



## CAUSES OF DELAYS IN NIGERIA ROAD CONSTRUCTION PROJECTS: A CASE STUDY OF LAGOS-IBADAN EXPRESSWAY

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### Abstract

*One of the most important sectors in infrastructure development in Nigeria is road construction. However, several roads construction projects in Nigeria suffer from prolonged delays. This has a negative effect on the success of road construction projects and causes damage such as recurring problems in the road construction industry in terms of schedule, cost, quality, safety and the amenity of road users. To identify the causes of delays, a modified questionnaire was designed from the extant literature by looking at the causes of delays in road construction projects along Lagos-Ibadan Expressway in Nigeria and in consultation with engineering experts with more than 10 years of experience on road construction projects. The main objective of the study is to determine the main causes of these delays and to offer possible solutions. A total of 17 causes of delay were identified as important in Nigeria road construction project. Questionnaire respondents included 27 Contractors, 23 Consultants, 16 Quantity Surveyor, 8 Architects and 20 Others from the construction industry making it 94 in total. The survey results indicate that the five top factors causing road construction delays are: Clients' Financial difficulties; Cash Flow during construction; Political Influence; Government regulations; and Inclement or Bad weather.*

**Keywords:** *Causes of Delay; Road Construction Projects; Experts; Lagos-Ibadan Expressway; Nigeria*

## **Introduction**

Nigeria is a developing nation located in West African Sahara in the continent of Africa region. It is geographically located between the Sahel to the North and the Gulf of Guinea to the South in the Atlantic Ocean <sup>1,2</sup>. It covers an area of 923,769 square kilometres (356,669 sq mi), with a population of over 211 million. Nigeria borders Benin Republic in the West, Cameroon in the East, Chad in the Northeast, and Niger in the North. Based on its strategic location, Nigeria has the potential to transform itself into a land-linked country developing connections with its neighbours through the road network and railways <sup>3</sup>. Thus, development of the transportation infrastructure is one of the most important means of promoting the country's economic development. In the decades since independence in 1960, the Nigeria Government has invested significantly in infrastructure development, especially expanding and improving the road network <sup>3</sup>. Lack of annual budgets for road infrastructure such as maintenance, rehabilitation and upgrading to ensure standards and improved road safety are moribund.

Road construction often fall behind schedule in Nigeria as in many developing countries <sup>3</sup>. There are over 800 road projects currently ongoing across the country. These include the Lagos-Ibadan Expressway, second Niger Bridge, Bodo-Bonny Road, Abuja-Kaduna-Kano Expressway and Obajana-Kabba Road in Kogi State and so on <sup>4</sup>. In 2020, the FGN issued a NGN162.5 billion (about USD393.4 million) Sukuk (Islamic bond), the third of a three-part series, which was utilised for the construction and rehabilitation of roads across six geo-political zones in Nigeria <sup>4</sup>. Most of these projects are behind schedule due to one delay or the other. This is an important issue affecting the management of road construction projects in the country. It is essential to establish the main causes of such delays and search for possible solutions in improving the state of affairs in Nigeria. Road construction delays have many negative impacts, such as environment, as budget over-runs and effects on the economy and so on <sup>3</sup>. Some delays were observed by some researchers G. Agyekum-Mensah et al., (2012); Sambasivan & Soon -YW, (2007) in literature and it was established that over 40 per cent of projects worldwide were involved in delays. These are specifically affecting directly or indirectly those who use the roads and/or live near roads under construction. Thus, it is imperative to find the main common causes of delay in road construction projects along Lagos-Ibadan Expressway

in Nigeria. Landmark projects such as Lagos-Ibadan Expressway have attracted a lot of public debate on project delays<sup>7</sup>. This, therefore, suggested that delay remains a prevailing challenge within Nigeria construction industry and beyond.

Despite the studies on the causes of delay in many countries, a search on causes of delay in the Nigeria construction literature is found scarcely<sup>7</sup>. However, the construction industry has moved on and there have been changes which include the 2008 economic recession<sup>3</sup>. Until now, delays still remain a cornerstone problem in the Nigeria construction industry Wolstenholme et al., (2009) therefore, described delays as worth researching. It is clearly on record that the Nigerian road construction industry encountered the issue of not being able to finish projects within the specified time. Lagos- Ibadan Expressway in Nigeria was examined by the authors in this study where causes of delays were identified; of these waiting for information, Clients' Financial difficulties and Cash Flow during construction were ranked highest. Other factors affecting the delay are; Political Influence, Site conditions-related unforeseen circumstances, Material procurement, Government regulations, Decision making, Contract management, Price Fluctuation, Changed orders/Discrepancies in contract documents, Late Deliveries of materials/equipment, Structural Design variations, Inclement or Bad weather, Effective or Poor communication among stakeholders, Labour Dispute or Strikes, Inflation or Sudden increase in good/commodities, Equipment Breakdown/ Management and so on.

Most studies on the causes of delay found in literature are based on the rankings by respondents (random participants), and they are rarely verified by practitioners (the people involved)<sup>7</sup>. Though, to understand real life issues in specified industries, it is appropriate to ask the people involved. Therefore, this study closes this gap in knowledge by aiming at identifying the factors that causes delay in Nigeria construction industry, with Lagos-Ibadan Expressway as a case study and proffering solution on how the delay can be minimized. This research made use of a quantitative approach using an organized questionnaire given to construction experts with more than 10 years of experience in Nigeria road construction projects specifically; Highway Engineers, Quantity Surveyors, Land Surveyors, Geologist, Material merchants, Construction managers, Consultants and Project Managers. These experts were chosen from

both the private (temporary workers and permanent) and public sectors in Lagos State. The main objectives of this study are the following:

- To identify the causes of delays in Nigeria road construction projects.
- To rank the causes of delays in Nigeria road construction projects.
- To find ways to eliminate the causes of delays in Nigeria road construction projects.

There are five sections in this paper, the Introduction, Literature Review, which establishes the present state of knowledge; followed by the Research Methods used for the study, the Data Analysis and Presentation of Results and also Conclusion and Recommendations. The general scope of this study is to assess the causes of excessive delays in the completion of Lagos- Ibadan Expressway Road projects in Nigeria during both the pre and post contract stages. A questionnaire survey is carried out to collect information on potential effects, factors and the possible solution of the delays. Responses from 94 experts from the construction firms such as Highway Engineers, Quantity Surveyors, Land Surveyors, Geologist, Material merchants, Construction managers, Consultants and Project Managers were analyzed.

### **Literature Review**

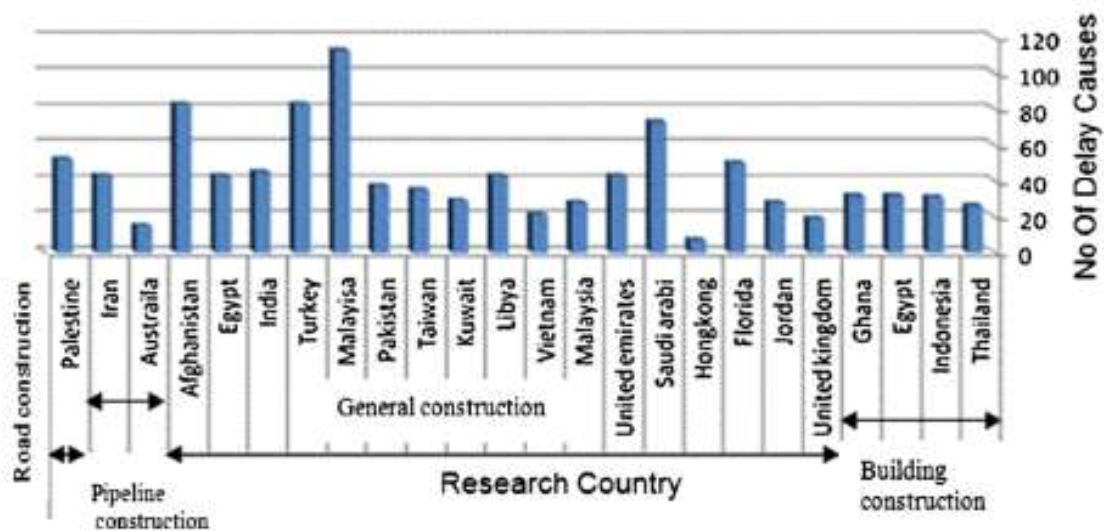
Several studies have been conducted to identify the causes of delay in construction projects <sup>9</sup>. There are different definitions by researchers for “delay”; but, in this study delay is defined simply as “the inability to meet the scheduled time” <sup>7</sup>. Also, legal consequences of delays in construction has been presented by <sup>10</sup>. In 2006, Assaf & Al-Hejji, outlined 53 main causes of delay in large construction projects. Delay causes are further classified into eight major groups (see Table 1) with different levels of sternness to different groupings <sup>9</sup>. But Conlin & Retik, (1997) classified delays into two main types, excusable and non-excusable. By and large, excusable delays are those that are understandable by the parties and non-excusable are the opposing type. These are usually client-initiated delays but the non-compensable are the opposite.

Different numbers of causes were found in 24 countries with different project delays and important causes and ways of ranking the causes <sup>13</sup>. The classification of the causes in each research on the type of construction is presented in Fig 1 The difference in the number of delays causes for each type of construction as in general type of construction and other researches showing

delays caused in Malaysia and Hongkong to be 113 and 7 respectively <sup>13</sup>. However, strong evidence shows the performance inconsistency of construction projects and the trend is growing rapidly. Therefore, sustainable development of construction industry is important <sup>14</sup> which has a multiplying effect on the wider economy <sup>15</sup>

Main group	Causes under each group
1. Project group	1 Low project bid price 2 Construction area restricted 3 Inconvenient site access 4 Poor ground conditions 5 Poor soil quality 6 Poor terrain conditions
2. Owner group	7 Delayed payment by owner 8 Delayed decision by owner 9 Coordination between owner and contractor. 10 Unreasonable project timeframe 11 Financial issues related to owner 12 Project delayed by owner 13 Delayed approval of materials 14 Not well-defined scope of work 15 Delayed land expropriation by owner 16 Change order from owner during construction 17 Late issue of approval documents by owner. 18 Unclear assignment of responsibility near province boundaries
3. Contractor group	19 Difficulties in financing project by contractor 20 Poor communication between contractor and other parties 21 Conflict between contractor and other parties 22 Poor resource management 23 Necessity to re-do work due to contractor failings 24 Ineffective planning management by contractor 25 Insufficiently skilled technical staff 26 Insufficient equipment and vehicles for the work 27 Poor quality control 28 Improper construction method 29 Contractor cash flow
4. Consultant group	30 Consultant too lenient 31 Poor coordination between the consultant and contractor(s) 32 Delay in implementing inspection by consultant 33 Poorly qualified inspector 34 Insufficient inspectors
5. Design group	35 Delayed design work 36 Mistakes in design 37 Inappropriate design
6. Laborers group	38 Low labor productivity 39 Insufficiently skilled equipment operator 40 Insufficient laborers 41 Personal conflict between laborers and management team 42 Personal conflict among laborers
7. Materials and equipment group	43 Lack of equipment efficiency 44 Shortage of equipment 45 Changes in material types and specifications during construction 46 Shortage in materials
8. External group	47 Political situation 48 Exchange rate fluctuation under contract 49 Change in loans policy by bank 50 Weather conditions 51 Monopoly market 52 Oil price increase 53 Public events

**Table 1: List of Possible Delay Causes and Groupings**



**Figure 1 Classification of number of causes assembled from the literature review.**

Looking at the above fig 1, general construction type projects are studied in 16 various countries worldwide showing that a country like Malaysia is studied in two different researches with two different numbers of causes of delay (113) and (28). Several causes of delays were shown in fig 1. According to the figure above, delays due to general construction are applicable in 16 different countries while building, pipeline and road constructions are 4,2,1 country respectively. Looking at the configuration of the projects, it has shown that the causes of delay in road construction projects needs a widen research of study since the timely completion of highway construction projects is a national priority (Aziz & Abdel-Hakam, 2016). Starting point is identifying the root causes of delay and recognizing fundamental principles of failure. Atkinson (1999) described construction projects as a continuous failing exercise which needs to be address. But despite the advanced technology and project management techniques available to the practitioners, construction projects still experience delays <sup>17</sup>

One of the earliest researchers <sup>18</sup> clearly presented one causes of delays in United State of America construction industry. Seventeen (17) delay factors were identified and top five were established as weather, labour supply, subcontractors, design changes, shop drawings and foundation conditions. This

was followed with the study conducted in Turkey by Arditi et al., (1985) establishing 23 causes of delay in construction industry. From their findings four topmost factors were identified as shortage of materials, difficulty in receiving payments from agencies, contractor's difficulties to get loans and credit purchase, and organisational characteristics. Then in the United Kingdom, Sullivan & Harris, (1986) during their study established 19 causes of delays, ranking waiting for information, variation orders and ground problems as the highest. Subsequently, various researchers examined the causes of construction delays in various countries as shown in Tables 2 and 3<sup>3,18-21</sup>.

<b>Item</b>	<b>Common causes of delay</b>	<b>Ranking based on occurrences</b>
1	Inadequate planning	1
2	Finance and payment	2
3	Slow in Approving	3
4	Variation	3
5	Ground condition	4
6	Labour supply, and subcontractors	5
7	Design changes	5
8	Material shortage	5
9	Manufactured and imported items	5
10	Site Management	5
11	Weather	6
12	Fluctuation	6
13	Construction mistake	6
14	Contractors experience	6
15	Contingency or unforeseen	6

**Table 2: Top 15 causes of delay observed in construction literature**

A critical review of several causes of delay in construction were observed amongst the studies by researchers Fallahnejad, (2013); Hamzah et al., (2011); Sweis et al., (2008) in an extant literature. Furthermore, critical review on main causes of delay were identified by Hamzah et al., (2011); Sambasivan & Soon-YW, (2007) which includes poor planning, poor site management, financial issues, delay of material delivery and management problems. Planning in terms of project management was identified as a major problem of construction delay

in Malaysia Lim & Mohamed, (2000); they ranked lack of experience, lack of site supervision and lack of appropriate skills as the main problems consecutively. Although, Sweis et al., (2008) anticipated that these main causes can be grouped into three categories, which are, input factors (concerned with labour, material and equipment), internal environment (contractor, owner and consultants) and exogenous factors (weather and government regulations). Although, literature has indicated that delay is a universal issue within construction, which was proved through empirical study in the UK that causes of delay in road construction is scanty in the twenty-first century<sup>25</sup>. This was justified by Santoso & Soeng, (2016) during their conducted research in Cambodia that the causes and effects of delay in road construction projects is significantly scanty based on time, cost and quality of the project.

<b>Author(s)</b>	<b>Country of study</b>	<b>Method used</b>
Al-Momani (2000)	Jordan	Survey
Lim and Mohamed (2000)	Malaysia	Case study (interviews)
Stumpf (2000)	General	Literature review
Odeh and Battaineh (2002)	Jordan	Survey
Frimpong <i>et al.</i> (2003)	Ghana	Survey
Long <i>et al.</i> (2004)	Vietnam	Questionnaire
Assaf and Al-Hejji (2006)	Saudi Arabia	Survey
Faridi and El-Sayegh (2006)	UAE	Survey
Lo <i>et al.</i> (2006)	Hong Kong	Survey
Sambasivan and Soon (2007)	Malaysia	Survey
Abd El-Razek <i>et al.</i> (2008)	Egypt	Survey (piloted semi-structured)
Le-Hoai <i>et al.</i> (2008)	Vietnam	Survey
Sweiss <i>et al.</i> (2008)	Jordan, Middle East	Survey
Toor and Ogunlana (2008)	Thailand	Case study (questionnaire and interviews)
Al-Kharashi and Skitmore (2009)	Saudi Arabia	Survey
Enshassi <i>et al.</i> (2009)	Gaza Strip	Survey
Han <i>et al.</i> (2009)	Korea	Survey
Tumi <i>et al.</i> (2009)	Libya	Survey
Fugar and Agyekwah-Baah (2010)	Ghana	Survey
Hamzah <i>et al.</i> (2011)	General	Literature review
Mahamid <i>et al.</i> (2012)	West Bank, Palestine	Survey
Doloi <i>et al.</i> (2012)	India	Questionnaire
Fallahnejad (2013)	Iran	Survey
Memon (2014)	Malaysia	Survey
Shehu <i>et al.</i> (2014)	Malaysia	Survey
McCord <i>et al.</i> (2015)	Northern Ireland	Survey

**Table 3: Studies on causes of delay in construction in twenty-first century observed in literature**



Therefore, in this study a critical review of 17 studies was conducted by finding common causes of delay in which an important knowledge gap is to be filled by identifying and evaluating the causes of delay along Lagos- Ibadan Expressway in Nigeria. These causes were mostly extracted from the extant literature before it was finally used as questionnaire.

### **Research Methods**

In the course of this study, necessary input and information were analysed enabling the reliable and reasonable information. The study is aimed at identifying the factors that causes delay in Nigeria construction industry, with Lagos-Ibadan Expressway as a case study and proffering solution on how the delay can be minimalized. This research made use of a quantitative approach using an organized questionnaire given to construction experts with more than 10 years of experience in Nigeria road construction projects specifically; Highway Engineers, Quantity Surveyors, Land Surveyors, Geologist, Material merchants, Construction managers, Consultants and Project Managers were considered. These experts were chosen from both the private (temporary workers and permanent) and public sectors in South West of Nigeria because of the road location.

A non-irregular sampling method was utilized and sample size of ninety-four respondents were analyzed. These ninety-four respondents were experts from construction industry. A classified closed-ended questionnaire was used showing demographic and descriptive data analysis. Two hundred samples were sent out online, with ninety-four returned responses gotten back for proper analysis. This amount to 47% of validated data for analysis. The research study concentrates specifically on road constructions projects in Nigeria using Lagos-Ibadan expressway as case study.

The primary data which refers to field data were obtained through the use of well-structured questionnaire developed from extant literature establishing the probable factors affecting the delay of road construction in Nigeria. The secondary data were used as the orbit in which the research design revolved around. The questionnaire survey was tailored towards assessing the perceptions of contractors and consultants of the relative importance of causes and the effects of construction delay. The questionnaire was therefore designed into six sections: sections A; B; C; D, E and F. These were represented as

follows Company and Respondent Profile; Causes of Delay; Details of Project Schedule; Quality Control and Accident Occurrence; Unskilled workforce, Payments and Supplies; and Project Delay respectively. The questionnaires were delivered online to the various target groups.

A total number of Two hundred (200) questionnaires were distributed as mentioned earlier and 94 were returned and analysed. The analysis involved both descriptive and inferential statistics of the data analysis. Descriptive statistics includes frequency count and percentages, such as tables and graphs for the presentation of results while inferential statistics includes multiple regression, person correlation coefficient and reliability statistics. But for this conference, only few of mentioned analysis is shown. This was done to test for the 94 relatedness of the research objectives and finding were discussed SPSS Statistical software version 24.0 was used for the analysis.

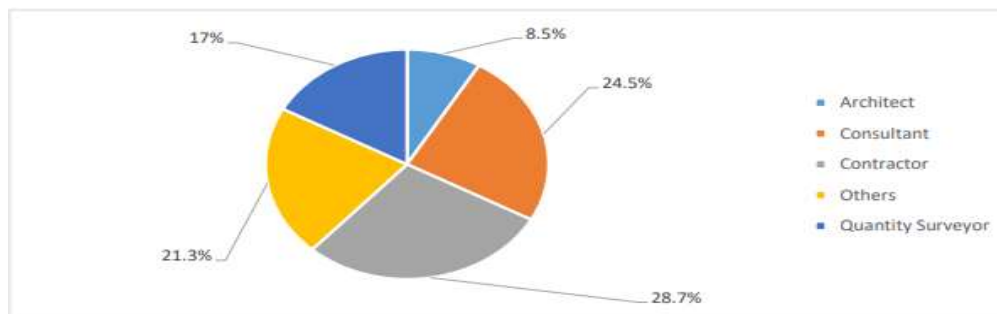
The major limitation of this study is the pandemic Covid19, which restricts human daily activities. It is no longer news that the world experienced a global lockdown which made it relatively difficult to achieve quick response from the respondents. Secondly there was reluctance from some of the respondents in finding time to complete and return the questionnaires even after persuading them to do so online. Furthermore, online fraud and hacking of people data hence penetrating into ones' account by internet fraudsters made some persons reluctant to respond to the sent questionnaire. For simplicity and convenience in filling the questionnaire, it was presented only online format and the collection of data was made easier.

## **DATA ANALYSIS AND PRESENTATIONS OF RESULTS**

The analysis involved both descriptive and inferential statistics of the data analysis. Descriptive statistics includes frequency count and percentages, such as tables and graphs for the presentation of results while inferential statistics includes multiple regression, person correlation coefficient and reliability statistics. This was done to test for the relatedness of the research objectives and finding were discussed. SPSS Statistical software version 24.0 was used for the analysis.

	Frequency	Percent	Valid Percent	Cumulative Percent
Architect	8	8.5	8.5	8.5
Consultant	23	24.5	24.5	33.0
Contractor	27	28.7	28.7	61.7
Others	20	21.3	21.3	83.0
Quantity Surveyor	16	17.0	17.0	100.0
Total	94	100.0	100.0	

*Source: Research Project 2020/Analyzed with SPSS 24.0*



*Source: Research Project 2020/Analyzed with SPSS 24.0*

**Table 4.1 Position held in construction industry  
 Descriptive Analysis Showing the Affected Factors**

	N	Mean	Std. Deviation	Rank
Equipment Breakdown/ Management.	94	2.17	1.11	14
Inflation or Sudden increase in good/commodities.	94	2.38	1.17	6
Labour Dispute or Strikes.	94	2.03	1.19	16
Effective or Poor communication among stakeholders.	94	2.02	1.14	17
Inclement or Bad weather.	94	2.40	1.12	5
Clients' Financial difficulties.	94	2.70	1.30	1
Structural Design variations.	94	2.15	1.02	15
Late Deliveries of materials/equipment.	94	2.21	1.18	12
Changed orders/Discrepancies in contract documents.	94	2.29	1.15	9
Price Fluctuation.	94	2.38	1.14	6
Contract management.	94	2.20	1.04	13
Decision making.	94	2.26	1.15	11
Cash Flow during construction.	94	2.56	1.28	2
Government regulations.	94	2.41	1.33	4
Material procurement.	94	2.29	1.17	9
Site conditions-related unforeseen circumstances	94	2.37	1.23	8
Political Influence.	94	2.52	1.50	3

*Source: Research Project 2020/Analyzed with SPSS 24.0*

**Table 4.2 The Factors that Causes Delay in the Construction Project in Construction Industries**

**Descriptive Statistics Showing mean score value (MSV)and ranking**

Descriptive Statistics			
Delay Factors	No	Mean Score	RANK
Client' Financial difficulties.	94	2.70	1
Cash Flow during construction.	94	2.58	2
Political Influence.	94	2.52	3
government Regulations	94	2.41	4
Inclement or Bad weather.	94	2.40	5
Price Fluctuation.	94	2.38	6
Inflation or Sudden increase in good/commodities.	94	2.38	7
Site conditions-related unforeseen circumstances	94	2.37	8
Material procurement.	94	2.29	9
Changed orders/Discrepancies in contract documents.	94	2.29	10
Decision making.	94	2.26	11
Late Deliveries of materials/equipment.	94	2.21	12
Contract management.	94	2.22	13
Equipment Breakdown/ Management.	94	2.17	14
structural Design Variation	94	2.15	15
Labour Dispute or Strikes.	94	2.03	16
Effective or Poor communication among stakeholders.	94	2.02	17

**Table 4.3 The mean score value (MSV)and ranking**

Table 4.2 above shows the factors that causes delay in the construction project according to their ranks while Table 4.3 shows the mean score value (MSV) and ranking. Clients' Financial Difficulties was ranked 1<sup>st</sup> as highest factor that causes delay in construction project with mean value of 2.70 and deviate from the mean at 1.30 Std. Dev. Cash Flow during construction was ranked 2<sup>nd</sup> highest factor that causes delay in construction project with mean value of 2.56 and deviate from the mean at 1.28 Std. Dev. And Political Influence was ranked 3<sup>rd</sup> highest factor that causes delay in construction project with mean score of 2.52 and deviate from the mean at 1.50. While Structural Design Variations was ranked 15<sup>th</sup>; Labour Dispute or Strikes were also ranked 16<sup>th</sup>; and Poor

Communication among Stakeholders ranked 17<sup>th</sup> as the least factor causes delay in construction project with mean values of 2.15; 2.03 and 2.02 respectively.

### How long was the entire project delayed in the Construction Project?

	Frequency	Percent	Valid Percent	Cumulative Percent
0 - 20% extra of initial schedule duration.	25	26.6	26.6	26.6
21 - 40% extra of initial schedule duration.	35	37.2	37.2	63.8
41 - 60% extra of initial schedule duration.	23	24.5	24.5	88.3
61 - 80% extra of initial schedule duration.	9	9.6	9.6	97.9
81 - 100% extra of initial schedule duration.	2	2.1	2.1	100.0
Total	94	100.0	100.0	

Source: Research Project 2020/Analyzed with SPSS 24.0

**Table 4.4 Delay Period of the entire Project.**

### Discussion of Findings

- 27(28.7%) of them were Contractors, 23(24.5%) of them were Consultants, 16(17.0%) of them were Quantity Surveyors, 8(8.5%) of the respondents were Architects, and 20(21.3%) of them were from other professional experts. Majority of the participants in the research study were contractors.
- It was also reported that most of the respondents participated in the study have 1-5yrs working experience.
- Late Payment, Unskilled Laborer and Late Delivery of materials bring significant changes in Construction delay.
- There is correlation between Late Payment, Unskilled Laborer and Late Delivery of Materials in determining the Causes of Delay in the Construction Project.

## CONCLUSION AND RECOMMENDATIONS

### Conclusion

In conclusion, identifying the causes of delay in road Nigeria construction industry is worth studying because of its importance and usefulness in putting a halt to incomplete project. Harmonizing the measures to drastically reduce the high level of road projects delay at the federal, state and local government levels

is imminent to sustainability. From the conducted survey and analysis, it was discovered that most of the factors causing delays in Road construction Projects are financially related because of the nation economy. The analysis feedback results from the questionnaire survey have shown that out of the 17 factors that made the list of factors causing delays in construction projects in Nigeria, 15 factors were commensurate with road construction projects. It is therefore important that the experts' experiences were explored rather than arguably recycling other attributes from existing studies, from different countries, with the potential for statistically biased analysis. The study contributes to the better understanding of the causes of delays in Nigeria road construction project by using quantitative research strategy.

### **Recommendations**

After conducting a thorough research study into the factors causing delay of road construction in Nigeria the following recommendations were deduced from the study with the intention of assisting the minimization of unnecessary delays in the nearest future. The following Suggestions are established:

- Detailed and comprehensive site investigation should be done at the design phase to avoid variations and late changes during the construction period
- The government should ensure that projects biddings are based on experience and expertise and not based on nepotism.
- Allow sufficient time for proper planning, design, information documentation, and tender submission.
- Cost estimates should be based on feedback from the contractors' experience and understanding of the project conditions rather than on historical data adjusted for inflation increases over each year using a cost-based bottom-up approach to estimate preparation.
- Prompt payment to contractors on time in order not to delay the work progress which tends to cause time overrun.
- The government in cooperation with other stakeholders should invest in human capital development considerably by training construction workers with the right technical skills to become more efficient.

With this kind of measure in place Nigeria can construct quality infrastructure without seeking costly assistance from companies and countries and additionally make the country to be more competitive in the global market.

## Reference

1. Coleman J. Nigeria: The African giant. *Round Table*. 1959;50(197):55-63. doi:10.1080/00358535908452221
2. Fafunwa AB. *History of Education in Nigeria*. Taylor and Francis; 2018. doi:10.4324/9780429454905/HISTORY-EDUCATION-NIGERIA-BABS-FAFUNWA
3. Bounthipphasert S, Shozo N, Toshihiro O, Takafumi N. Causes of Delays in Road Construction Projects in Laos | Global Journal of Research In Engineering. *Glob J Res Eng* . 2020;20(3):19-32. Accessed March 5, 2022. <https://engineeringresearch.org/index.php/GJRE/article/view/2063>
4. Okafor N, Sunmola A, Samuel V, Okolie C, Udo Udoma, Belo-Osagie. Construction and Projects in Nigeria: Overview. Thomson Reuters. Published February 20, 2022. Accessed March 6, 2022. <https://projects.worldbank.org/en/projects-operations/project-detail/P090135>
5. Agyekum-Mensah G, Knight A, Pasquire. Adaption of structured analysis design techniques methodology for construction project planning . In: *Proceedings of 28th Annual ARCOM Conference*. Vol 2. ARCOM; 2012:1055-1065. Accessed March 6, 2022. <https://irep.ntu.ac.uk/id/eprint/6199/>
6. Sambasivan M, Soon -YW. Causes and effects of delays in Malaysian construction industry. *Elsevier*. 2007;25(5):517-526. Accessed March 6, 2022. <https://www.sciencedirect.com/science/article/pii/S0263786306001700>
7. Agyekum-Mensah G, Knight AD. The professionals' perspective on the causes of project delay in the construction industry. *Eng Constr Archit Manag*. 2017;24(5):828-841. doi:10.1108/ECAM-03-2016-0085/FULL/HTML
8. Wolstenholme A, Austin S, Bairstow M, Blumenthal A. Never waste a good crisis: a review of progress since Rethinking Construction and thoughts for our future. *Constr Excell*. Published online October 21, 2009:1-33. Accessed March 6, 2022. [https://repository.lboro.ac.uk/articles/Never\\_waste\\_a\\_good\\_crisis\\_a\\_review\\_of\\_progress\\_since\\_Rethinking\\_Construction\\_and\\_thoughts\\_for\\_our\\_future/9460931/files/17084201.pdf](https://repository.lboro.ac.uk/articles/Never_waste_a_good_crisis_a_review_of_progress_since_Rethinking_Construction_and_thoughts_for_our_future/9460931/files/17084201.pdf)
9. Mahamid I, Bruland A, Dmaid N. Causes of Delay in Road Construction Projects. *J Manag Eng*. 2012;28(3):300-310. doi:10.1061/(ASCE)ME.1943-5479.0000096
10. Leishman DM. Protecting Engineer Against Construction Delay Claims: NDC. *J Manag Eng*. 1991;7(3):314-333. doi:10.1061/(ASCE)9742-597X(1991)7:3(314)
11. Assaf S, Al-Hejji S. Causes of delay in large construction projects. *Elsevier*. 2006;24(4):349-357. Accessed March 7, 2022. <https://www.sciencedirect.com/science/article/pii/S0263786305001262>
12. Conlin J, Retik A. The applicability of project management software and advanced IT techniques in construction delays mitigation. *Elsevier*. 1997;15(2):107-120. Accessed March 7, 2022. <https://www.sciencedirect.com/science/article/pii/S0263786396000464>
13. Aziz RF, Abdel-Hakam AA. Exploring delay causes of road construction projects in

- Egypt. *Alexandria Eng J.* 2016;55(2):1515-1539. doi:10.1016/J.AEJ.2016.03.006
14. Enshassi A, Ayyash A. Factors affecting cost contingency in the construction industry - Contractors' perspective. *Int J Constr Manag.* 2014;14(3):191-208. doi:10.1080/15623599.2014.922729
  15. Durdyev S, Ismail S. On-site construction productivity in Malaysian infrastructure projects. *Struct Surv.* 2016;34(4-5):446-462. doi:10.1108/SS-12-2015-0058/FULL/HTML
  16. Atkinson R. Project management: cost, time and quality, two best guesses and a phenomenon, its time to accept other success criteria. *Elsevier.* 1999;17(6):337-342. Accessed March 8, 2022. <https://www.sciencedirect.com/science/article/pii/S0263786398000696>
  17. Sweis G, Sweis R, Hammad A, Shboul A. Delays in construction projects: The case of Jordan. *Elsevier.* 2008;26(6):665-674. Accessed March 8, 2022. <https://www.sciencedirect.com/science/article/pii/S0263786307001573>
  18. BALDWIN, MANTHEI JM, ROTHBART H, HARRIS RB. Causes of delay in the construction industry. *ASCE J Constr Div.* 1971;97(CO2):177-187. doi:10.1061/JCCEAZ.0000305
  19. Arditi D, Akan GT, Gurdamar S. Reasons for delays in public projects in Turkey. *Constr Manag Econ.* 1985;3(2):171-181. doi:10.1080/01446198500000013
  20. Sullivan A, Harris FC. Delays on Large Construction Projects. *Int J Oper Prod Manag.* 1986;6(1):25-33. doi:10.1108/EB054752/FULL/HTML
  21. Santoso DS, Soeng S. Analyzing Delays of Road Construction Projects in Cambodia: Causes and Effects. *J Manag Eng.* 2016;32(6):05016020. doi:10.1061/(ASCE)ME.1943-5479.0000467
  22. Fallahnejad M. Delay causes in Iran gas pipeline projects. *Elsevier.* 2013;31(1):136-146. Accessed March 8, 2022. <https://www.sciencedirect.com/science/article/pii/S0263786312000683>
  23. Hamzah N, Khoiry M, Arshad I, Tawil N, Ani A. Cause of construction delay-Theoretical framework. *Elsevier.* 2011;20:490-495. Accessed March 8, 2022. <https://www.sciencedirect.com/science/article/pii/S1877705811030013>
  24. Lim C, Mohamed M. An exploratory study into recurring construction problems. *Elsevier.* 2000;18(4):267-273. Accessed March 8, 2022. <https://www.sciencedirect.com/science/article/pii/S0263786399000162>
  25. McCord J, McCord M, Davis PT, Haran M, Rodgers WJ. Understanding delays in housing construction: evidence from Northern Ireland. *J Financ Manag Prop Constr.* 2015;20(3):286-319. doi:10.1108/JFMPC-07-2015-0028/FULL/HTML