response SA=Strongly Agree A=Agree SD=Strongly Disagree D=Disagree

**Source:** Authors field survey and analysis (2014)

**Table 2:** Client Caused Delays in building construction.

| Causative factors of construction delay | NR | SA | A | SD | D | Total | RII | Rank |
|---|---|---|---|---|---|---|---|---|
| | - | 4 | 3 | 2 | 1 | | | |
| Incomplete drawings | - | 115 | 101 | 12 | 0 | 234 | 0.84 | 1 |
| Inadequate supervision of works | - | 81 | 141 | 12 | 0 | 234 | 0.82 | 2 |
| Poor contractors prequalification | - | 109 | 81 | 38 | 6 | 234 | 0.81 | 3 |
| Discrepancies and mistakes in design drawing and other contract document | - | 42 | 186 | 3 | 3 | 234 | 0.79 | 4 |
| Late preparation of valuation | - | 72 | 102 | 42 | 18 | 234 | 0.74 | 5 |
| Delay in design information | - | 42 | 132 | 52 | 8 | 234 | 0.72 | 6 |
| Conflicts of the drawing and specification | 9 | 78 | 97 | 11 | 39 | 234 | 0.71 | 7 |
| Variation orders | 24 | 52 | 138 | 17 | 3 | 234 | 0.70 | 10 |
| Delays in work approval | - | 34 | 147 | 29 | 24 | 234 | 0.70 | 10 |
| Poor effective communication among consultants/parties involved | 3 | 42 | 132 | 30 | 27 | 234 | 0.70 | 10 |
| Inappropriate overall organizational structure | 24 | 76 | 62 | 46 | 26 | 234 | 0.65 | 11 |
| Slow decision making | 16 | 27 | 80 | 74 | 37 | 234 | 0.57 | 12 |

NR=No Response SA=Strongly Agree A=Agree SD=Strongly Disagree D=Disagree

**Source:** Authors field survey and analysis (2014)

**Table 3:** Consultant Caused Delays in building construction.

| Causative factors of construction delay | NR | SA | A | SD | D | Total | RII | Rank |
|---|---|---|---|---|---|---|---|---|
| | - | 4 | 3 | 2 | 1 | | | |
| Improper planning and schedule problem | - | 149 | 85 | 0 | 0 | 234 | 0.91 | 1 |
| Financial incapability | - | 127 | 107 | 0 | 0 | 234 | 0.89 | 2 |
| Poor site management and supervision | - | 96 | 120 | 18 | 0 | 234 | 0.83 | 3 |
| Inadequate experience | - | 49 | 176 | 0 | 9 | 234 | 0.78 | 4 |
| Inexperience about project | - | 48 | 156 | 30 | 0 | 234 | 0.77 | 5 |
| Contractors insolvency (inability to pay debt) | - | 51 | 139 | 44 | 0 | 234 | 0.76 | 6 |
| Inaccuracy of materials estimating | 27 | 101 | 89 | 14 | 3 | 234 | 0.75 | 7 |
| Lack of incentive motivation of workers | - | 38 | 166 | 16 | 14 | 234 | 0.74 | 8 |
| Conflicts in work schedules of subcontractors | 27 | 79 | 114 | 14 | 0 | 234 | 0.73 | 9 |
| Equipment availability and failure | - | 50 | 119 | 38 | 27 | 234 | 0.71 | 10 |
| Unskilled/incompetent site workers | 3 | 36 | 133 | 29 | 33 | 234 | 0.68 | 12 |
| Relationship between contractor and labour (industrial relation) | 3 | 76 | 69 | 36 | 50 | 234 | 0.68 | 12 |
| Poor labour productivity | 6 | 30 | 142 | 29 | 27 | 234 | 0.67 | 13 |
| Scarcity of labour and skilled personnel | 4 | 18 | 108 | 64 | 40 | 234 | 0.60 | 14 |

NR=No Response SA=Strongly Agree A=Agree SD=Strongly Disagree D=Disagree

**Source:** Authors field survey and analysis (2014).

**Table 4:** Contractor Caused Delays in building construction.

| Causative factors of construction delay | NR | SA | A | SD | D | Total | RII | Rank |
|---|---|---|---|---|---|---|---|---|
| | - | 4 | 3 | 2 | 1 | | | |
| Force Majeure (Acts of God) | - | 84 | 135 | 0 | 12 | 231 | 0.81 | 1 |
| Negligence | 3 | 105 | 70 | 44 | 12 | 234 | 0.78 | 2 |
| Government policies and changes | - | 39 | 180 | 0 | 12 | 231 | 0.77 | 3 |
| Unfavourable site condition | 6 | 86 | 112 | 3 | 27 | 234 | 0.76 | 4 |
| Market value | 3 | 100 | 80 | 0 | 51 | 234 | 0.74 | 6 |
| Fluctuation in prices of building | 3 | 99 | 70 | 23 | 39 | 234 | 0.74 | 6 |
| Inclement weather | 3 | 59 | 115 | 30 | 27 | 234 | 0.71 | 9 |
| Poor quality materials | 3 | 46 | 141 | 17 | 27 | 234 | 0.71 | 9 |
| Breakdown of plant/machinery | 6 | 46 | 141 | 17 | 24 | 234 | 0.71 | 9 |
| Site accidents | 6 | 15 | 127 | 33 | 53 | 234 | 0.60 | 10 |

NR=No Response SA=Strongly Agree A=Agree SD=Strongly Disagree D=Disagree

**Table 5:** Delays Caused by Incidental factors.

making (RII=0.57) and inappropriate overall organization structure (RII= 0.65) as the least causes of building construction delay in the study area.

This is in agreement with previous studies by Ren et al. [20], that incomplete drawings, delay in approval of documents, incomplete contract documents, changes in drawings and specifications and duration of inspection procedure were the four topmost caused of delay in building construction in Dubai.

However, According to Assaf and Al-Hejji [13], the four key causes of delay according to consultants are contractor's improper planning,

| Identified effects of delays in building construction project | No response | Very Low | Low | High | Very High | Total | RII | Rank |
|---|---|---|---|---|---|---|---|---|
| | - | 1 | 2 | 3 | 4 | | | |
| Increase in final cost of the project | 3 | 0 | 0 | 101 | 130 | 234 | 0.88 | 1 |
| Extension of time on project | 4 | 0 | 15 | 145 | 70 | 234 | 0.80 | 2 |
| Dispute between parties involved | 4 | 0 | 34 | 127 | 69 | 234 | 0.77 | 4 |
| Wastage and underutilization of manpower resources | 4 | 4 | 45 | 96 | 85 | 234 | 0.77 | 4 |
| Accumulations of interest rate on the capital to finance the project | 27 | 0 | 14 | 94 | 99 | 234 | 0.75 | 8 |
| Additional claims by main contractor | 4 | 0 | 34 | 147 | 49 | 234 | 0.75 | 8 |
| Interest on loans soar up | 16 | 0 | 15 | 143 | 60 | 234 | 0.75 | 8 |
| Reduce profit margin | 4 | 0 | 61 | 100 | 69 | 234 | 0.75 | 8 |
| Increase overhead | 7 | 4 | 51 | 103 | 69 | 234 | 0.74 | 9 |
| Extra taxes and dues due to delay | 3 | 27 | 36 | 87 | 81 | 234 | 0.73 | 10 |
| Extension of time | 31 | 0 | 3 | 130 | 70 | 234 | 0.72 | 12 |
| Loss of confidence on the contract, thereby jeopardizing the reputation of the contractor in the case of future tendering chances | 3 | 0 | 74 | 100 | 57 | 234 | 0.72 | 12 |
| Total abandonment of building project | 31 | 12 | 28 | 81 | 82 | 234 | 0.68 | 13 |
| Under-utilization of equipment and plant purchased for the project | 3 | 14 | 81 | 94 | 42 | 234 | 0.67 | 14 |
| Result in loss revenue to clients | 13 | 10 | 90 | 64 | 57 | 234 | 0.65 | 15 |
| High cost of service work | 40 | 0 | 39 | 122 | 33 | 234 | 0.62 | 16 |
| Distributed cash flow | 46 | 0 | 92 | 81 | 15 | 234 | 0.52 | 17 |

**Table 6:** Effects of Delay on Construction Project.

contractor's poor site management, insufficient client's payments for completed and on-going work, and shortage of equipment and materials.

## Contractor related relays in building construction projects

Findings from the study further revealed that the respondents attributed improper planning and scheduling problem (RII=0.91), financial incapability (RII=0.89), poor site management and supervision (RII=0.83), Inadequate experience (RII=0.78) and inexperience about project (0.77) as the top five contractors-caused delay in building project (Table 4) in the study area.

The research revealed that besides improper planning and scheduling problem, one of the most critical factors of construction delay under contractor related is financial incapability. This finding is indeed in agreement with the findings of El-Razek [12] that financial problem of the contractor is the most important cause of delays on building projects. Also, inadequate contractor experience and lack of experience about project most especially, are among the critical factors causing delays in Osun construction industry. This result also supports the findings by Hemanta et al. [21] for a similar study carried out in Indian construction projects who noted that this is as result of probably lack of formal training among site professionals who usually develop their supervisory skills by experience. The study however revealed that two (2) least client-caused factors on construction delays are poor labour productivity (RII=0.67) and scarcity of labour and skilled personnel (RII=0.60).

## Delays caused by incidental factors

Findings from the study also revealed that respondents attributed force majeure (Acts of God) with (RII=0.81), negligence (RII=0.78) and government policies and changes (RII=0.77) as the top three (3) delays in building construction projects caused by incidental factors in the study area.

In addition, the study reveals site accidents (RII=0.60) was identified by the respondents as the least delays caused by incidental factors (Table 5).

## Effect of delays in construction

The delay consequences can differ among different parties like loss of wealth, time and capacity. For the client, delay could mean the loss/waste of income and unavailability of facilities. For contractor, delay could mean the loss of money/revenue for extra spending on maintenance of equipment and materials, labour hiring and loss of time.

The third objective therefore, examines the effect of delays in building construction projects in Osun state. The data was subjected to analysis using the Relative Importance Index (RII) to identify the effects of delay according to the ranking of the attributes in terms of their criticality as perceived by the respondents.

Findings from the study revealed that the surveyed respondents attributed increase in final cost of project (RII=0.88), extension of time on project (RII=0.80), dispute between parties involved and wastage coupled with underutilization of manpower resources, with a corresponding RII value of (0.77) and (0.77) respectively as the top three (3) effects of delays in building construction project in Osun state.

However, the survey respondents identified distributed cash flow (RII=0.52), high cost of service work (RII=0.62) and loss of revenue to clients (RII=0.65) as the least three (3) effect of delays in building construction project in the study area (Table 6).

## Conclusion and Recommendations

Delays are a major problem suffered by most of the construction projects in Osun state although the causes of delays and the measures to avoid delays or ease the impacts has still not been fully understood by project participants. This research discussed the specific working environment of Osun building construction projects and investigated the root causes of the delay and effects of delay contributed by the major project participants.

Despite the fact that delays are inevitable; however, they can be avoided or minimized when their causes are effectively identified and analyzed. The aim of this study was to assess the causes and effect of delays in building construction projects in Osun, so that appropriate mitigation measures are put in place to cushion the effects of delay.

Three (3) objectives were investigated using a detailed literature review and surveys with stakeholders in the building construction industry in Osun state. A total of forty two (42) delay attributes were identified and categorized into four groups of client related factors, consultant related delay factors, contractor related delay factors and delay caused by incidental factors. The computed Relative Importance Index (RII) provided a benchmark for ranking all the attributes and group of delays so as to inform the basis for determining the most significant and less significant factors in the Osun context. Generally, factors with RII>0.70 were considered highly significant and a total of thirty four (34) factors fell into this range, while factors that yielded RII<0.70 were considered less significant and a total of eight (8) factors fell into this range as indicated in the summary of results in Tables 2-6.

Although some of the major causes of delays for the Osun building construction industry follow similar trend as those found by other scholars elsewhere, one key factor that was ranked among the top ten lead causes of delay that emerged as a new attribute in this area of study is force majeure (acts of God). The study results also support the opinion for a long time been held by many individuals both within and outside the construction industry that accord the major cause of delays to contractors. It was observed that contractor-caused delays ranked highest with (RII=0.91) and was attributed to improper planning and scheduling problem, followed by financial incapability (RII=0.89), while client-caused delay (RII=0.89) attributed to cash flow problem (delay payment) was observed as the second most common cause of delay in building construction in Osun state.

Furthermore, the study reveals increase in final cost of project (RII=0.88), extension of time on project (RII=0.80), as the top two (3) effects of delays in building construction project in Osun state, while cash flow (RII=0.52) had the least effect.

Based on research findings, the following recommendations were made;

1. According to findings from the study, cash flow problem (delay payment) ranked highest among the clients-caused delays in building construction in Osun. As a result, clients should ensure that proper planning and costing of the works are made during the pre-contract period so as to avoid unnecessary stoppage of works as a result of funding constraints because this not only increases the construction period but also impacts on the contractors overhead costs such as costs related with mobilization and demobilization during the period within which the works were suspended.

2. Furthermore, in ensuring that delay in building construction projects are considerably reduce and the effects minimized, clients should undertake an adequate planning for the project at inception and make enough fund available based on reliable estimate made by the Quantity Surveyor at the inception. The client should engage services of competent construction professionals; the Architect should at once and at inception produce economic design as dictated by cost plan prepared by the Quantity Surveyor who also controls cost from inception and throughout the duration of the contract.

3. In addressing incomplete drawings and inadequate supervision of works attributed as topmost consultants-caused delays, it is recommended that consultants should ensure that all design changes during the execution of the works are handled clearly while not conceding the desired outcome of the final project.

4. Also, the consultants should ensure that adequate site investigations are carried out both during feasibility study and conceptual design so as to ensure that appropriate measures are taken care of during the detailed design so as to avoid suspension of works during the construction phase to address the design challenges.

5. The consultant should ensure that there is a competent representative on the site to make quick decisions that are binding and to ensure that works are well supervised and properly done.

6. In tackling the problem of improper planning and scheduling that was ranked as the top most contractor-caused delay observed in the study, it will be recommended that the contractor should ensure proper planning and scheduling of the works and ensure effective site management and supervision of the works so as to keep watch on critical activities and strive to complete projects within the specified time while meeting quality and cost requirements.

7. In addition to the above, contractors should ensure they have enough cash flow to execute the works and desist from the practice of diverting particular project funds to non-project activities to avoid being cash-strapped during the execution of the works.

8. All stakeholders should ensure that proper planning must be done to cater for unforeseen events that may prolong the construction period, increase cost and cause damage to property and injury to project participants. Such risks should be transferred to competent stakeholders like insurance companies so as to help reduce the effect of costs in the event of delay occurrence.

9. Prompt payment to the contractor as dictated by Quantity Surveyors valuation and Architect's certificate. The government should also put in all efforts to reduce inflation and when there is change in political government, previously started job should not be abandoned for their new idea. Government should also make sure competent contractor that have strong financial stand are employed to execute contract works.

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**Citation:** Adekunle O, Ajibola WK (2015) Factorial Causative Assesments and Effects of Building Construction Project Delays in Osun State, Nigeria. J Archit Eng Tech 4: 150. doi:10.4172/2168-9717.1000150