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Key Driving Factors of Cost Overrun in Highway Infrastructure Projects in Nigeria: A Context-Based Perspective

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Abstract

Purpose- Extensive research towards identifying the attributable cost overrun factors globally have been conducted predominantly from a **survey-oriented** perspective, which disregard the contextual basis on which these triggers manifest. This study aims to explore the driving factors of cost overrun in highway projects, specific to the Nigerian context.

Design/methodology/approach- The research used a context-based approach to seek project stakeholders' perspective on the key drivers of cost overrun in highway projects in Nigerian. Semi-structured interviews **were conducted** with client, contractor and consultant organisations involved in **the provision** of highway **infrastructure projects in Nigeria**. The collected data was analysed using a developed coding framework **grounded** on case study approach, principles of inductive thematic analysis and saliency analysis to identify the key drivers.

Findings- Findings from the analysis identified triggers from macroeconomic, societal, leadership and project management perspective with synergistic relationship with each other based on prevalence and significance. Among the key triggers are delay in work progress, political instability, adverse weather, social issues, delay in progress payment to contractors, and modification of project scope. In conclusion, the triggers of cost overrun in highway projects are contextually driven by the complex nature of the project management, societal, macroeconomic and leadership triggers specific to the Nigerian context.

Research limitations/implications- The research was limited to only highway infrastructure projects in Nigeria. Furthermore, the findings are based on a small sample size and thus, caution must be taken before applying the outcome of this study in a generalized way to other contexts.

Practical implications- Practically, the stakeholders i.e. client, contractors and consultants should acknowledge the contextual circumstances in which each of the triggers take place, which will aid in developing pragmatic measures and make the right decisions towards addressing these triggers during any highway construction project in Nigeria and enhance the chances of project success.

Originality/value- The context-based approach applied in this study is expected to provide a new insight **in understanding the triggers of cost overruns**, especially in highway projects in Nigeria **and indeed other developing countries with similar governance characteristics**.

Keywords: Context-Based, Cost Overrun, Drivers, Highway Projects, Thematic Analysis

Paper type: Research paper

1. Introduction

Highways are significant to utilizing the potentials of emerging countries by harnessing diverse clusters of economic activities. As the major and most popular means of transportation in most emerging countries, Federal highways account for the movement of about 95% of freight, vehicle and persons in Nigeria, despite accounting for about 18% of the total national highway network (Muhammad and Sebastian-Dauda, 2017). For instance, Nigeria has about 200,000 kilometres of highway network with around 36,000 kilometres of Federal highway spread across the thirty-six (36) states and the Federal Capital Territory, Abuja (Onolenemen, 2013, Muhammad and Sebastian-Dauda, 2017, Ogbu and Adindu, 2019). Yet, highway infrastructure construction remains one of largest areas of construction investment in Nigeria. For example, about 229 highway projects worth over ₦2.361 trillion are currently on-going across all regions in Nigeria (FMW&H, 2019). However, the uniqueness, dynamic, increasing complexity of highway infrastructure projects and the highly competitive and fragmented nature of the construction industry has resulted in construction projects and highway infrastructure projects in particular continually facing uncertainties that render cost management very difficult and thus, leads to poor cost performance. Hence, poor cost performance has been regarded as one of the most serious issues during the implementation of publicly funded highway infrastructure projects (Flyvbjerg et al., 2003).

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3 Cost overruns impact significantly on all the key stakeholders involved in project delivery process due to the
4 undesirable perception attributed to poor cost performance, despite having a collective goal of delivering the
5 project within the set cost performance target (Park and Papadopoulou, 2012). However, cost overruns brings
6 about less return of investments on the part of the public client, if any and significantly exert so much strain on
7 the scarce public funds available which affects the socio-economic development of a country, particularly
8 developing countries, because it restricts government ability to invest in new public projects. This pervasive
9 problem can undesirably affect the economy and jeopardize public confidence in the ability of government to
10 deliver complex but very critical infrastructure projects (Flyvbjerg et al., 2003, Love et al., 2015b).

11
12 In practice, cost overruns occur in most highway projects and the magnitudes significantly varies with
13 geographical context, empirical studies and individual projects (Famiyeh et al., 2017). In total, Flyvbjerg et al.
14 (2003) examined 258 infrastructure projects (including 167 highway projects) covering a range of countries across
15 North America, Europe and Japan. The study found that 9 in 10 projects were unsuccessfully delivered within
16 budgetary provision. It was further revealed that cost overruns are evident and pervasive in highway infrastructure
17 projects. Similarly, of the 142 highway projects constructed between 2004 and 2014 in the Federal Capital
18 Territory, Nigeria, only 10 projects were completed within the agreed budget (Anigbogu et al., 2019).

19
20 Globally, considerable effort has been directed towards understanding why and how construction projects
21 exceed their estimated costs, but most of the studies carried out concentrated on general construction and transport
22 infrastructure in general (Love et al., 2011, Love et al., 2015a). Although, highway construction cost overruns
23 contribute to significant financial risks, in most of the studies, which are largely survey-oriented, highway
24 construction cost overruns, especially in Nigeria are under studied. For instance, Mansfield et al. (1994);
25 Omoregie and Radford (2006), Amadi and Higham (2017), Leo-Olagbaye and Odeyinka (2018), and Anigbogu
26 et al. (2019). Thus, understanding the driving factors of cost overrun in highway projects from a contextual
27 viewpoint is important to acknowledge the circumstances in which these factors occur, and the unique peculiarity
28 attributed to the Nigerian context. This study, therefore, aims to investigate the driving factors of cost overrun in
29 highway projects in Nigeria qualitatively to unravel the contextual issues that are missing in previous positivist-
30 oriented studies.

31 32 33 34 35 36 37 38 39 40 41 42 **2. Literature Review**

43 44 *2.1 Concept of cost overrun*

45 Cost overrun is a universal and pervasive problem in construction projects and particularly highway projects
46 regardless of the size of the project and its geographic location (Johnson and Babu, 2018). Furthermore, Flyvbjerg
47 et al. (2018) concluded that highway infrastructure projects record significant cost overruns. However, the trend
48 is more prominent in emerging countries partly, due to issues related to dishonest practices which sometimes
49 result to projects almost doubled on their budgeted cost (Durdyev et al., 2012).

50
51 Cost overrun has been described by several scholars as the difference between the final actual cost and the
52 initially agreed cost of a project. However, the main difference in the definition lies in the baseline of the initial
53 estimate considered by the authors within the project delivery process i.e. baselines as time of formal decision to
54 build, project definition, contract award and the difference is a determining factor to the magnitude of cost
55 overruns (Flyvbjerg et al., 2003, Cantarelli et al., 2012b, Love et al., 2015a).

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57 Moreover, some authors opined that changes in project cost vary with stages of the project development
58 (Cantarelli et al., 2012a). They described cost overrun during the various project development phases and
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explained that cost overrun at the pre-construction stage is measured as the variation between the forecasted costs at the start of construction and at the decision date. On the other hand, cost overrun in the construction stage is measured as the variation between the final construction cost and the forecasted cost at the time of start of construction (Figure 1).

Global studies have thus acknowledged the pervasiveness of this problem by revealing magnitudes of cost overrun ranging from 7.9% to over 450% (Flyvbjerg et al., 2003, Odeck, 2004, Okon, 2009, Cantarelli et al., 2012b, Locatelli et al., 2017). For instance, Okon (2009) quoted an extreme high cost overrun figures of 500% associated with some completed highway projects in the region of Niger delta, Nigeria. This is far more substantial compared to the magnitude reported by Amadi (2016). The study revealed a mean cost overrun of 216.47% based on a sample of 61 completed highway projects from 2002 traversing the swamps of Nigeria's Niger delta region (Amadi, 2016). Looking at the cost performance of individual projects, many projects in Nigeria have been reported to have experienced cost overrun ranging from 23.6% to about 199% as demonstrated in Table I. Furthermore, the channel tunnel project commonly known as "BIG DIG" in United States of America, experienced a substantial cost overrun of over 400% (Olivio and Shaver, 2014). The significant implication of the variations in the project cost is both economic and political (Singh, 2010). Many studies on highway infrastructure projects have reported huge cost overruns and have been consistent over the years (Creedy et al., 2010). These positive variations are attributed to a plethora of factors that can be described partly by geo-economic differences and region specificity of cost performance Cantarelli et al. (2012a), which are mostly assessed from a positivist perspective.

Fig I. Sequence of project cost changes across various project development phases
Adapted from Gkritza and Labi (2008) and Love et al. (2013)

Table I. Magnitude of cost overruns in some selected highway projects in Nigeria
Source: FMW&H (2019)

2.2 Causes of cost overrun

Over the years, the inability of many highway infrastructure projects to be delivered within the contractual budgets has inspired many researchers to enquire about the various factors responsible for the underperformance in different countries. This is because of sensitivity in the culture, practices and institutional structures of various countries (Johnson and Babu, 2018). For instance, Mansfield et al. (1994) explored the causes of cost overrun in Nigerian highway projects from the perspective of key industry stakeholders i.e. client, consultant and contractors using a questionnaire survey. The study found that, the major causes of cost overrun were attributed to finance and payment for completed works by the client, inaccurate estimates or forecasts, poor contract management and fluctuation in prices of materials as unanimously agreed by the stakeholders. Similarly, Omoregie and Radford (2006) conducted an experimental survey on the causes and effects of delay and cost escalation in infrastructure projects in Nigeria based on the data and findings of the study of Mansfield et al. (1994). The study identified the major causes of cost overruns as price fluctuation, financing and payment of completed works, poor contract management, delay and unsuitable ground conditions, inaccurate estimates, design changes, fraudulent practices and kickbacks and shortage of materials. Amadi and Higham (2017) who found with high level of significance, the impact of inadequate geotechnical investigation has on the cost performance of highway projects, revealed that adverse ground conditions are the primary triggers of high cost overrun experienced in highway projects in the Niger delta region of Nigeria. Leo-Olagbaye and Odeyinka (2018) conducted a study on the risk factors that

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3 **impact** the financial performance of highway projects in Osun state, Nigeria. Using a sample size of 115
4 experienced professionals involved in about 34 highway projects, **the study** found changes in scope, defective
5 design, changes in initial design, delay in the availability of design information and adverse weather conditions
6 to be the most significant risk factors. Anigbogu et al. (2019) examined the causes of cost overrun using
7 questionnaire responses complemented **by** analysis of project documents and interviews to affirm the significance
8 of the factors from key stakeholders involved in highway infrastructure development in **Federal Capital Territory,**
9 Nigeria. Analysis of the questionnaire survey data, project documents and interviews showed that inflation,
10 fluctuation of prices, exchange rate, government related issues like changes in policies, variation, delays in
11 payment to contractors, design changes, corruption and unforeseen ground conditions were the key
12 contributory causes.

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18 Kaliba et al. (2009) investigated the major causes and effect of cost escalation and schedule delays in road
19 construction projects in Zambia between 2006 and 2007. **The findings of the study** revealed that reasons for cost
20 overrun are unfavourable weather, change in scope of projects, environmental issues, schedule delays, civil unrest,
21 pressure from government at local level, technical difficulties and inflation.

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24 Using historical project cost data of 231 Australian highway projects constructed between 1995 and 2002 in
25 Queensland to identify the causes of cost overruns, Creedy et al. (2010) identified 10 factors and used expert
26 opinion to rank the relative importance of each factor. The findings revealed that design changes and changes in
27 scope during the project development are the highest contributors to project cost overruns in the analysed highway
28 projects.

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31 Park and Papadopoulou (2012) examined the causes of cost overrun in transport infrastructure in Asia
32 (Malaysia, South Korea, Thailand, Taiwan, India, Vietnam, Bangladesh, Pakistan, Singapore, Hong Kong and Sri
33 Lanka). Analysis using index method was based on 145 questionnaire responses from construction professionals
34 in Asia. It was observed from the survey analysis that the five most significant factors that cause cost overruns
35 are contract award to the lowest bidder, inadequate site investigations, unforeseen site conditions, inadequate pre-
36 construction study and inaccurate estimates.

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39 **Akoa (2011) conducted a study in Cameroon to identify the causes of cost and time overrun in infrastructure**
40 **projects based on analysis of 84 questionnaire survey responses from various stakeholders involved in highway**
41 **projects. The results of the study revealed that the five most significant causes of cost overrun are poor site**
42 **condition, insufficient technical studies, poor project planning, optimism bias and lack of adequate equipment**

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45 Alinaitwe et al. (2013) conducted a study based on analysis of questionnaire survey responses of project
46 stakeholders involved in public projects in Uganda and used a case study of civil aviation authority projects to
47 validate the results. **The study** found that scope changes, payment delays to contractors, poor project monitoring
48 and control and high inflation and interest rates are the five most significant factors impacting negatively on the
49 project cost performance.

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52 **Using a relatively small sample size of 42 professionals involved in highway infrastructure projects in**
53 **Namibia, Shimete and Wall (2017) revealed that cost overrun does not occur in isolation and therefore affirm**
54 **similar findings with other African countries. Specifically, scope changes, contractor inexperience, contractors'**
55 **cash flow and financial difficulties, inaccurate estimates and poor project planning were reported to be the most**
56 **significant factors.**

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3 Ebrahim et al. (2017) adopted a fuzzy triangle function in order to identify the effectiveness degree of factors
4 causing cost overruns based on the questionnaire survey responses of project stakeholders (i. e. client, consultant
5 and contractor) involved in highway projects in Egypt. The findings of the study revealed that the most significant
6 factors are poor project planning and execution, inadequate planning for the project cost and lack of following up
7 cost during the execution of the project, poor communication between project stakeholders, price increase of
8 construction materials and lack of robust technical study by the contractor before tendering for the project.
9 Analysis of survey responses of 59 project stakeholders involved in highway projects in Egypt confirmed the
10 prevalence of cost overrun. The study found several significant determinants of cost overrun including poor
11 communication between parties, poor contract documentation, increase in price of construction materials and
12 obsolete equipment in site (Akai et al., 2017).

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17 Nasir et al. (2011a) used literature review and questionnaire survey to investigate key factors of cost overrun
18 in highway projects in Pakistan. The results of the study showed that factors like delay in making payment to
19 contractors, poor project planning, problem with land acquisition, price increase, inaccurate estimate and scope
20 changes were identified to have severe effect on cost performance of a highway project in Pakistan. Also, Zafar
21 et al. (2016) conducted an analysis of the factors causing cost overrun in highway projects in the terrorism affected
22 areas of Pakistan. The study was based on questionnaire survey responses and analysis from stakeholders involved
23 in the provision of these infrastructures. The study found that lack of qualified contractor willing to operate within
24 the region, the project location, abandonment of plant and equipment due to series of threats, complex site
25 condition and inadequate site investigation due to security threats are the main challenges impacting on the cost
26 performance of highway projects. Likewise, Sohu et al. (2017) adopted a questionnaire survey and analysis based
27 on responses of 30 stakeholders with significant experience involved in highway project development in Sindh
28 province of Pakistan. The study found that delay in making payment to contractor, poor project planning, poor
29 contract management, delay in decision making, scope changes and financial difficulty faced by the client are the
30 most significant causes of cost overrun in highway project within the context of the study.

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37 Andrić et al. (2019) investigated the cost performance and causes of cost overrun in infrastructure projects in
38 Asia (east region, south region, central region and south east region) and made comparison with other global
39 studies such as Flyvbjerg et al. (2003), Cantarelli et al. (2012) and Huo et al. (2018). The statistical analysis was
40 based on project data 102 infrastructure projects (58 highway projects) and found that the key causes of cost
41 overruns are increase cost of resources (construction materials, equipment, and labour), construction works (such
42 as complex site condition and scope changes), changes in design specifications, land acquisition and
43 compensation, and unstable exchange rate.

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48 Based on the reviewed literature, it is evident that significant effort has been made to understand the causes
49 of cost overrun globally and thus these causes have been found to be sensitive to territories. However, most of
50 these studies including the few studies conducted in Nigeria that are based on a specific state or region, for
51 instance, Mansfield et al. (1994), Omoregie and Radford (2006), Amadi and Higham (2017), Leo-Olagbaye and
52 Odeyinka (2018) and Anigbogu et al. (2019), have used a survey-based approach to collect data from stakeholders
53 and index method to analyse the retrieved data, though with occasional use of interviews and thus, disregard the
54 contextual circumstances in which these factors take place. As such, these studies have not been able to address
55 the existing dichotomy of the triggers of cost overrun from the context. Ahiaga-Dagbui et al. (2015) submits that
56 cost overrun research to date has been primarily oriented on identifying the drivers from a survey-oriented
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3 perspective and thus, there has been limited research understanding cost overrun triggers contextually. To support
4 this assertion, Ahiaga-Dagbui et al. (2015) described the bulk research on cost overrun as replicative, stating that,
5 “ it is argued that questionnaires alone may not be suitable for investigating complex and systemic problems like
6 cost overrun on construction projects. . . it is no surprised that the same factors seem to come top of the list most
7 of the time. . .”. Moreover, to the best of our knowledge, no similar studies in the Nigerian context has been
8 conducted.
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11 The research reported herein, looks at the Nigerian context due to the dearth in contextual studies of cost
12 performance in highway projects and focuses on experts from client, contractor and consultant organisations
13 involved in highway infrastructure development. It thus, contributes to project management by ensuring that the
14 triggers are understood from the context in which the cost overrun take place and hence ensure that the requisite
15 measures are taken in order to address the contextual problem. Moreover, as emphasized by Anigbogu et al.
16 (2019), few studies on highway projects have been performed in Nigeria, and therefore, this study will contribute
17 to expanding and improving the knowledge and understanding of the context-specific triggers of cost overrun in
18 highway projects by providing an empirical study in Nigeria.
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3. Research Methodology

Considering the nature of the study, which is based on understanding the driving factors of cost overrun in highway projects in Nigerian context, the research question to be answered and philosophical orientation informed the choice of the research strategy, most suitable data source and collection technique (Bryman and Bell, 2015). This is also in line with the recommendation of Amadi and Higham (2018) that, it is very vital to take a more contextually embedded view in order to have a broader understanding of the complex web of issues that are responsible for cost overrun in highway infrastructure projects. From the aforementioned, the study adopted a qualitative case study approach. Case study strategy is thus, considered appropriate due to the qualitative and exploratory nature of the study as “the flexibility of the case study lends itself particularly well to exploration” (Robson, 2002). It is helpful in identifying various themes (the various drivers of cost overrun) relevant to the problem. Hence, adopting a qualitative case study afford the opportunity to explore the context specific explanation of the drivers of cost overrun from key experts and not the generalised population (Saunders, 2009). Also, to understand a problem in a context specific setting, Patton (2002) has emphasised the significance of adopting an approach that produces outcomes of a research phenomenon inductively from data where the researcher does not attempt to manipulate the phenomenon of interest. Furthermore, documenting the detailed description of the methodology and methods adopted for the study ensured that the quality of the research findings is strengthened as advocated by Sa'id (2019).

3.1 Data collection

Data for this study were collected through interviews. Amaratunga et al. (2002) opined that interviews are the most widely used data collection method in construction management research, and thus provide the researcher with valuable and unique data that unfold naturally from the participant's viewpoint (Lopez and Whitehead, 2013). In particular, semi-structured interviews with key stakeholders involved in highway infrastructure development in Nigeria was utilized in line with Ghauri and Gronhaug (2002), DiCicco-Bloom and Crabtree (2006) and Bryman and Bell (2015) observations. Furthermore, Lopez and Whitehead (2013) pointed out that, interviews are important and dominant in a naturalist research setting where there is no disconnect between the researcher and the research process. In all, 16 stakeholders across the 3 key organisations were interviewed for the study with experiences ranging from 10 years to more than 20 years. Though the issue of representation in field oriented research is still debated Steinberg (2010) and Baker and Edwards (2012), this sample is thus considered a fair representation considering other studies from similar context Amadi and Higham (2018) and Amadi and Higham (2017) and also by considering the experience, knowledge of the contextual issues and geographical location of the participants (Kolb, 2008). Furthermore, in line with the recommendation of Guest et al. (2006), data saturation can occur within the first 12 interviews after which few new phenomena are likely to emerge.

3.2 Interview process

The interview process was based on a structured guide that was designed in accordance with the general guidelines for conducting field oriented research (Kvale and Brinkmann, 2009). This ensure that findings of the study from the interview process is deemed reliable as suggested by Sa'id (2019). He mentioned that in order for an outcome from a qualitative study to satisfy the trustworthiness criteria as suggested by Bryman (2012), a standard protocol should be designed and utilized for data collection through interviews. The interview protocol consisted of four sections with the same questions directed to the participants considering the nature of the problem and their

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3 experience and knowledge of the cost performance challenges facing highway projects. In the preparatory stages
4 leading to the interview process, the researcher sent an interview information sheet to the various respondents that
5 were recruited purposefully i.e. the client and contractor organisations. This information sheet introduced the aim
6 of the research study and highlighted the importance of their respective contribution to the overall research. The
7 participants through their respective organisations responded positively and agreed to participate in the interview
8 process. The interview protocol was equally sent beforehand to organisations to further disseminate to the
9 respective respondents so as to familiarise themselves with the questions in the guide and prepare adequately for
10 the interview. Each of the interviews lasted an average of one hour i.e. between 40 minutes to 1hr 20 minutes.
11 However, prior to commencing the interview, each participant was asked for permission to record and document
12 the conversation, and also anonymously quote the participant in any academic written documents with full
13 adherence and commitment to safeguarding their confidentiality. This is in line with the recommendation of
14 Saunders (2009) on the importance of adhering to the commitment to the safeguard of participants privacy and
15 confidentiality. All the participants agreed to the request of recording the conversation. The recording of the
16 interview was conducted using a voice recorder and supplemented by note takings where necessary and
17 subsequently a detailed report of each interview session was produced (Bryman and Bell, 2015). As recommended
18 by Bryman (2012), the findings of the research were offered to some of the stakeholders that were interviewed to
19 enhance the credibility of the study and ensure that the findings are congruent with the views of the stakeholders.

3.3 Sampling of interview respondents

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30 As advocated by Arcury and Quandt (1999), the interview participants were selected based on their ability to
31 provide the most relevant and reliable information that is relevant to the problem under investigation. This point
32 has been emphasised by Creswell (2013) on the need to recruit interview participants that can share their
33 knowledge related to the investigative phenomenon. In this regard, interview participants were selected
34 purposively complemented by chain-referral technique as recommended by Fawehinmi (2018). Purposive
35 technique was used because of its important characteristic of approaching and selecting stakeholders based on
36 their knowledge and experience in highway projects development, though in some instances, infeasible to gain
37 access to all the stakeholders involved in the construction of highway projects due to bureaucratic barriers and
38 other constrictions (Sargeant, 2012, Collis and Hussey, 2009). On the other hand, to get around the problem of
39 bureaucracy, snowballing approach also known as chain-referral approach was adopted as a complementary
40 approach to gain access to stakeholders that could not be contacted before embarking on the interview process,
41 but are very much involved and important to the phenomenon under study. Snowballing sampling approach
42 provided a means to gain access to very important stakeholders that will otherwise be impossible if only purposive
43 approach was relied upon in identifying and recruiting participants (Sargeant, 2012, Green and Thorogood, 2009).
44 Hence, selecting stakeholders through chain referral sampling ensures that those that are not easily accessible
45 purposively were identified (Green and Thorogood, 2009). On this basis, other key stakeholders i.e. the consultant
46 organisation were accessed through referral from stakeholders in the client and contractor organisations. Collis
47 and Hussey (2009) and Sargeant (2012) have emphasised the significance of both approaches. Adopting this
48 hybrid sampling approach afforded the opportunity to achieve equivalence in representativeness between the
49 stakeholders that were accessed through referrals from the purposively selected stakeholders and those that were
50 purposively selected (Fawehinmi, 2018). In particular, the participants for the interview were key stakeholders
51 charged with the responsibility of delivering highway projects in Nigeria. The key stakeholders are the client i.e.

public sector who are solely responsible for the provision of financial commitment, the contractor who is responsible for delivering the project after going through the tendering process and the consultant who act as a check and balance vehicle on behalf of the client (Mansfield et al., 1994). The stakeholders from the contractor and consultant organisations were located in Abuja (the Federal Capital of Nigeria) and Lagos state and all have solid reputation in the execution of publicly funded highway projects. The stakeholders from the public client were selected from the Federal Ministry of Works and Housing (FMW&H) headquarters, Abuja and regional office in Lagos state. All the selected stakeholders had substantial experience in the management of public sector highway projects in line with the recommendation of Mansfield et al. (1994). This ensures that access to invaluable information that informs the problem from all the key stakeholders was obtained and thus, covered a significant depth of information.

Table II. Interview respondents' information

As shown in Table II, the participants background were presented including their representative organisations, the code assigned to each participant, and years of working experience using their respective organisations as acronyms and the sequence of the conduct of the interviews such as CO_01 representing participant 1 from the contractor organisation, C_01 representing participant 1 from the consultant organisation and CL_01 representing participant 1 from the client organisation respectively. However, it should be noted that all the interviews followed the same procedure and followed the interview protocol though with further probing for more insightful clarification on issues relevant to the phenomenon under investigation.

3.4 Data analysis approach

For the analysis of the qualitative interview data, a coding framework as shown in Figure IV was developed. The developed coding method is based on case study approach Yin (2014), principles of inductive thematic analysis Braun and Clarke (2006) and saliency analysis Buetow (2010) and also by adopting key elements of a coding framework advocated by Turner et al. (2013) which is compatible with asynchronous data. Furthermore, key elements and steps of other established coding approaches introduced by Kim and Andersen (2012), Yearworth and White (2013), Eker and Zimmermann (2016) were adopted. The coding procedure incorporates steps 1-5 of thematic analysis framework (Braun and Clarke, 2006). The interviews were analysed using the formulated framework, which involved transcribing the interview recordings into text as presented in Figure III. The texts were repeatedly read to search for meanings and patterns, and to note items of interest. These items of interest were sorted into sub themes by organising items of similar interest into categories. Each theme was reported. However, certain themes are salient within the data and thus not recurrent and hence, are very vital in addressing the research problem. Themes that had statements like "the major reason ..., this is a serious..." were considered as salient and those that had frequently occurring codes were identified as frequent. Themes that were neither frequent nor salient were discarded (Buetow, 2010). Saliency analysis which is an extension of thematic analysis which ensure that vital information that result in the identification of relevant themes are not ignored because of non-recurrence (Buetow, 2010, Anigbogu et al., 2019). This is based on a framework advocated by Buetow (2010), which considers both prevalence and recurrence in analysing qualitative data so that all the information required to address the research question are taken into consideration (see Figure II). However, as presented in Figure IV, only steps 1 and 2 of the coding framework were used for the data analysis process which corresponds to steps 1-5 of thematic analysis framework introduced by Braun and Clarke (2006).

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3 **Figure II. Saliency framework matrix**
4 **Adapted from** Buetow (2010)

5 **Figure III. Data Analysis Process**

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7 *3.5 Adopted steps of the coding process*

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9 *3.5.1 Step One- Identifying codes and discovering themes in the data:* The first stage of the coding process
10 **corresponds to** steps 1-3 of thematic analysis framework and it is used to define the problem and establish **the**
11 **boundary of the study** (Braun and Clarke, 2006). During the first step of the coding process, the interview data
12 was coded to identify the important information relevant to the research question. However, some of the codes
13 are the representation of the original terms from the interview transcripts while, others were clues from the
14 literature which resulted in the generation of numerous codes. **In** this stage, the contents of the transcripts are
15 processed in order to understand and delineate the boundaries of the **study**, keeping in mind the research question.
16 Understanding the context of the study is very important in order to code the concepts that are not explicitly stated
17 in the extracts (Kim and Andersen, 2012, Eker and Zimmermann, 2016). The data often include open statements
18 that clearly hint to a concept i.e. original terms from the interview transcripts. However, there are statements that
19 do not disclose a concept with clear references and which the codes were then borrowed from the existing
20 empirical works.
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As the coding process progresses, the codes were revisited several times in an iterative process which often
ensures that the problem is been narrowed down to the most important elements and information that will
subsequently be used throughout the data analysis (Kim and Andersen, 2012). At this stage, the idea of which
themes represents the coded extracts begin to become apparent and the researcher/coder begin to have some initial
ideas of the themes that will emerge as a result of observed dominant patterned relationships of the various codes
or codes of similar status (Braun and Clarke, 2006). **The process of coding was buttressed by the use of a computer**
aided qualitative data analysis software (CAQDAS) i.e. NVivo 12 software which has a special feature **of**
maintaining link between the coded extracts and the identified codes **as advocated by Yearworth and White (2013)**
and Eker and Zimmermann (2016).

3.5.2 Step Two- Categorizing and aggregating codes into refined themes: This step **corresponds to** steps 4-5 of
thematic analysis framework (Braun and Clarke, 2006). This step involves examining the codes and assessing if
they really fit into a particular theme and the theme indeed reflect on the research question and also assess the
essence of the theme and what it really means (Braun and Clarke, 2006, Eker and Zimmermann, 2016). The nodes
that **refer** to similar concepts are linked to each other and then forms a theme which was done in a hierarchical
manner. However, the final coding tree formed from this step is **created** iteratively. Further revisiting, regrouping
and analysis of the sifted data extracts was **performed**, and the refined themes of the aggregated relevant coded
information identified.

The boundary of the research is clearly determined by focusing only on the highly significant themes as
emphasized by Anigbogu et al. (2019). This is also in line with Buetow (2010) recommendation that in considering
resultant themes from the data analysis process, both importance and recurrence should be taken into cognizance
because recurrence of a theme does not necessarily implies significance and thus ignoring other themes because
of non-prevalence could result in missing out on a very significant chunk of information relevant to the research
question. **Braun and Clarke (2006)** also supports this assertion. They mentioned that, it is not necessarily the most
frequently occurring themes that are most important, but those most related to the research question. Therefore,

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3 the framework of saliency analysis advocated by Buetow (2010) which considers the salient information within
4 the data as well as prevalence of information **was** adopted to further support the identification of the key themes
5 which are both important and prevalent (see Figure II).
6

7 The themes that had statements of emphasis about the importance like “this is a big issue”, “the major
8 reason.....” etc.” were considered salient and highly important even though they are not frequent and those
9 statements that had frequently occurring codes were identified and regarded as frequent. However, themes that
10 were neither frequent nor important were ignored (Anigbogu et al., 2019, Buetow, 2010).
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13 **Figure IV. Coding Process**

14 **Adapted from** Turner et al. (2013)
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4. Results and discussion

4.1 Results

The emergent themes representing the various drivers from the data analysis process were categorised based on four organising themes i.e. project management related drivers, leadership related drivers, macroeconomic related drivers and societal related drivers all representing the drivers under each category based on steps 1 and 2 of the developed coding framework presented in Figure IV. The categorisation of the drivers is in concordance with existing studies on drivers of poor cost performance of highway infrastructure projects as demonstrated by the works of Kaliba et al. (2009), Cantarelli et al. (2013), Akoh (2018), Leo-Olagbaye and Odeyinka (2018), Anigbogu et al. (2019) and Ogbu and Adindu (2019). Furthermore, Ogbu and Adindu (2019) posit that, the essence of the categorisation is to ensure that proper tool for explaining cost overrun phenomena is adopted. However, in analysing the data, consideration was given to the themes that do not recur, but rather important so as to avoid ignoring very vital information that is relevant to problem under investigation because of non-recurrence as recommended by Buetow (2010). Tables III and IV shows the frequency and saliency of the themes and Table V show the most significant themes.

4.1.1 Frequently occurred themes

From the data analysis, it was evident that some of the themes generated have high frequency of occurrence and others have less frequency of occurrence. However, Table III shows the level of frequency of the various themes.

Table III. Frequency of occurrence

4.1.2 Identification of salient themes

By considering the matrix framework in Figure II, it was possible to ascertain the prevalence and importance of each theme based on the following matrix combination; 1- Recurrent and important; 2- Important but not recurrent; 3- Recurrent but not important; 4- Not recurrent and not important. Table IV shows the salient themes for all category of drivers.

Table IV. Salient themes

4.1.3 Key drivers of cost overrun

Based on the resultant matrix combination in Table IV and frequently occurred themes in Table III, it was possible to identify the highly significant themes on which the boundary of the research is established. Table V shows the key drivers of cost overrun.

Table V. Key drivers

4.2 Discussion of results

The outcome of the analysis of the data evidences the circumstantial basis on which these triggers emanate within the context. The result of the most significant triggers shown in Table V based on the analysis are presented below. They fall into various categories as presented.

4.2.1 Project management related drivers

Under performance of highway project due to project management related issues is been considered as one of the main challenges facing most highway construction projects because these challenges become apparent during construction and more information about the project becomes clear which are related to project delivery and

management (Love et al., 2011, Love et al., 2015). Though, they are issues that could be anticipated and thus controlled Siemiatycki (2015), yet, it is very prevalent in publicly funded projects. This is affirmed by the emergent themes identified from the discussions with key project stakeholders involved in the provision of highway infrastructure projects in Nigeria. Evidently, most themes identified from the data relate to technical risks and uncertainties that are specific to projects funded and executed by public sector agency.

4.2.1.1 Delay in progress of work

Considering the importance of ensuring smooth progress of a construction project, highway projects particularly, publicly funded projects are known to be infamous for delay due to numerous issues arising from the technical, political and social perspectives. However, in many developing countries, many projects funded by the public agency are simultaneously executed and thus, limiting the sustained availability of funds to key projects, and hence, leading to stoppage of work pending the availability of funds. This is in consonance with existing empirical findings. For instance, Mansfield et al. (1994) and Anigbogu et al. (2019) in Nigeria and Kaliba et al. (2009) in Zambia. The interviewees emphasised that:

What for sure also in this particular case is there was a standstill in the project, where we didn't work for one and a half years because we were not paid (CO_02)

The contractors often suspend work because, the client does not pay regularly, and they face serious issue of cash flow which is a threat to their financial survival (CL_06)

You know, the main thing is that, the project has been on and off for quite a few times, it really affected the progress of the project because the client is committed to a lot of ongoing projects all over the country (CL_03)

In some instances, instability in the political establishment can affect the progress of work because the transition from one government to another may affect the funding commitment due to lack of political will. As indicated by the following interviewees:

As the funding was missing, we suspended the project again, the first time before the election and at the end of the election year again because of course then you know the political environment was uncertain with elections imminent, there was no funds coming to the project (CO_02)

The contractor had to suspend the project and abandon the site on several occasions for a long period, basically, because then, you see, the then government were not committed to make the necessary funding provision for the project in the budget. They never had interest in the project, that was mainly the reason why they refused to make the financial commitment (CL_05)

Social issues related to attitude of people often affect construction works particularly if the project is a reconstruction of an existing highway. For that reason, the consequences of not obeying simple traffic rules could significantly affect the project. As captured by the interviewee's narration:

It also causes delay in our progress of work because, most of our trucks get stuck in the traffic and can only be relieved when the traffic is eased, and this happen whenever such thing i.e. traffic builds up and accidents happen (CO_02)

One religious institution alone in a day has over a million worshippers in attendance and that massive population alone causes huge traffic and inconvenience everyone involved. That alone is an issue because, it affects the progress of work on site, and the contractors are off site on that day because it is just going to complicate matters (CO_04)

4.2.1.2 Adverse Weather

Though in most site-based construction practice, the anticipated impact of unfavourable weather condition such as rain is usually estimated and incorporated into the project program, the severity of such conditions beyond the anticipated impacts significantly affect construction project. Akoh (2018) attributed this to the varying climatic

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3 **conditions in Nigeria.** This finding also agrees with earlier studies. For instance, Kaliba et al. (2009) in Zambia
4 and Leo-Olagbaye and Odeyinka (2018) in Nigeria. The emphasis on the impacts has been clearly explained by
5 the interviewees:

6
7 *The weather particularly looking at the southwest region, slows the pace of work on site because, once it is raining*
8 *particularly, the kind of heavy downpour we experience in Lagos, there is no possible way we can lay the asphalt*
9 *and in most cases this rain comes in heavily and can last for a day or more. That alone is a serious problem. It*
10 *has significant impact on the project (CO_02)*

11
12 *The rainy season forces the contractors to stop working, when it is raining because you know, the rain sometimes*
13 *come with heavy downpour and slows the pace of work. They usually make effective use of the dry season as they*
14 *try as much as possible to push for speed (CL_05)*

15
16 *When it's the rainy season, the earthworks and laying of asphalt is usually suspended and the lost construction*
17 *grounds is recovered once the rains are over (CO_03)*

18 19 4.2.1.3 Delay in payment to contractors

20 The public sector allocates and finances large highway projects throughout Nigeria and controls the execution of
21 highway projects **(Abiodun, 2017, Adamu et al., 2015).** Unfortunately, it is unreliable **Oyedele (2012) and**
22 **Muhammad et al. (2015)** since most times payments for contractors are often delayed beyond the contractually
23 stipulated period. It is often caused by bureaucracy in the public sector and inadequate funding provisions to key
24 projects. The **impact** on the project is significant as it often results to situations where contractors are faced with
25 cash flow issues and often suspend the project pending when they get paid. This finding is concurrent with findings
26 of earlier studies. For instance, Mansfield et al. (1994) and Anigbogu et al. (2019) in Nigeria, Sohu et al. (2017)
27 and **Nasir et al. (2011a) in Pakistan** and Alinaitwe et al. (2013) in Uganda. The emphasis on this key issue has
28 been made by some of the interviewees. They put it this way:

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31 *The projects have been on and off, of course because of the fact that contractors are faced with financial*
32 *challenges due to overdue payment, the government has not been paying as at when due, you know, it is a serious*
33 *financial threat to the contractor, because it is a big project and the contractors put in significant amount of funds*
34 *into it, hoping the government will fulfil its contractual obligation to pay within the agreed timeframe (CL_03)*

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37 *The issue of finance significantly slows down the progress of work and the contractors often mobilise out of site*
38 *anytime they find themselves in a financial difficulty because, you know the payment has not been consistently*
39 *provided (C_03)*

40
41 *The delays in payment of agreed contract fees to the contractors adversely affects the pace of work on all the*
42 *projects, I mean you don't expect the contractors to keep working without any payment. This has resulted to*
43 *default in meeting the completion deadline (C_06)*

44
45 *Payment of certified work has always been a very serious matter on all the publicly funded projects, there is no*
46 *assurance from the government that we will get paid anytime we work, so I mean it is very risky for us as a*
47 *company because we put in our resources and effort, but we don't get paid on time, sometimes for more than a*
48 *year (CO_03)*

49
50 *The issue of payment is a big issue on most of the projects, because, most times funding are not forthcoming,*
51 *where the funds don't come on time, it basically affects the contractor and as a result the contractor is not be able*
52 *to perform the contractual obligations as required (CL_02)*

53 4.2.1.4 Modification of project scope

54 Making changes to the scope of a project is inevitable when the project complexity is often underestimated. In
55 most publicly funded highway projects, projects are awarded, and contractors often embark on large scale
56 endeavours without fully knowing the details of what is required and as such end up caught in significant changes
57 to the project scope when details begin to emerge. Earlier studies have reported the prevalence of this **trigger**. For
58 instance, Kaliba et al. (2009) in Zambia, Creedy et al. (2010) in Australia, Alinaitwe et al. (2013) in Uganda,
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3 Shimete and Wall (2017) in Namibia, Leo-Olagbaye and Odeyinka (2018) in Nigeria, Sohu et al. (2017) and Nasir
4 et al. (2011a) in Pakistan and Andrić et al. (2019) in Asia. This is pointed out by some of the interviewees referring
5 to the projects they have been involved in across the country:
6

7 *The government brought in additional works and the initial scope of the project was expanded because when the*
8 *new government now came on board, they realised that the project has not taken into consideration some of the*
9 *development within that project corridor i.e. development such as churches springing up, communities around,*
10 *other religious bodies, even industrial development along the road axis, so additional work in form an increased*
11 *scope of works was added, so you now have additional works and it was added to the initial cost (CL_01)*
12

13 *Initially, in this project, we had about 5 pedestrian bridges for the road, but due to the growing population and*
14 *development of towns and villages, we had to increase the pedestrian bridges to 10 i.e. from 5 to 10 so that also*
15 *has increased the scope of the work and subsequently, you know the cost will be increased as well, therefore,*
16 *scope change is a major factor in almost all the roads financed by the government (CL_02)*
17

18 *The initial cost was almost doubled which is caused by augmentation which was caused by additional works so*
19 *the scope changed so at the beginning, it was pure simple highway project only the rehabilitation and*
20 *reconstruction of the road, later on, the client want to develop the road into a toll able road which means you*
21 *have to build some facilities to make it toll able so now in the additional works also include additional structures*
22 *such as flyovers to create U-turn possibilities which are on a different level than the actual road level and also*
23 *toll plazas and other things, so the scope changed and this is the main reason why the contract value changed*
24 *(CO_02)*
25

26 Often a development which spans many years without completion will result in obsolete scope overtime due to
27 population growth and thus, have significant impact on road users, religious institutions, businesses and some
28 communities along the corridors of the project due to increased social issues (traffic, road users' indiscipline and
29 accidents). As a result, modifying the scope becomes imperative to accommodate certain grievances of
30 stakeholders affected by the project. As exemplified by some of the interviewees:
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32 *I mean, the idea of the additions of the new structures and upgrading existing ones was necessary because of the*
33 *pressure we often go through, not only from the religious organisations, but also the communities, industries and*
34 *businesses because everyone using that road is affected and not really happy about the situation (C_04)*
35

36 *Because of the traffic impact particularly the religious institutions which happen to be along that axis of the road,*
37 *I mean, there is always that apprehension from these institutions, communities and particularly motorists, because*
38 *of what they go through almost on a daily basis, you know, people often cannot afford living in city due to high*
39 *cost of owning and renting a house, so, they come to those towns to either build or rent a house and that has*
40 *compounded the problem as well. So, the government now had to reconsider the concept of the highway to expand*
41 *the scope so that the upsurge of people, communities and religious centres along that corridor will be*
42 *accommodated (CL_03)*
43

4.2.2 Leadership related drivers

44 The performance of highway projects is in part dependent on a sound project delivery process. Considering the
45 nature of construction projects in Nigeria, particularly, highway infrastructure projects, the public sector is entirely
46 responsible for identifying where a particular project is to be located and also responsible for the provision of the
47 necessary finance to successfully deliver on the projects in its entirety (Akoh, 2018). Hence, highway projects in
48 Nigeria are strongly affected by all forms of biases from the project sponsors solely because it is a publicly funded
49 intervention and as such lack some form of political will to ensure its success (Oyewobi et al., 2011). The influence
50 of politics in the entire process is significantly evident based on the emerging themes from the interactions with
51 key stakeholders in the industry. It has somehow become part of the entire project delivery process in Nigeria
52 essentially because of the monopolistic nature of highway project financing responsibilities and ownership as
53 evident from the themes that were identified from the analysed data.
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4.2.2.1 Political instability

The impact of political instability is viewed from the viewpoint of the country's political leadership and often affect the project particularly, an on-going project throughout its lifecycle. Because of the shorter time horizon of political leaders which often is shorter than the completion period of most highway projects in Nigeria, the political uncertainty is exacerbated as a result of transition in government through elections or otherwise because it takes time for the new leadership to decide on its priorities with regards to on-going projects. The finding reaffirms the outcome of earlier studies. For instance, Akoh (2018) in Nigeria. He found that, publicly funded highway projects are significantly affected by the political uncertainty and its influence on on-going key projects. Furthermore, Herrera et al. (2020), revealed that political situation in most countries, particularly, developing countries due to government changes can create favourable environment for cost overrun occurrence and eventually compromise the successful project development. As emphasised by some of the interviewees:

Then, we had a sudden and unexpected transition of government, the new government cancelled the agreement because, I think they were not interested and comfortable with the concession agreement, I mean they had reservations with the whole process that led to the agreement. It is really sad and unfortunate (C_04)

When the new government came on board, because you know in Nigeria, every government has interest in one thing or the other and unfortunately every new government when elected decide on which project to continue providing funds. This issue is normal in Nigeria (CL_02)

The instability in the political scene really has significant impact on most of the projects, because you know, any time there is a change in leadership, it takes time for them to settle down in office and decide on their priorities. In most cases, ongoing projects are affected because they try to initiate new projects and these ongoing projects progress are slowed down. If you look at the projects across the country, they have been on for more than a decade and nothing significant has been achieved (C_03)

This particular project alone has undergone a series of transitions because of the political uncertainty in the country. The uncertainty problem is a serious one on all projects across the country particularly, because all the highway projects are publicly funded (CL_01)

We are in an environment where most times a new government will come on board and may not be interested in the projects that embarked upon by the previous government (C_03)

4.2.3 Societal related drivers

During the construction phase of highway projects, the socio-economic impacts on the local communities constitutes the highest consequence of the development, with the acquisition of land and assets along the corridor of the development potentially affecting the communities despite the significant positive impact the project will provide to those communities. This is even more when the project is a reconstruction and rehabilitation of an existing highway which then faces dual challenges of usage and the reconstruction activities. However, as a result there is a possibility of the client and other key project stakeholders to face all sort of problems from these communities. Consequently, issues of attitude of people affected by the construction work plays a key role in defining the efficiency in the management of the project, particularly in developing countries where the laws of the land are not strictly adhered to. For instance, Cardoso (2005) revealed that construction activities cause significant inconveniences to the environment and indeed those affected by a particular project, which eventually, could affect the cost performance of a project. The emergent themes from interactions with key project stakeholders attest to that affirmation.

4.2.3.1 Social issues

Highway projects are impacted by issues resulting from the interaction between people through their attitude and the impact of the construction work on the people. This is often the case during the construction phase of highway projects, **mostly**, a reconstruction project. As a result, social issues arise when people are affected by the construction work. For instance, due to the capital intensity and significance of highway construction or reconstruction projects, they often require diversion of traffic which often has significant impact on existing road users and restricts access to some parts of the road sections (Boateng et al., 2017). Thus, in most instances, the construction or reconstruction of highway projects particularly in developing countries unavoidably causes substantial commotions in usual vehicular operations during the construction phase, often creating unease and delays for motorists and compelling them to consider using alternative route such as using opposing lanes which in most cases compound the traffic issues. Cardoso (2005) highlighted the impact of increased traffic due to construction activities. Earlier studies on transport infrastructure project has confirmed this prevalence of social issues and how they have affected project performance. For instance, Boateng et al. (2017) study on the performance of megaprojects. The interviewees emphasised on the impact of traffic gridlock on **highways** which often affects a project mainly, with the presence of communities and big religious institutions and their activities.

As mentioned by some interviewees on the projects they have been involved in:

Then, we have a situation that in our stretch on this particular road, all these big churches quite often, we say on that particular day, we are not working I mean, all of a sudden a million people drop onto the road, there is no point for us to work because it will just make the situation worse (CO_01)

We often have traffic situations and things like that in most of the projects because of the reconstruction nature of the projects, to some extent there are days where the road is blocked and the contractors have to step down operation for a day or so, so that on its own also affect the project (CL_02)

The issue of traffic is usually excessive and a serious one, so once you have a small problem along the section of the road, it affects all other sections and before you fix it, it generates a backlog of traffic (CL_01)

Some interviewees mentioned that accidents due to impatience of people and non-adherence to traffic regulations and diversions, predominantly, when there are no adequate construction diversion signs to make motorists aware of the dangers of the diversions have impact on **projects**. Often, when heavy trucks and vehicles collide, people often express their dissatisfaction about a project citing the diversions and construction works as the cause of **most** accidents. Some of the interviewees mentioned that:

If you look at some social aspects, particularly, when it comes to people's attitude which of course seriously poses challenge not only to the contractors, but also traffic management agencies in trying to control people in terms of vehicular traffic and the impatience of the commuters most times result in accidents (C_01)

You realise that our people where we work a lot, you see indiscipline nature of our people which has been delaying the progress of the work, whereby the contractor is on the road working all the necessary safety gadgets are in place and then you now see a vehicle that is not road worthy breaking down, instead of people exercising a little patience to allow it to be moved, people decide to drive against the traffic they now move to the other lane and by the time they move to the other lane at the end of the day they block the people coming from the opposite direction (CL_01)

The problem starts when you have two lanes in one and a truck breaks down, then you are left with one lane but people make five lanes out of it, I mean there is a lot of thought and effort put into this traffic management system but it just needs everybody to work together on this one if you decided to go against the flow of traffic, that's it, it's dead, you immediately forget that you are on an opposing flow of traffic and you go beyond the speed limit benchmark (CO_01)

The problem is only often the indiscipline of the motorist, we have speed limits in place, nobody cares, they are driving too fast, they are falling asleep, they are causing accidents, they are moving in the opposite direction of traffic and if you cause accidents in a diversion, then we have concrete piers in place so they will be moved, they

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3 *will be shifted to the other direction and this is building up the hiccup and then people think they can do a short*
4 *cut going the wrong way which is even causing more problems (CO_02)*
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6 **5. Limitations and Implications**

7 **The limitation of this study results from the sample size even though, the issue of representation is still debated**
8 **in a naturalistic enquiry, the findings of which could be influenced by the subjective opinions of the stakeholders.**
9 **Furthermore, the study is based on only highway sector projects in Nigeria. Therefore, caution must be taken**
10 **before applying the outcome of this study in a generalized way to other contexts.**

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13 **The empirical findings of this study are consistent with existing empirical literature. As for the practical**
14 **implications for the highway sector of the construction industry in Nigeria, the stakeholders i.e. client, contractors**
15 **and consultants should acknowledge the contextual circumstances in which each of the triggers take place, which**
16 **will aid in developing pragmatic measures and make the right decisions towards addressing these triggers during**
17 **any highway construction project in Nigeria and enhance the chances of project success. From a theoretical**
18 **perspective, the contribution highlights the key triggers from project management, leadership, societal and**
19 **macroeconomic viewpoint and thus providing a context based empirical enquiry of the cost overrun triggers in**
20 **highway projects in Nigeria.**

21 **6. Conclusion**

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27 The success of highway infrastructure projects is directly linked to delivering these projects within the contractual
28 budgets, and thus, understanding the key attributable factors of poor cost performance is paramount to achieving
29 significant success. The study was conducted to understand the key driving factors of cost overrun in highway
30 infrastructure projects in Nigeria by considering the peculiar context and institutional and behavioural
31 circumstances in which they manifest. Interviews with key industry stakeholders was conducted and analysed
32 with the aid of a thematic analysis informed coding framework. The series of evidence from the analysis has thus,
33 provided a context-specific explanation about these triggers which negates the prevailing dichotomy **of the triggers**
34 **from the** context **found** in existing empirical studies. The key drivers were delay in work progress, political
35 instability, adverse weather, social issues, delay in progress payment and modification of project scope. Thus,
36 framing the study within the setting of **a developing country like** Nigeria has indeed provided **an** understanding
37 of these triggers which signifies that these triggers cannot be detached from the circumstantial basis of their
38 occurrence. It is also evidenced that, the identified driving factors do not emanate in isolation and hence, are
39 interrelated with each other to influence performance. Though understanding the individual triggers could assist
40 in ensuring the **necessary factor specific** actions are taken to inhibit its occurrence, a holistic approach to
41 understanding these triggers is required so that necessary contextual measures could be implemented to address
42 the problem.

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47 **Future research could consider taking a holistic approach to understanding the triggers by applying system**
48 **thinking philosophy and also replicate the study in different context within Nigeria and in other developing**
49 **countries based on a blend of qualitative and quantitative approaches i.e. mixed method approach.**
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Table I. Magnitude of cost overruns in some selected highway projects in Nigeria

S/No	Zone	Project	Length (km)	Original contract sum (N)	Revised contract sum (N)	Cost difference (N)	Cost overrun (%)	Year of contract award
1	North Central	Dualization of Abuja-Abaji-Lokoja road (Section I)	42	11,227,571,390.41	28,666,721,831.64	17,439,150,441.23	155.3	2006
2	North East	Dualization of Kano-Maiduguri highway (Section II: Shuari-Azare)	117.8	35,841,452,834.88	65,315,458,261.59	29,474,005,426.71	82.2	2006
3	North West	Dualization of Kano-Maiduguri highway (Section I: Kano-Wudil-Shuari)	105	37,047,307,376.33	55,122,713,072.02	18,075,405,695.69	48.8	2006
4	South West	Rehabilitation, reconstruction and expansion of Lagos-Ibadan dual carriageway (Section I: Lagos-Shagamu)	43.6	70,753,387,798.42	134,861,795,702.80	64,108,407,904.38	90.6	2013
5	South East	Rehabilitation of Otoucha-Ibaji-Nzam-Innoma-Iheaka Ibaji Section of Otoucha-Ibaji-Odulu-Ajegwu Road in Anambra State	32	5,804,811,747.04	7,173,909,755.40	1,369,098,008.36	23.6	2009
6	South South	Dualization of Lokoja-Benin Road: Obajana Junction-Benin (Section III Phase I: Auchi-Ehor)	54.2	11,659,588,909.69	34,866,400,154.56	23,206,811,244.87	199	2012

Source: FMW&H (2019)

Table II. Interview respondents' information

S/No	Type of Organisation	Interviewee Code	Years of Working Experience
01	Client	CL_01	22 years
02	Client	CL_02	13 years
03	Client	CL_03	19 years
04	Client	CL_04	17 years
05	Client	CL_05	12 years
06	Client	CL_06	18 years
07	Client	CL_07	13 years
08	Consultant	C_01	14 years
09	Consultant	C_02	17 years
10	Consultant	C_03	20 years
11	Consultant	C_04	19 years
12	Consultant	C_05	12 years
13	Consultant	C_06	16 years
14	Contractor	CO_01	19 years
15	Contractor	CO_02	14 years
16	Contractor	CO_03	12 years

Table III. Frequency of occurrence

Leadership Related Drivers		Project Management Related	
Alternative government funding	12	Project duration	11
Political interference	16	Delay in progress of work	31
Political opposition to project	17	Modification of project scope	23
Political instability	29	Design modification	8
Project termination	10	Poor project planning	19
Breach of contract agreement	6	Project quality deficiency	6
Societal Related Drivers		Delay in payment to contractors	21
Land issues with communities	11	Deficiency in financial source	19
Social issues	25	Bureaucratic process	7
Stakeholder involvement	11	Rework	6
Threat to personal & assets security of communities and religious institutions	4	Variation	12
Public grievances	11	Constructions materials	4
Communities opposition to project	13	Outstanding liabilities	5
Macroeconomic Related Drivers		Adverse weather	28
Fluctuation in prices of materials, labor and equipment	15		
Inflation	7		

Table IV. Salient themes

Leadership Related Drivers				
Theme	1	2	3	4
Alternative government funding			✓	
Political interference	✓			
Political opposition to project	✓			
Political instability	✓			
Project termination			✓	
Breach of contractual agreement				✓
Societal Related Drivers				
Land issues with communities	✓			
Social issues	✓			
Stakeholder involvement			✓	
Threat to personal & assets security of communities and religious institutions				✓
Public grievances			✓	
Communities opposition to project	✓			
Macroeconomic Related Drivers				
Fluctuation in prices of materials, labor and equipment	✓			
Inflation		✓		
Project Management Related Drivers				
Project duration			✓	
Delay in progress of work	✓			
Modification of project scope	✓			
Poor project planning	✓			
Outstanding liabilities		✓		
Constructions materials				✓
Variation			✓	
Rework				✓
Bureaucratic process		✓		
Deficiency in financial source	✓			
Delay in payment to contractors	✓			
Design modification				✓
Adverse weather	✓			
Project quality deficiency				✓

Key: 1-Recurrent and important; 2- Important but not recurrent;

3- Recurrent but not important; 4- Not recurrent and not important

Table V. Key drivers

Categories of Drivers	Drivers	Frequency of Occurrence	Saliency	Significance
Project Management Related	Delay in progress of work	31	High	1
Leadership Related	Political instability	29	High	2
Project Management Related	Adverse weather	28	High	3
Societal Related	Social issues	25	High	4
Project Management Related	Modification of project scope	23	High	5
Project Management Related	Delay in payment to contractors	21	High	6

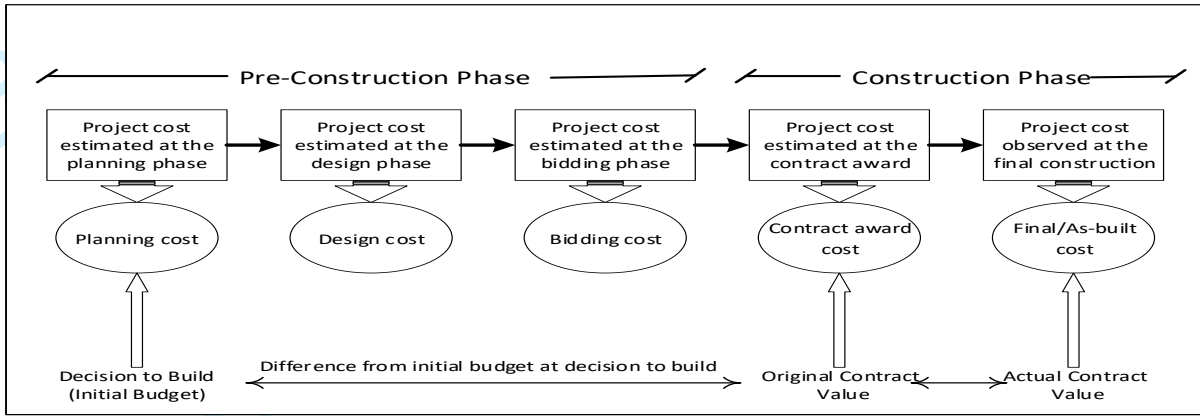


Figure I. Sequence of project cost changes across various project development phases
Adapted from Gkritza and Labi (2008) and Love et al. (2013)

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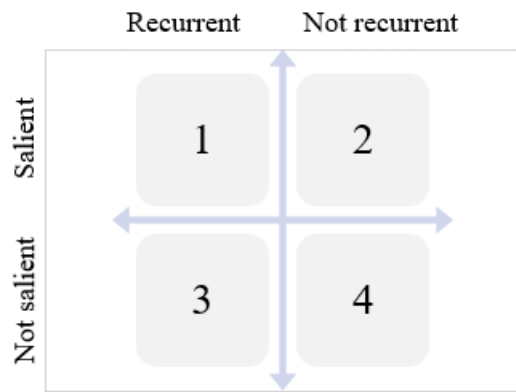


Figure II. Saliency framework matrix
Adapted from Buetow (2010)

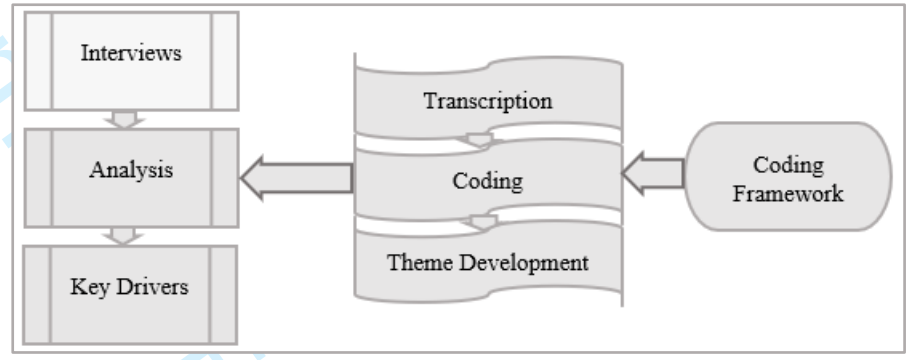


Figure III. Data Analysis Process

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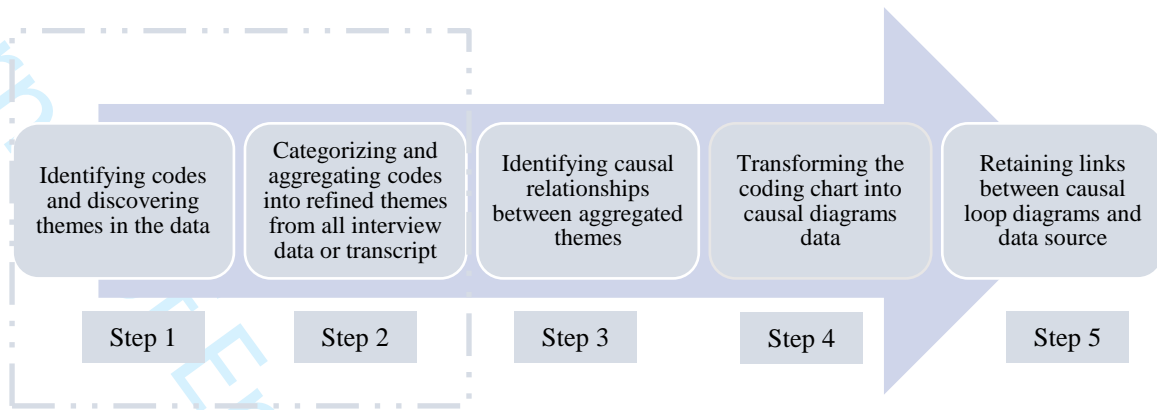


Figure IV. Coding Process

Adapted from Turner et al. (2013)