

PROJECT DELAYS IN THE NIGER DELTA REGION, NIGERIA -  
SIGNIFICANT CAUSES, EFFECTS AND SOLUTIONS



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A research report submitted to the Faculty of Engineering and the Built Environment, University of the Witwatersrand, in partial fulfilment of the requirements for the degree of Master of Science in Engineering.

Johannesburg, 2012

**DECLARATION**

I declare that this research report is my own unaided work. It is being submitted to the Degree of Master of Science in Engineering to the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination to any other University.

.....

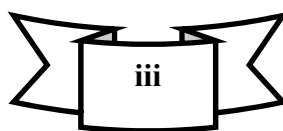
*(Signature of Candidate)*

27<sup>th</sup> ..... day of ...November....., 2012.....

(day)                      (month)                      (year)

## **DEDICATION**

To God, Most High who spoke and it came to pass. To my beautiful, God-fearing wife- Egondy and to my children- Ukemeabasi, Uwakmfon and Mfoniso for their prayers, loyalty and supports, and finally to my parents: Elder/Elder (Mrs) Nyong J. Akpan who consistently pushes me to greater heights through words of encouragements and prayers.



## **ABSTRACT**

This study investigates causes and effects of infrastructural project delays in the Niger Delta region, Nigeria using literature and questionnaire surveys. Potential benefits and beneficiaries of project delays were also investigated. Research participants were public service, multinational and private companies' project practitioners.

Participants perceived that, there were eleven most important causes of delays. The first five are: youth unrest, militancy and communal crises; inadequate planning by the contractors; delay or non-payment of compensation to the communities; wrong choice of consultants and contractors by the clients; and weather condition.

Time overrun; budget overrun; and disputes and claims were perceived as the most important effects of delays. Participants also perceived that delays mostly occur in roads/bridges, shore protection and channelization projects.

The study suggests that, delays could be curtailed through dialogue and careful management of militants/communal crises, proper planning by contractors, prompt release of funds and engagement of qualified vendors by clients.

## ACKNOWLEDGEMENTS

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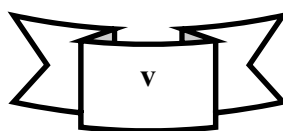
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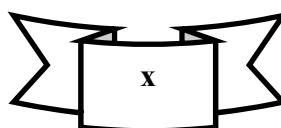
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## CHAPTER ONE

### 1 INTRODUCTION:

This chapter outlines the research background, problem statement, research questions, research objectives, research scope, and brief description of research methodology. It concludes with a framework of the research report.

#### 1.1 Background:

Construction is an industry that involves complex and dynamic processes. It consists of successful coordination of multiple discrete business entities such as professionals, tradesmen, manufacturers, trade unions, Investors, local authorities, specialists, trade contractors and others (Keane and Caletka, 2008)

Construction projects impact on a nation's economy. Successful completion of construction projects leads to wealth creation, socio-economic growth and improved standard of living. Nations are evaluated as “developed”, “developing” and “underdeveloped” based on the quantity and quality of completed construction projects in their domain (Abdullah, *et al*, 2011 and Kaliba, *et al*, 2009).

Delay in completion of construction projects is one of the most recurring problems in the construction industry (Faridi and El-Sayegh, 2006). It is a common global phenomenon (Salleh, 2009, Enshassi, *et al*, 2009 and Majid, 2006).

Delays have costly, risky and undesirable consequences on project success in terms of time, cost, quality and safety. These impacts are not only confined to the construction industry but they influence the overall economy of a country (Pourrostan, *et al*, 2011, Carnell, 2008, Okumbe and Verster, 2008).

Several attempts by Project Professionals and Researchers to tackle the causes and effects of project delays have not yielded sufficient positive results (Sambasivan and Soon, 2007). “Even with today's technology, and management's understanding of project management techniques, construction projects continue

to suffer delay and project completion dates still get pushed back” (Aibinu & Odeyinka, 2006). These delays are experienced both in the public and private sector projects (Yang, *et al*, 2010).

#### 1.1.1 Brief overview of the Niger Delta region, Nigeria:

The Niger Delta region is situated in Southern Nigeria. It is one of the largest Deltas in the World and is characterised by predominantly wet season for eight months of the year (Adejuwon, 2012). Petroleum oil and gas, in which the Nigerian economy currently depends on, is explored in this region. Onomehbor (2006) and Odularu (2008), state that all economies in the World depend on crude oil to a large extent.

Nigeria is the tenth largest contributor to the World’s crude oil supply (U.S. Energy Information Administration, 2010). Ninety percent (90%) of its foreign exchange earnings are derived from petroleum oil explorations. Therefore, recent crises in the Niger Delta region have attracted national and international concerns in view of the region’s strategic positioning in the Nigerian and the World economy (UNDP, 2006). These crises are products of agitations by the Niger Delta indigenes due to inadequate and poor state of infrastructures, and gross underdevelopment in the region, despite long years of petroleum oil explorations (Ejibunu, 2007; U.S. Energy Information Administration, 2010; Dike, 2007 and Ojo, 2011).

The Niger Delta region comprises of nine states of the federation: Abia, Akwa Ibom, Bayelsa, Cross River, Delta, Edo, Imo, Ondo and Rivers states (Ejibunu, 2007 and NDDC, 2009). It suffers environmental degradation as a result of oil exploration which started in the nineteen fifties (Ejibunu, 2007).

#### **Construction projects in the Niger Delta region:**

Construction projects in the Niger Delta region include infrastructural and utilities projects such as buildings (hospitals, school blocks, skill acquisition centres), electrifications, jetties/shore protection, channelization, roads/ bridges and water works. They are executed to improve socio-economic conditions of the citizens. Presently, on-going infrastructural construction projects consume 60%-70% of

annual capital budgetary expenditure in the region (NDDC, 2009). These projects are out-sourced to contractors and consultants for execution (NDDC, 2009). Successful completion of construction projects in the Niger Delta region is a key determinant to successful explorations of petroleum oil.

Additionally, completion of the infrastructural projects will minimise agitation for development, militancy and youth unrests in the region. Consequently, there would be peaceful operations of the oil and gas Companies in the region (NDDC, 2009) and consequently, a boost on the Nigerian economy.

Donor agencies, such as the European Union and NGO's, partner with some benefitting communities to execute infrastructural projects in the region. These agencies implement the projects according to terms and conditions stipulated on a memorandum of understanding (MOU) agreed between them and the beneficiary communities.

**Niger Delta Development Regional Master Plan (NDRDMP):**

In 2009, the Niger Delta Regional Development Master Plan (NDRDMP) was launched to ensure well-coordinated developmental programmes by the developmental partners. The master plan contains a detailed framework on how the developmental activities are to be carried –out in the Niger Delta region.

Implementation of the master plan is expected to be completed within fifteen years duration at a cost of over six trillion Naira (N6,000,000,000,000) or over thirty-six million US Dollars (USD 36,000,000 using exchange rate of N160 = 1 USD (NDDC, 2009). Continuous rise in the inflation rate in Nigeria would increase the cost of implementing the master plan, if the projects are not completed on scheduled time. Sambasivan and Soon (2007) state that construction project delay leads to time overrun cost overrun and total abandonment.

Thus, delay in execution of infrastructural projects in the Niger Delta could impede oil explorations and cause negative impacts on the socio-economic activities of the Nigerian state. This, therefore, poses serious concern to the developmental partners in the Niger Delta region.

### 1.2 Problem statement:

Over the years, Researchers and Project Professionals have attempted to proffer solutions to the frequent cases of project delays but these efforts have not yielded sufficient results because stipulated completion dates are rarely met (Sambasivan & Soon, 2007).

Elder Godswill Orubebe, Minister of Niger Delta Affairs in Nigeria claimed that, developmental programmes in the Niger Delta region have been challenged by delays in execution of construction projects (Vanguard newspaper, July 6, 2011). Ojo (2011) remarks that, the Niger Delta region has been severely deprived by a lack of basic social amenities. Most of these social amenities projects had construction works begin over the past years but their completion time got pushed back beyond the stipulated completion durations (NDDC, 2009). Onomehbor (2006) expressed the opinion that, there is a dissatisfaction and a great concern among project stakeholders in the Niger Delta Region regarding construction project delays because stipulated project timelines are hardly achieved.

### 1.3 Central research questions:

Delays in the completion of projects in the Niger Delta Region have been identified as a problem. This raises the central question of this research study:

What is the nature and significance of construction project delays experienced in the Niger Delta Region?

#### 1.3.1 Specific research questions:

The specific questions to be addressed in this research are:

What are the major causes of delays? What are the effects of delays? How can these delays be eliminated or minimised? Which projects mostly experience delays? Are there some benefits and beneficiaries of construction delays? Do all types of business organisations (public service, multinational companies and private companies) experience project delays? Do delays occur in all types of project management organisations (functional, matrix and Projectised

organisations)? Do all categories of construction projects in the Niger Delta region experience delays? Do delays occur in all States in the Niger Delta region?

#### 1.4 Research objectives:

The objectives are in two dimensions:

##### 1.4.1 Primary objectives:

The primary objectives are to:

- Identify causes of project delays and determine the most important ones in the Niger Delta region, Nigeria.
- Identify effects of project delays and determine the most important ones in the Niger Delta region, Nigeria.
- Investigate whether there were benefits of project delays.
- Propose solutions to project delays in the Niger Delta region.

##### 1.4.2 Auxiliary objectives:

The Auxiliary objectives are to:

- Investigate whether there were beneficiaries of delay.
- Investigate whether delays occur in all States of the Niger Delta region.
- Investigate whether project delays are experienced in all types of business organisations (Public service, Multinational companies and Private companies) in the Niger Delta region.
- Investigate whether project delays are experienced in all project management organisations (Projectised, matrix and functional organisations) in the Niger Delta region.
- Investigate the extent of project delays among different types of projects in the Niger Delta region, Nigeria.

#### 1.5 Research Hypotheses:

Hypotheses are predictions of a research's outcome (Trochim, 2006). They enable a researcher to be focused in his study. Hypotheses connect a dependent variable with independent variables (Onomehbor, 2006).

In this study, the dependent variable is project delays while the independent variables are causes and effects of project delays.

Hypotheses could be stated in the negative or positive manner. Negative hypotheses are termed “null” while positive hypotheses are termed “alternative”.

A preliminary review of relevant literature was carried out. This resulted in identification of thirty-eight causes of projects delay grouped under eight categories. Eight effects of project delays were also identified from the literature survey (these are elaborated in sub-sections 2.5.5 and 2.5.6).

#### 1.5.1 Hypothesis:

There is no cause/effect of project delays in the Niger Delta region that is the most important.

**Sub-hypotheses:** The above hypothesis was framed into the under-listed fourteen sub-hypotheses:

**Sub-hypothesis 1:** Youth unrest, militancy and communal crises are not the most important cause of project delays in the Niger Delta region.

**Sub-hypothesis 2:** Inadequate planning by the contractors is not the most important cause of project delays in the Niger Delta region.

**Sub-hypothesis 3:** Delay or non-payment of compensation to the communities is not the most important cause of project delays in the Niger Delta Region.

**Sub-hypothesis 4:** Wrong choice of consultants and contractors by the clients is not the most important cause of project delays in the Niger Delta Region.

**Sub-hypothesis 5:** Weather condition is not the most important cause of project delays in the Niger Delta Region.

**Sub-hypothesis 6:** Poor contract management by the consultants is not the most important cause of project delays in the Niger Delta Region.

**Sub-hypothesis 7:** Late identification and resolution of drawings and specification errors and omissions by the consultants is not the most important cause of project delay in the Niger Delta Region.

**Sub-hypothesis 8:** Lack of community buy-in is not the most important cause of project delays in the Niger Delta Region.

**Sub-hypothesis 9:** Inappropriate design by the consultants is not the most important cause of project delays in the Niger Delta Region.

**Sub-hypothesis 10:** Unrealistic contract duration by the clients is not the most important cause of project delays in the Niger Delta Region.

**Sub-hypothesis 11:** Poor coordination of subcontractors by the contractors is not the most important cause of project delay in the Niger Delta Region.

**Sub-hypothesis 12:** Time overrun is not the most important effect of project delays in the Niger Delta Region.

**Sub-hypothesis 13:** Budget overrun is not the most important effect of project delay in the Niger Delta Region.

**Sub-hypothesis 14:** Disputes and claims are not the most important effect of project delays in the Niger Delta Region.

#### 1.6 Scope of the research:

The study was limited to investigations of delays in developmental or public sector projects sponsored by the Niger Delta Developmental Partners.

#### 1.7 Assumptions made in the study:

The under-listed assumptions were made prior to the study:

- Project delay is a major challenge in the Niger Delta region, Nigeria.
- Project practitioners in the Niger Delta region, Nigeria would be willing to participate in the study.
- Participants would provide honest responses to questions.

- Relevant literature on the research study would be available and accessible.
- Research participants in the pilot study would have adequate knowledge of the research study.
- There would be statistical tools to analyse collected data such as to achieve the research objectives.

#### 1.8 Methodology:

The research was conducted using literature survey and questionnaire research methodologies. Research Participants were Clients, Contractors and Consultants in the public service, multinational companies and private companies located in the Niger Delta region. They were project /field staff or Management staff of their organisations. Convenience and judgemental sampling approach were adopted to select the participants. Their selection reflected varying project management organizational structures- i.e. Projectised, matrix and functional organizations.

The Research data was entered using “epi” software but tabulated in Microsoft Excel. The use of MS Excel enabled data description in frequency tables, graphs, charts, calculations of means and mean scores. SPSS (Statistical Package for Social Sciences) software was adopted to carry out factor analysis on the data in order to make valuable inferences.

#### 1.9 Outlines of the research report:

This section gives a brief framework on how the research report is presented.

##### 1.9.1 Chapter one:

Chapter one introduces the research. It contains the research background, brief overview of the Niger Delta region. It captures problem statement, research questions, research objectives and research scope. The chapter also contains justification for the study and overview of the methodology adopted to conduct the research.

1.9.2 Chapter two:

Chapter two covers reviews of literature on similar works. This chapter discusses methods adopted in previous studies, their findings, gaps and flaws in those studies.

1.9.3 Chapter three:

Chapter three contains discussions on the research methodology and the instrument used to conduct the study. Epistemology of research was overviewed as well as philosophical concepts on research methodologies. A discussion on the design and administration of questionnaires and online survey was made. Most questions on the questionnaire were rated using a five- point Likert scale. Few questions were “optional” ones. Reliability and validity of the instrument were appropriately determined. Selection criteria for adopted research methods, research population, sampling techniques, ethical issues and theoretical discussion on data analysis were covered in this chapter.

1.9.4 Chapter four:

Chapter four covered results of data analysis such as frequency tables, graphs, pie charts, bar charts, mean, mean scores and quantitative data from inferential statistics.

1.9.5 Chapter five:

Chapter five consists of discussions and findings from the research study. It captures implications of the results with respect to the objectives of the research.

1.9.6 Chapter six:

The chapter covers conclusions, solutions to curtail project delays and recommendations for further study.

1.10 References:

List of books, journals, research reports and others cited in the report are presented here. Harvard style of referencing was adopted.

1.11 Bibliography:

This contains a list of literatures surveyed during the research study but not cited in the dissertation.

1.12 Appendices:

This captures relevant details that could enhance greater understanding of the research report. It also contains a section on definition of some key terms used in the research study.

## CHAPTER TWO

### 2 LITERATURE REVIEW:

This chapter gives a conceptual frame work for this research and how it fits into existing body of knowledge. It provides intellectual context for the research. Discussions on findings and gaps from previous related studies are also made.

#### 2.1 Overview of the construction industry:

The Construction industry is as old as the human existence. It started from time immemorial during the construction of the tower of Babel and Noah's Ark as recorded in the Holy Bible (Genesis 11:1-5 and Genesis 6:13-22 ).The great Egyptian pyramid was a product of the earliest construction industry (Wirick, 2009 and National Geographic Society, 1996).

Construction involves harmonisation of activities and resources. Every industry is accompanied by the provision of infrastructures through construction works and gets sustained through construction activities such as during maintenance or rehabilitation projects. Therefore, all other industries directly or indirectly depend on the construction industry to survive (Chidinma & Emoh, 2011).

“Construction industry is massive and gulps a large chunk of a country's finances or capital outlays” (Kaliba, *et al*, 2009). Faridi and El-Sayegh (2006) state, that in United Arab Emirates (UAE), construction practitioners contribute 14% to the national Gross Domestic Product (GDP).

However, Pourrostan, *et al* (2011) expressed the opinion that “project delays are the biggest problems in the construction industry and their effects are negative”. Therefore, there is a need for greater cooperation among the stakeholders in the construction industry to investigate and proffer solutions to project delays (Pesamaa, *et al*, 2009).

##### 2.1.1 Types of construction projects:

There are two broad categories of construction projects: Public sector and Private sector projects.

**Public sector projects:**

Jo' and Barry (2008) observed that public sector construction projects are carried out to foster economic development and to raise standard of living of the populace. These projects are also known as developmental projects because they are used as yardstick to measure the extent of development of an area (Abdullah, *et al*, 2011 and Kaliba, *et al*, 2009). In Nigeria, public sector projects account for 60% of the country's annual investment (Dlakwa and Culpin, 1990). Generally, public sector projects are believed to be the dividend of the tax payers' money.

Some examples of public sector projects are roads, bridges, public hospitals, water works, electrification projects, shore protection, jetties, telecommunication, rail ways, and Airports (Dlakwa and Culpin, 1990).

Wirick (2009), states that public sector projects are unique in initiation and execution. Effective managements of these projects require special skills and understanding. Thus, their managers must devise appropriate strategies, else the projects' objectives would not be realised. He recommends that for a public sector project to be successfully executed, its management approach must be different from those of private sector projects. One major skill that is required from a public sector Project Manager is an understanding of the public service processes and procedures.

Findings from Morris (1990) and Dlakwa and Culpin (1990) have shown that public sector projects in developing countries such as India and Nigeria respectively, experience frequent delays more than private sector projects. One of the causes of these delays is internal bureaucracy or "red tape" associated with most public service establishments (Bozeman, *et al*, 2008).

The bureaucratic challenge is a consequence of the "functional" nature of public service institutions. Here, each functional unit (department) is required to make decisions in project execution and final authority lies on the top management. This slows down decision making processes (Jameson, 2007).

**Private sector projects:**

Private sector projects are construction projects initiated and executed by the private or multinational companies for the benefit of the companies. They are carried out to enhance investments of the sponsor companies and for profit making.

The primary purpose of engaging in a private sector construction project is to boost the investment opportunities of the investor companies. Such companies solely finance and run the projects to completion (Winch, 2012).

Private sectors projects are usually carried out in tandem with the strategic vision of the client's company. These projects create assets to be exploited by the private companies, add value to the economy and are used for the public good but at a price (Winch, 2012).

**2.1.2 Construction projects and national economy:**

The construction industry is essential in wealth creation, provision of social amenities and infrastructures which other sectors of the economy depend upon to thrive (Abdul-Rahman, *et al*, 2009). Abdullah, *et al* (2011) and Kaliba, *et al* (2009), state that a country's development is measured by the extent of successful construction works, especially in the provision of infrastructures and social amenities.

Memon, *et al* (2011), argue that construction projects are crucial and significant contributors to economic growth. They are key players in the national economy because they generate employments and create wealth (Sweis, *et al*, 2008).

Dlakwa and Culpin (1990) found that, in Nigeria sixty percent (60%) of the total national investment goes into construction projects.

Delays in construction projects therefore impact on the economic projections of a nation.

## 2.2 Project management organisational structures:

The complexity of the construction industry demands appropriate coordination of activities and resources. This is driven through structured management systems unique to specific establishments (PMBOK® Guide, 2004). Larson and Gobeli (1989) argue that project success is influenced by the nature of project management structure. They observed that, this influence is in the magnitude of 7% - 22% of the factors that affect project performance.

There are three types of project management organisational structures: Functional organisations, Projectised organisations and Matrix organisations (PMBOK® Guide, 2004, Larson and Gobeli, 1989). These are discussed in subsection 2.2.1:

### 2.2.1 Functional organisations:

Jameson (2007), states that a functional organisation is structured hierarchically with a strong concept of subordination. Specialisation is centralised. Each job becomes the focal point of the functional unit or department. Similar skills are classified into one unit or department. Each department concentrates on its core activities. Resources are allocated according to each department's needs and roles. This type of organisation gives the Project manager restricted authority. The ultimate authority lies on the top management. Most companies in the modern era rely on this type of structure.

Jameson (2007) outlines the benefits of functional organisational structure as follows:

- The chain of command is linear and sound.
- Concentrated tutoring, leadership and guidance consistently nurture the human resources' abilities.
- Grouping of similar professionals together enhances development of professional expertise.

- The structure provides an easy path for the employees to grow within the organization sideways as well as upwards in the organizational tree.

Jameson (2007) gives the under listed drawbacks of functional organisational structure:

- Slow decision-making process lead to slow speed in resolving problems thus, may cause inefficiency in the system.
- Grouping of similar skills together leads to lack of broader vision of the overall organizational objectives.
- There is a complication in the flow of communication and information synchronization between functional units.

Ferraro (2012) states that, projects undertaken in functional organisations under-achieve their objectives by between 20%-70%. He mentions that, Managers of projects in this type of organisation are regarded as project coordinators because they represent the management of their establishment on issues relating to projects but are not given the authority to make decisions.

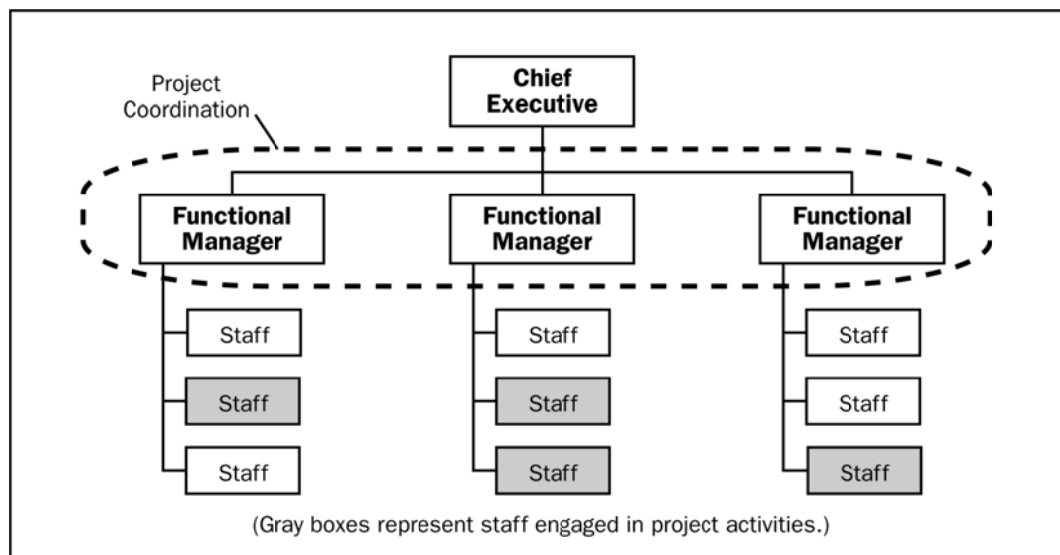
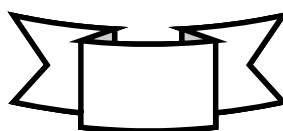


Figure 2.1: Functional organisational structure (source: PMBOK® Guide, 2004)



### 2.2.2 Projectised organisations:

Projectised organisations carry out their activities around projects and programmes. Their Project manager has authority over resources relating to the project (Larson and Gobeli, 1989).

The Project manager is responsible for planning and implementing an assigned project up to its completion using relevant skills and resources. He selects his team and receives relevant resources to execute the project. The team members are loyal to the Project manager.

There is little or no bureaucracy in this type of organisation. Most private contracting and consulting firms operate this type of organisational structure.

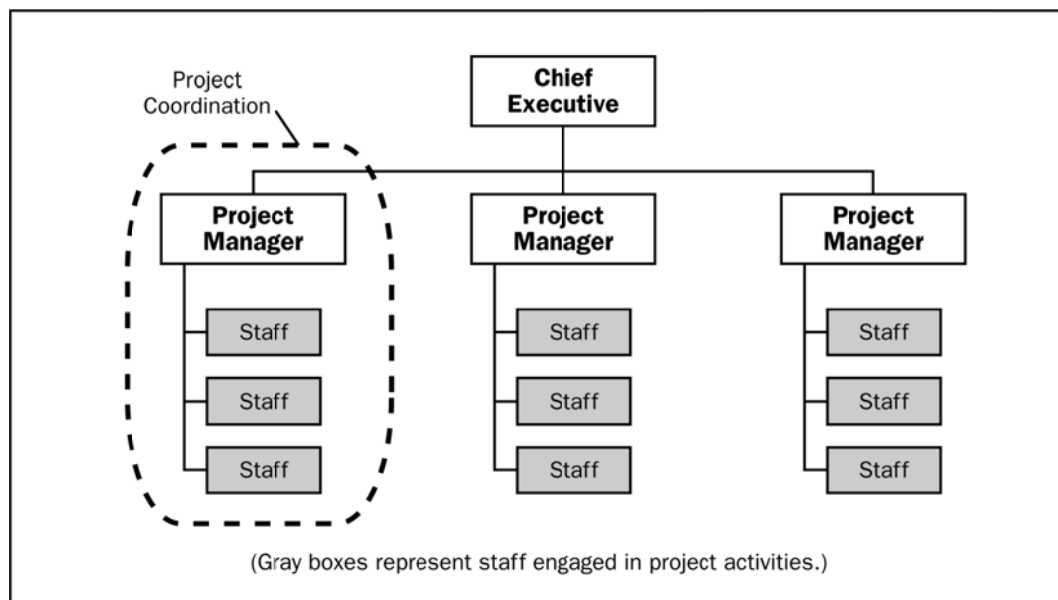
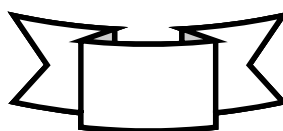


Figure 2.2: Projectised organisational structure (source: PMBOK® Guide, 2004)

### 2.2.3 Matrix organisational structure:

In a matrix organisation, the Project manager exercises some form of authority over the project. There are two channels of commands- along functional lines and along project lines.

Katz and Allen (1985) observed that there is a tendency for projects to perform better in matrix organisations than in the other organisations. This is because in matrix organisations, the benefits of the other two types of organisations are



shared while their disadvantages are reduced. In matrix organisation, the Project manager share equal authority with the functional manager. The Project manager is responsible for “what” is to be done while the Functional manager decides on “how” things are to be done. This calls for collaboration among them to ensure actualisation of the project’s objectives. This type of organisation is mostly operated by the multinational companies.

Larson and Gobeli (1989) observed that, projects executed by Projectised and matrix organisations were more successful than those executed in functional organisations.

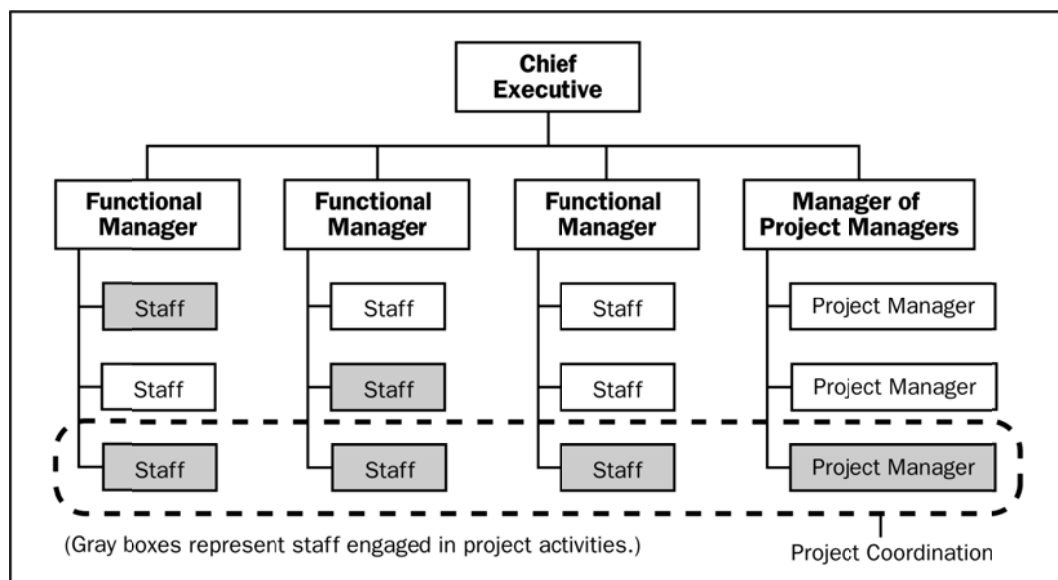
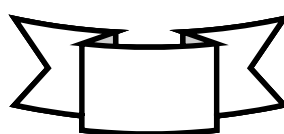


Figure 2.3: Matrix organisational structure (source: PMBOK<sup>®</sup> Guide, 2004)

### 2.3 Project stakeholders:

Stakeholders are individuals or organisations who influence project execution or who are influenced by its implementation and outcome. They are people or organisations who have investments or interests in the project (PMBOK<sup>®</sup> Guide, 2004). Mintzberg (1995) comments that, stakeholders interact with the project through the forces of conflict and cooperation. Therefore, balancing these forces is vital to project success. It thus implies that, project success depends on the extent to which stakeholders are satisfied and are made to cooperate with each other (Odeyinka and Yusuf, 1997).



Stakeholders could be internal or external. Internal stakeholders are those directly involved in the execution of projects. They include: project manager, project team, project sponsors or clients, consultants and contractors. External stakeholders are those who are not directly involved in projects' execution but their actions influence project execution. Examples of external stakeholders are benefitting communities, political leaders in the project location, etc.

Stakeholders conflicting interest is a major challenge against timely completion of projects (Odeyinka and Yusuf, 1997). The onus lies on the Project Manager to apply skills and relevant resources to manage stakeholders effectively. The Project Manager is tasked with the responsibility of mapping out stakeholders during the planning phase of a project.

Newcombe (2010) proposed two principles to effective management of the stakeholders:

- Project Manager must treat all stakeholders fairly and ensure that project's objectives drives every action.
- The Project Manager must at all times, act as an agent of all stakeholders.

Most causes of project delays are directly or indirectly connected to the stakeholders (Odeyinka and Yusuf, 1997).

They may also exert influence over the project's objectives and outcomes. This influence is high at the commencement of project but decreases as the project progresses. However, the impacts of stakeholders' influence on project increases as the project progresses. This is represented in figure 2.4 (PMBOK® Guide, 2004).

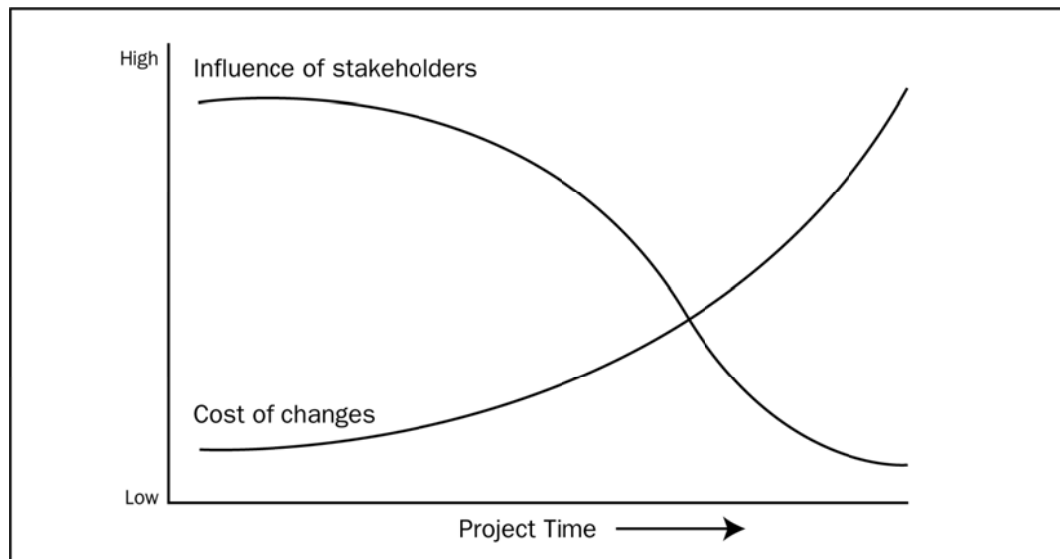


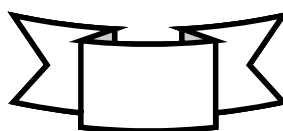
Figure 2.4: Stakeholders' Influence over project time (source: PMBOK® Guide, 2004)

#### 2.4 Project delays:

Projects are considered delayed when their stipulated completion durations have not been achieved (Majid, 2006).

Toor and Ogunlana (2008), Haseeb, *et al* (2009), Al-Khaarashi and Skitmore (2008), Odeyinka and Yusuf (1997) and Le-Hoai, *et al* (2008), all observe that, delays are frequent occurrences in developing countries such as Thailand, Pakistan, Saudi Arabia, Nigeria and Vietnam respectively. Delays are not only experienced in the developing countries, they are global phenomena (Salleh, 2009), Enshassi, *et al* (2009) and Majid (2006).

Most researchers such as Abdul-Rahman, *et al*, 2009; Abdullah, *et al* (2011); Kaliba, *et al* (2009) and Memon, *et al* (2011) consider construction project delays as hazardous to the project stakeholders and the national economy. Impacts of delays give project practitioners and stakeholders great concern. Pourroostam, *et al* (2011), remark that, project delays are the biggest challenges of developing countries' construction industry.



Therefore, it would be appropriate to investigate causes of delays and the effects of delays in construction projects. Findings from such investigations could assist in proffering solutions to delays.

#### 2.4.1 Classification of delays:

Delays are categorised as follows: excusable non-compensable delays, Non-excusable delays, excusable compensable delays and concurrent delays (Ahmed, *et al*, 2002).

Excusable non-compensable delays are those which are beyond the control of both the owner and the contractor. Non-excusable delays are those which are the responsibility of the contractor. Excusable compensable delays are delays caused by the project owner (client). Concurrent delays are those caused by both the owner and the contractor. There are a few tests which must be satisfied for a delay to be considered excusable and compensable. The starting point of satisfying these tests is establishing a basis for measuring delay, and identifying relevant events that led to such delays (Keane & Caletka, 2008).

#### 2.4.2 Previous studies on causes of project delays:

This subsection focuses on some earlier works on causes of project delays. Discussion of the findings and gaps from these research studies are conducted in section (2.5).

Several researchers and project practitioners have undertaken studies on causes of construction project delays. Keana & Caletka (2008) explained that delays are caused by many conditions and factors:

Sambasivan and Soon (2007) identified ten most important causes of project delays in Malaysian construction industry. These are: contractor's improper planning, contractor's poor site management, inadequate contractor's experience, inadequate client's finance and payment of completed work, problem with subcontractors, shortage in material, labour supply, equipment availability and failure, lack of communication between parties, and mistakes during the

construction stage. They carried- out investigations using questionnaire surveys administered to two hundred (200) clients, consultants and contractors. The questionnaires contained twenty-eight identified causes of delays. The factors were grouped into eight categories: client related causes, contractor related causes, consultant related causes, material related causes, labour and equipment related causes, contract related causes, contractual relationship related causes and external causes.

Fugar, *et al* (2010), carried out an investigation on causes of delays in building construction projects in Ghana using a literature survey and semi-structured interview administered to clients, consultants and contractors. They identified thirty-two possible causes of delays and concluded that, financial- related issues were the most significant causes of delays.

Generally, building construction projects are manned by temporary staffs that are paid daily, weekly or monthly. Default in payment of allowances due to lack of funds de-motivate site workers. Most site workers are low income earners and therefore depend on the site allowances for their daily up-keep. Lack of funds may also affect procurement of materials and maintenance of equipment required to execute projects and consequently delays in activities (Koushki, *et al*, 2005).

Faridi and El-Sayegh (2006) investigated significant causes of construction delays in the United Arab Emirates (UAE) using questionnaires administered to contractors and consultants. They concluded that there were ten most significant causes of delays. These were approval of drawings, inadequate early planning, slowness of the owners' decision-making process, shortage of manpower, poor supervision and poor site management, productivity of manpower, skill of manpower, non –availability of materials on time, obtaining permit/approval from the municipality/different government authorities and financing by contractors during construction. They remark that, consultants and contractors were in agreement on their perception about causes of delays.

Sweis, *et al* (2008) conducted investigations on causes of delays in Jordan construction projects using questionnaire survey administered to residential

projects' consultants, Engineers, contractors and clients (owners). The participants were senior project management professionals. Most participants perceived that, financial difficulties experienced by the contractors and too many change orders by the owners were the leading causes of delays.

Change orders impact on the original project scope and affect delay in on-going activities. These culminate into delay in completion. Some change orders could take long time to be processed depending on the content of the request and nature of project organisation. For instance, in functional organisations, decision- making takes longer time, thus change orders slow down project progress. Even in organisations where modern project management principles are adopted, frequent change orders could distort the project implementation plan and lead to time lost during re-adjustment of the plan. More so, if the change orders involve critical tasks of the project, other activities would be stalled until such changes are carried- out.

Majid (2006) discovered ten most important causes of delays in Aceh, Indonesia from a list of fifty-seven factors identified from literature review. Investigation was conducted using questionnaires survey. He concluded that the most significant causes of delays were: insufficient equipment, inaccurate time estimate, monthly payment difficulties, change orders, inaccurate cost estimate, poor site management and supervision, inadequate modern equipment, shortage of construction materials, incompetent project team, improper project planning and scheduling, and contractor's financial difficulties. He remarked that contractor's related issues were the most significant causes of delays.

Toor and Ogunlana (2008) carried- out investigation of causes of delays on major construction projects in Thailand using questionnaires and interview surveys. They identified seventy-five causes of delays from literature and grouped them into ten categories. They concluded that design related, clients related, contractor related and finance related issues were the most significant causes of delays. They expressed their opinion that, causes of delays were similar in developing countries but with minimal differences.

Mahamid (2011) identified the under listed eight major causes of delays in West Bank, Palestine: poor communications between construction parties, poor resource management, delay in commencement, insufficient Inspectors, rework from poor material quality, rework from poor workmanship, payment delay and segmentation of the West Bank.

Hau (2010) conducted investigation on causes of delays in downstream oil and gas projects in Malaysia using questionnaire survey. He states that, the six most important causes of delays were: subcontractor cash flow problem, late delivery of vendor supplied equipment, unrealistic project schedule, client initiated variations, poor site management and supervision, and late delivery of Vendor data.

Yau and Yang (2012) state that public contending or political involvement and tedious review process of government agencies are the most significant causes of delays in power distribution substation projects in Taiwan. Their research was conducted using questionnaires survey which contained twenty-seven causes of delays identified from literature review. They categorized the causes into five: contract related, client related, turnkey contractor related, government related and “others”.

Enshassi, *et al* (2009) investigated causes of project delays in Gaza Strip using questionnaire survey methodology. The questionnaires contained one hundred and ten causes of delays grouped into twelve categories: project related contractors’ responsibilities, consultants’ responsibilities, owners’ responsibilities, professional management, design and documentation, materials, execution, labour and equipment, contractual relationship, government relations and external factors. Questionnaires were administered to project stakeholders: clients, contractors and consultants. They concluded that, there were three major causes of delays: strikes and border closures, lack of materials in the markets and delays in material delivery to the site.

Kaliba, *et al* (2009) conducted study on causes of delays in Zambian road construction projects using literature survey, structured interviews and questionnaires survey. They identified the under-listed thirteen major causes of

project delays: delayed payments, financial processes and difficulties by the contractors and clients, contract modification, economic problems, materials' procurement, changes in drawings, staffing problems, equipment unavailability, poor supervision, construction mistakes, poor coordination on site, changes in specifications and labour disputes and strikes.

Jo and Barry (2008) conducted a study on causes of delays on government sponsored projects in Mozambique using literature survey and questionnaire survey. They administered the questionnaires to senior managers in selected ministries. Their research revealed that, lack of standard procurement procedure was the most important cause of public sector project delays. Political interference was the second most important cause of delays in the government's sponsored infrastructural projects.

Singh (2009) studied causes of delays in infrastructural projects in India. He concluded that organizational or institutional failure was the major cause of project delays in India. He observes that, only a small percentage of projects got completed on schedule.

Ahsan and Gunawan (2009) analysed cost and schedule performance of one hundred international developmental projects using secondary data (post appraisal reports) from Asian Development Bank in four Asian countries: Bangladesh, China, India and Thailand. They concluded that, international developmental projects were delayed. They identified the following eleven causes of delays: lengthy procedure for contract evaluation and award, procurement delay, civil works and land acquisition delay, consultant recruitment delay, natural calamities, government procedural delay, local politics and economic problem, loan approval and disbursement delay, project staff hiring delay, new scope addition and frequent changes of project staff. They established that lengthy procedure for contract evaluation and award was the most significant cause of delay.

Couto (2009) state that, poor institutional performance was one of the most significant causes of project delays in Portugal. He used literature and interview approach to conduct his research. He categorised causes of delays into six:

materials-related, equipment-related, labour-related, contractor management - related, financial management of project- related and owner-related.

Haseeb, *et al* (2009) remarked that project delay is a common occurrence in the Pakistani construction industry. They concluded that natural disasters such as flood and earthquake were the most significant cause of delays. Their investigation was carried using literature and questionnaire surveys. From literature survey, they identified thirty-six causes of delays and grouped them into client related, consultants related, contractors related, contract form related, labour related, project condition related, and external factors.

Al-Kharashi and Skitmore (2008) remark that, there were frequent and lengthy delays in Saudi Arabian Public sector projects. They utilized questionnaires to investigate most important causes of delays from a list of one hundred and eleven (111) causes. These causes were categorised into six: client related, consultant related, contractor related, labour related, material related, contract and relationship related. Their participants were clients, consultants and contractors in the Saudi construction industry. They concluded that, shortfall of qualified and experienced manpower was the most significant cause of project delay.

Vafaiee, *et al* (2010) studied significant causes of delays in Iranian gas procurement projects. They observed that financial problems were the most significant causes of delays. Their investigation was through literature and questionnaire surveys. They identified thirty causes of delays from previous works and grouped them as: client related, contractor related, supplier related, infrastructure issues, financial and banking related and legal and contractual issues.

Le-Hoai, *et al* (2008) employed questionnaires to investigate causes of delays in Vietnam large construction projects. The research participants were construction Experts in the country. Seven significant causes of delay were established out of the twenty-one factors identified from literature survey. These were: slowness and lack of constraints, incompetence, design, market and estimate, financial capability, government and worker issues.

Ahmed, *et al* (2002) investigated causes of delays in Florida State's building construction projects. They identified ten significant causes of delays. These were building permits approval issues, change orders, changes in drawings, incomplete documents, inspections, changes in specifications, decisions during development stage, shop drawings approval, design development, change in laws/regulations. The stakeholders' responsibilities to causes of delays were assigned as follows: contractors = 44%, owners =24%, government =14%, shared = 12%, consultants =6%.

Project delays have several negative impacts on the project and stakeholders as would be discussed in subsection 2.4.2.

Table 2.1: Summary of previous works on significant causes of project delays

| Researchers                          | Country | Significant causes of project delays                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------------------------|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Okpala &amp; Aniekekwa (1998)</b> | Nigeria | <ul style="list-style-type: none"> <li>➤ Contractors' difficulties in receiving interim payments from public agencies</li> <li>➤ Contractors' financial difficulties</li> <li>➤ Inadequate public agencies' budgets</li> <li>➤ Deficiencies in contractors' organizations</li> <li>➤ Deficiencies in planning and scheduling</li> <li>➤ Frequent variation and change orders</li> <li>➤ Difficulties in obtaining construction materials</li> <li>➤ Difficulties in public agencies' organizations</li> <li>➤ Contractors' unrealistic tenders</li> <li>➤ Unrealistic contract duration imposed by public agencies</li> </ul> |

|                                      |       |                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------------------------|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Ahmed, <i>et al</i> (2002)</b>    | USA   | <ul style="list-style-type: none"> <li>➤ Building permits approval issues</li> <li>➤ Change orders</li> <li>➤ Changes in drawings</li> <li>➤ Incomplete documents</li> <li>➤ Inspections</li> <li>➤ Changes in specifications</li> <li>➤ Decisions during development stage</li> <li>➤ Shop drawings approval</li> <li>➤ Design development</li> <li>➤ Change in laws and regulations</li> </ul>                                     |
| <b>Frimpong, <i>et al</i> (2003)</b> | Ghana | <ul style="list-style-type: none"> <li>➤ Monthly payment difficulties</li> <li>➤ Poor contract management</li> <li>➤ Material procurement</li> <li>➤ Inflation</li> <li>➤ Contractor's financial difficulties</li> <li>➤ Escalation of material prices</li> <li>➤ Cash flow during construction</li> <li>➤ Planning and scheduling deficiencies</li> <li>➤ Bad weather</li> <li>➤ Deficiencies in cost estimates prepared</li> </ul> |
| <b>Faridi &amp; El-Sayegh (2006)</b> | UAE   | <ul style="list-style-type: none"> <li>➤ Approval of drawings</li> <li>➤ Inadequate early planning</li> <li>➤ Slowness of the owners' decision-making process</li> <li>➤ Shortage of manpower</li> <li>➤ Poor supervision and poor site management</li> <li>➤ Productivity of manpower</li> <li>➤ Skill of manpower</li> </ul>                                                                                                       |

|                                     |           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------------------------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                     |           | <ul style="list-style-type: none"> <li>➤ Non-availability of materials on time</li> <li>➤ Obtaining permit/approval from the municipality/different government authorities</li> <li>➤ Financing by contractors during construction</li> </ul>                                                                                                                                                                                                                                                     |
| <b>Majid (2006)</b>                 | Indonesia | <ul style="list-style-type: none"> <li>➤ Insufficient equipment</li> <li>➤ Inaccurate time estimate</li> <li>➤ Monthly payment difficulties</li> <li>➤ Change orders</li> <li>➤ Inaccurate cost estimate</li> <li>➤ Poor site management and supervision</li> <li>➤ Inadequate modern equipment</li> <li>➤ Shortage of construction materials</li> <li>➤ Incompetent project team</li> <li>➤ Improper project planning and scheduling</li> <li>➤ Contractor's financial difficulties</li> </ul>   |
| <b>Sambasivan &amp; Soon (2007)</b> | Malaysia  | <ul style="list-style-type: none"> <li>➤ Contractor's improper planning</li> <li>➤ Contractor's poor site management</li> <li>➤ Inadequate contractor's experience</li> <li>➤ Inadequate client's finance and payment for completed work</li> <li>➤ Problem with subcontractors</li> <li>➤ Shortage in materials</li> <li>➤ Labour supply</li> <li>➤ Equipment availability and failure</li> <li>➤ Lack of communication between parties</li> <li>➤ Mistakes during construction stage</li> </ul> |

|                                          |                                       |                                                                                                                                                                                                                                                                                                                 |
|------------------------------------------|---------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Sweis, <i>et al</i> (2008)</b>        | Jordan                                | <ul style="list-style-type: none"> <li>➤ Financial difficulties experienced by the contractors</li> <li>➤ Too many change orders by the owners</li> </ul>                                                                                                                                                       |
| <b>Toor &amp; Ogunlana (2008)</b>        | Thailand                              | <ul style="list-style-type: none"> <li>➤ Design related issues</li> <li>➤ Clients' related issues</li> <li>➤ Contractors' related issues</li> <li>➤ Finance related issues</li> </ul>                                                                                                                           |
| <b>Al-Kharashi &amp; Skitmore (2008)</b> | Saudi Arabia                          | <ul style="list-style-type: none"> <li>➤ Shortfall of qualified and experienced manpower</li> </ul>                                                                                                                                                                                                             |
| <b>Jo' &amp; Barry (2008)</b>            | Mozambique                            | <ul style="list-style-type: none"> <li>➤ Lack of standard procurement procedure</li> <li>➤ Political interference</li> </ul>                                                                                                                                                                                    |
| <b>Le-Hoai, <i>et al</i> (2008)</b>      | Vietnam                               | <ul style="list-style-type: none"> <li>➤ Slowness and lack of constraints</li> <li>➤ Incompetence</li> <li>➤ Design</li> <li>➤ Market and estimate</li> <li>➤ Financial capability</li> <li>➤ Government</li> <li>➤ Workers' issues</li> </ul>                                                                  |
| <b>Ahsan &amp; Gunawan (2009)</b>        | Bangladesh, China, India and Thailand | <ul style="list-style-type: none"> <li>➤ Lengthy procedure for contract evaluation and award</li> </ul>                                                                                                                                                                                                         |
| <b>Kaliba, <i>et al</i> (2009)</b>       | Zambia                                | <ul style="list-style-type: none"> <li>➤ Delayed payments</li> <li>➤ Financial processes and difficulties by the contractors and clients</li> <li>➤ Contract modification</li> <li>➤ Economic problems</li> <li>➤ Materials' procurement</li> <li>➤ Changes in drawings</li> <li>➤ Staffing problems</li> </ul> |

|                                      |                      |                                                                                                                                                                                                                                                                                                                  |
|--------------------------------------|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                      |                      | <ul style="list-style-type: none"> <li>➤ Equipment unavailability</li> <li>➤ Poor supervision</li> <li>➤ Construction mistakes</li> <li>➤ Poor coordination on site</li> <li>➤ Changes in specifications</li> <li>➤ Labour disputes and strikes</li> </ul>                                                       |
| <b>Enshassi, <i>et al</i> (2009)</b> | Gaza Strip           | <ul style="list-style-type: none"> <li>➤ Strikes and border closures</li> <li>➤ Lack of materials in the market</li> <li>➤ Delays in materials' delivery to site</li> </ul>                                                                                                                                      |
| <b>Singh (2009)</b>                  | India                | <ul style="list-style-type: none"> <li>➤ Organizational or institutional failures</li> </ul>                                                                                                                                                                                                                     |
| <b>Haseeb, <i>et al</i> (2009)</b>   | Pakistan             | <ul style="list-style-type: none"> <li>➤ Natural disasters such as earthquake and flood</li> </ul>                                                                                                                                                                                                               |
| <b>Hau (2010)</b>                    | Malaysia             | <ul style="list-style-type: none"> <li>➤ Subcontractor cash flow problem</li> <li>➤ Late delivery of vendor supplied equipment</li> <li>➤ Unrealistic project schedule</li> <li>➤ Client initiated variations</li> <li>➤ Poor site management and supervision</li> <li>➤ Late delivery of vendor data</li> </ul> |
| <b>Vafaiee, <i>et al</i> (2010)</b>  | Iran                 | <ul style="list-style-type: none"> <li>➤ Financial problems</li> </ul>                                                                                                                                                                                                                                           |
| <b>Fugar, <i>et al</i> (2010)</b>    | Ghana                | <ul style="list-style-type: none"> <li>➤ Financial related issues</li> </ul>                                                                                                                                                                                                                                     |
| <b>Mahamid (2011)</b>                | West Bank, Palestine | <ul style="list-style-type: none"> <li>➤ Poor communication between construction parties</li> <li>➤ Poor resource management</li> <li>➤ Delay in commencement</li> <li>➤ Insufficient inspectors</li> <li>➤ Rework from poor material quality</li> <li>➤ Rework from poor workmanship</li> </ul>                 |

|                                  |        |                                                                                                                                                         |
|----------------------------------|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                  |        | <ul style="list-style-type: none"> <li>➤ Payment delay</li> <li>➤ Segmentation of the West Bank</li> </ul>                                              |
| <b>Yau &amp; Yang<br/>(2012)</b> | Taiwan | <ul style="list-style-type: none"> <li>➤ Public contending or political involvement</li> <li>➤ Tedious review process of government agencies</li> </ul> |

Table 2.1 shows that, significant causes of construction project delays vary from country to country. However, finance and payments' related issues were common in most countries surveyed.

#### 2.4.3 Effects of project delays:

The impact or consequences of delay in project completion is termed the effect of project delay. Memon, *et al* (2011), state that effect of delay is a change or impact due to delay.

#### **Quantitative determination of effects of project delays:**

The following techniques are used to quantitatively determine effects (impacts) of delays in projects:

- **Global impact technique:** This is a simplistic way to depict the impact of delay-causing events. Here, all delays and disruptions are plotted on a bar chart. The delay start and finish dates are determined for each event. The total delay to the project is calculated to be the sum total of the durations of all delaying events. This is also called impacted as-planned technique (Keane & Caletka, 2008).
- **Net impact technique:** In net impact technique, only the net effects of all claimed delays on a bar chart are depicted. Using this technique, all delays, disruptions, change orders and suspension are plotted on an as-built schedule. Only the net effect of all the delays is calculated and time

extension is the difference between the as-planned and the as-built completion dates (Keane & Caletka, 2008).

- **Adjusted as-built CPM technique:** This technique uses the CPM format to develop an as-built schedule. Delaying events are depicted as activities and linked to specific work activities. The critical path(s) are identified twice: once in the planned schedule and once at the end of the project. The difference between the as-planned completion date and the adjusted as-built completion date is the amount of time the claimant would request compensation. This method is similar to the net impact technique in that both techniques only show the net effect of all claimed delays on the projects' completion date (Yan & Yin, 2009)
- **Collapsing technique or “But for” technique:** This technique uses the CPM scheduling format and entails one party taking the as-planned schedule and injecting all delays that they are willing to accept responsibility for. The updated schedule yields a revised project completion date and is compared against the as-built schedule. The difference between the as-built and the revised project completion dates is a result of delays that were beyond the claimant's control ((Keane & Caletka, 2008).
- **Snapshot technique:** This technique is used to determine the amount of delay that has occurred on a project, when the delay occurred and the causes of the delay have been established. When analysing delays, the conventional approach is to ask the question, “this event occurred; what delay did it cause the project? The snapshot techniques are based upon the

as-planned, as-built and any revised schedules that have been implemented during the execution of the project. The total project duration is divided into a number of time periods, or snapshots. The dates of these snapshots usually coincide with major project milestones, significant changes in planning or when a major delay or group of delays is known to have occurred. The relationships and duration of the as-built schedule within the snapshot period are imposed upon the as-planned schedule while maintaining the relationships and duration of the as-planned schedule for the remaining activities after the snapshot period (Nguyen & Ibbs, 2006).

- ***Time impact technique analysis:*** This is similar to the snapshot technique, in that it examines the effects of delays or delaying events at different times in the project. The difference is that, the time impact technique concentrates on a specific delay or delaying events. The idea is to obtain a “stop action” picture of the project before and/or after a major delaying event has occurred. The as-planned schedule is first verified to reflect the contractor’s actual plan, and then it is updated at certain critical periods in the construction process; thereafter, the actual project duration is recalculated and a new completion date is established. The difference between the different completion dates is the effect that the particular delay had on the project as a result of the delay being inserted into the schedule. To perform the delay analysis using the time impact technique, delayed activities of the test case have to be identified (Keane & Caletka, 2008).

**Previous studies on effects of project delays:**

Memon, *et al* (2011) observed that time overrun, cost overrun, arbitration, disputes, total abandonment and litigation were the six likely effects of project delays. They concluded that time overrun was the most significant effect of delay followed by cost overrun.

Ghoddosi, *et al* (2008) concluded that time and cost overruns were the major effects of delays in Iran's Dam construction projects.

Bramble and Callahan (2011) observed that project delays lead to late completion of project, bad relationship among project stakeholders, poor quality workmanship by the Contractor, inefficiency and lost productivity by the Contractor, disputes, claims and abandonment or termination of the project.

Hau (2010) identified time overrun and cost overrun as the major effects of project delays in Malaysian downstream oil and gas projects.

Sambasivan and Soon (2007), state that, effects of delays were time overrun, cost overrun, disputes, arbitration, litigation and total abandonment.

Majid (2006) outlined time and cost overruns as the most important effects of project delays in Aceh construction industry, Indonesia.

Le-Hoai, *et al* (2008) remark that cost overrun was the most significant effect of project delays in Vietnam large construction projects.

Enshassi, *et al* (2009) identified cost overrun, time overrun, negative rate of economic growth and monetary loss, disputes, arbitration, and total abandonment as effects of project delays in Gaza Strip.

Al-Hamaidi and Tan (2009) state that "delays lead to claims and disputes".

Singh (2009) remarks that infrastructural projects in India are characterised by time and cost overruns due to frequent delays and these have serious negative economic implications.

Aibinu and Jagboro (2002) identified time overrun, cost overrun, disputes, arbitration, litigation and total abandonment as the effects of construction delays in Nigeria.

Manavizha and Adhikarib (2002) concluded that, cost overrun was a major consequence of delay in highway construction project in Nepal.

Frimpong (2003) investigated delays in the construction of ground water project in Ghana and identified cost overrun as a major effect.

Faridi and El-Sayegh (2006) observe that construction delays in the United Arab Emirates (UAE) have adverse impacts in terms of time, cost, quality and safety. They observed that its effects transcend the construction industry to the overall economy of the country.

Kaliba, *et al* (2008) identified poor quality of end product, project extension, litigation and cost overrun as the effects of delays in Zambian road construction projects.

Table 2.2: Summary of previous works on significant effects of project delays

| Researcher                              | Country | Significant effects of project delays                                                                                                                                           |
|-----------------------------------------|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Aibinu &amp; Jagboro (2002)</b>      | Nigeria | <ul style="list-style-type: none"><li>• Time overrun</li><li>• Cost overrun</li><li>• Disputes</li><li>• Arbitration</li><li>• Litigation</li><li>• Total abandonment</li></ul> |
| <b>Manavizha &amp; Adhikarib (2002)</b> | Nepal   | <ul style="list-style-type: none"><li>• Cost overrun</li></ul>                                                                                                                  |
| <b>Frimpong, <i>et al</i> (2003)</b>    | Ghana   | <ul style="list-style-type: none"><li>• Cost overrun</li></ul>                                                                                                                  |
| <b>Faridi &amp; El-</b>                 | UAE     | <ul style="list-style-type: none"><li>• Time overrun</li></ul>                                                                                                                  |

|                                      |            |                                                                                                                                                                                                                                |
|--------------------------------------|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Sayegh (2006)</b>                 |            | <ul style="list-style-type: none"> <li>• Cost overrun</li> <li>• Poor quality and unsafe completed projects</li> </ul>                                                                                                         |
| <b>Majid (2006)</b>                  | Indonesia  | <ul style="list-style-type: none"> <li>• Time overrun</li> <li>• Cost overrun</li> </ul>                                                                                                                                       |
| <b>Sambasivan &amp; Soon (2007)</b>  | Malaysia   | <ul style="list-style-type: none"> <li>• Time overrun</li> <li>• Cost overrun</li> <li>• Disputes</li> <li>• Arbitration</li> <li>• Litigation</li> <li>• Total abandonment</li> </ul>                                         |
| <b>Enshassi, <i>et al</i> (2009)</b> | Gaza Strip | <ul style="list-style-type: none"> <li>• Cost overrun</li> <li>• Time overrun</li> <li>• Negative rate of economic growth and monetary loss</li> <li>• Disputes</li> <li>• Arbitration</li> <li>• Total abandonment</li> </ul> |
| <b>Le-Hoai, <i>et al</i> (2008)</b>  | Vietnam    | <ul style="list-style-type: none"> <li>• Cost overrun</li> </ul>                                                                                                                                                               |
| <b>Kaliba, <i>et al</i> (2008)</b>   | Zambia     | <ul style="list-style-type: none"> <li>• Poor quality of end product</li> <li>• Project extension</li> <li>• Litigation</li> <li>• Cost overrun</li> </ul>                                                                     |
| <b>Ghoddosi, <i>et al</i> (2008)</b> | Iran       | <ul style="list-style-type: none"> <li>• Time overrun</li> <li>• Cost overrun</li> </ul>                                                                                                                                       |
| <b>Singh (2009)</b>                  | India      | <ul style="list-style-type: none"> <li>• Time overrun</li> <li>• Cost overrun</li> <li>• Negative economic impacts</li> </ul>                                                                                                  |
| <b>Hau (2010)</b>                    | Malaysia   | <ul style="list-style-type: none"> <li>• Time overrun</li> </ul>                                                                                                                                                               |

|                                      |         |                                                                                                                                                                                                                                                                                                    |
|--------------------------------------|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                      |         | <ul style="list-style-type: none"> <li>• Cost overrun</li> </ul>                                                                                                                                                                                                                                   |
| <b>Bramble &amp; Callahan (2011)</b> |         | <ul style="list-style-type: none"> <li>• Time overrun</li> <li>• Bad relationship among stakeholders</li> <li>• Poor quality workmanship by the contractor</li> <li>• Inefficiency and lost productivity by the contractor</li> <li>• Disputes</li> <li>• Claims</li> <li>• Abandonment</li> </ul> |
| <b>Memon, <i>et al</i> (2011)</b>    | Vietnam | <ul style="list-style-type: none"> <li>• Time overrun</li> <li>• Cost overrun</li> <li>• Arbitration</li> <li>• Disputes</li> <li>• Total abandonment</li> <li>• Litigation</li> </ul>                                                                                                             |

Table 2.2 shows that most researchers agreed that time overrun and cost (budget) overrun were the most important effects of construction project delays. However, the above researchers have varying opinions about other effects of delays.

## 2.5 Critique of the previous studies:

In this section, findings from the previous studies were evaluated. Some gaps in the previous works are also discussed to further justify the objectives of this research:

### 2.5.1 Generalisation of results:

A research study by Aibinu and Jagboro (2002) involved investigations on sixty-one building constructions projects in the South Western States of Nigeria. They surveyed 102 respondents drawn from contracting and consulting firms; generalised their results to cover the whole Nigerian construction industry. It is worthy to note that, Nigeria has six geo-political regions and several types of

construction works taking place or completed in each region. Each region has peculiarities in terms of geography, ecology, culture, and others (National Geographic Society, 1996). All these influence timely completion of projects. Therefore, it could be misleading to draw conclusion for the whole country's construction industry from a survey of 102 building construction participants located in one of the six geo-political regions.

Some causes of delays are peculiar to some localities. For instance, in the Niger Delta region, causes of delays such as youth unrest, militancy, poor weather condition and topographic challenges are unique to the region. There are causes of delays that are dependent on the type of project being executed. For example, poor weather condition would mostly impact on road construction projects than building construction projects.

There seem to have been an erroneous generalisation of results on investigations of construction project delays by Frimpong, *et al* (2003). They drew conclusion for causes of delays in ground water projects in developing countries through a survey of 125 participants in Ghana.

It may be inappropriate that generalisation was made on all developing countries from a study of only 125 participants in Ghana. These countries have diverse geographies, cultures and economy. For example, Enshassi, *et al* (2009) found out that strikes and border closures were among the most significant causes of delay in Gaza Strip - a developing country.

Sambasivan and Soon (2007) drew conclusions on the causes and effects of delays in Malaysian construction industry using 150 questionnaires. Malaysia has thirteen states and three federal territories (National Geographic Society, 1996). The country also has diverse cultures and geographies. It has many on-going infrastructural projects. Hence, 150 participants' opinions could not have reflected those of the entire construction industry in Malaysia.

Unfortunately, these results have been cited by later researchers without paying attention to the above observations. The researcher believes that geographical

peculiarities could affect the results of perception surveys. Aiyetan (2010) expressed the opinion that, causes of project delays differ from country to country. He listed environmental factors as one of the reasons why causes of delays differ between countries. Thus, a research instrument must be designed to capture peculiarities of the entire population from which research results would be generalised to capture.

In this research, it was ensured that project execution's experiences in all States of the Niger Delta region were captured. This was considered in the design of the demographic page of the research questionnaire. Also, selected participants in this study cut across all major business organisations and the key stakeholders in project execution in the Niger Delta region. This justified generalisation of the results in this study to cover project delays in the Niger Delta region.

#### 2.5.2 Non-inclusion of vital items in research instrument:

Most researchers did not capture the respondents' project management organisational structures in their research instrument's design. Findings from Ferraro (2012), Larson and Gobeli (1989), Katz and Allen (1985) and Jameson (2007) all state that, organisational structures of research participants could affect their perception. Therefore, earlier researchers ought to have incorporated respondents' project management organisational structures in their instrument's design rather than randomly sampling clients, consultants and contractors without due consideration to the types of organisation they operate.

Again, it could be misleading to make generalizations on an entire population which comprise the three types of project management organisations (Functional, Matrix and Projectised) from surveying only one type of organisational structure. Secondly, most previous studies' instruments rarely captured extents of project delays. Enshassi, *et al* (2009) remark that the extent of delays varies from project to projects. Incorporating extent or degrees of delays in the different types of project could help a researcher to concentrate efforts on critical areas thereby enhancing adoption of appropriate methods and tools to proffer solution (s).

#### 2.5.3 Economic impact of delays:

Enshassi, *et al* (2009), state that, project delays are problems of both developed and developing countries. Most researchers agreed that construction projects delays have adverse economic impacts on a nation (Chan, *et al*, 2004 and Singh, 2009). The last global economic recession, which is yet to be overcome by some countries, is a pointer that greater attention should be paid to the menace of construction project delays. Therefore, Project Practitioners and Researchers should intensify efforts to seek solutions to project delays.

#### 2.5.4 Benefits/beneficiaries of construction project delays:

Previous researches did not incorporate benefits and beneficiaries of delays in their investigations. As earlier discussed, several efforts to tackle delays, even with the use of project management methodologies and skills have not yielded timely completion of projects. Therefore, there should be a paradigm shift in the investigations about construction project delays. Causes and effects of construction project delays should equally be studied from a positive point of view with respect to benefits of delays and beneficiaries of delays. These studies could give revelations that might assist in proffering solutions to project delays.

There are currently no known literature that discusses benefits and beneficiaries of construction project delays. Therefore, this subject has been captured in this study. Findings are presented in chapter four.

#### 2.5.5 Classification of project delays:

Thirty-eight (38) causes of construction project delays were identified from earlier works by Vafaiee, *et al* (2010), Sambasivan and Soon (2007), Aibinu and Jagboro (2002), Odeyinka and Yusuf (1997). These were categorised and used for investigation in this study as follows:

##### **A. Clients' related issues:**

**1) Impractical allocation of resources:** Funds, manpower, materials, and equipment allotted are inadequate to complete the project. Sometimes, project owners or clients could embark on construction projects without considering

whether they have the required resources to complete such projects. This results in project delays (Nguyen & Ibbs, 2006).

**2) Design alterations and change orders:** Change in specifications and scope which were not considered originally. Change of design in order to address some omissions that were vital to project functionality. Alterations in design may require temporary stoppage of on-going project activities and thus lead to delay in overall project completion.

**3) Insufficient funding:** Funds are not adequately released during relevant phases of projects' execution. Milestones payments are not made on time due to organizational lapses or bureaucracy. Inadequate cash flow lead to delay in delivery of materials and equipment to the site and delay in payment of workers' salaries. All these could culminate into delayed project activities and hence delay in project completion.

**4) Unrealistic contract duration:** This could be caused by wrong packaging of the contract document, political interference or unprofessional/inexperienced client's staff. Where the stated completion duration is impracticable, such project can never be completed at the stipulated time. In this circumstance, the onus lies on the stakeholders to review the initial expected completion time and make amends where necessary.

**5) Delay or non-payment of completed works:** This happens when agreed milestones for payment are not followed or when there is no cash flow projection in the project implementation plan. For Public sector projects, delay in passage of the year's appropriation bill by the National Assembly could lead to delay in payment to Contractors and Consultants. This is because, the appropriation act gives the Client the authority to spend funds appropriated.

**6) Slow decision making:** Clients are the project Owners. When they do not make decisions on time as regards to project matters, they slow down activities at the project sites. Slow decision making could be caused by an organization's internal bureaucracy or wrong channels of communication.

**7) Wrong choice of Consultants and Contractors:** Clients select Consultants and Contractors as their vendors. If the selection process is faulty, unqualified vendors will be engaged. This could lead to faulty works and frequent rework, thus delay in project completion.

**8) Interference with project performance:** Sometimes top management staff of Client's establishment could interfere in project execution because of vested interest. For instance, some scope could be introduced without due authorization. This happens mostly, if the management staffs were instrumental to the appointment of the vendor.

**B. Contractors' related issues:**

**9) Incompetent site management:** Contractor's staffs that are not skilled in project management will not be able to manage their project site appropriately. Poor site management will culminate into faulty works, reworks and delay in completion of tasks, thereby leading to overall delays in the project completion.

**10) Inappropriate construction methods:** Construction is a complex activity driven by the Contractors. These activities are required to be carried out using best practices and tools to ensure successful execution of the projects. When the procedures are not followed, errors are imminent, this leads to rework and consequently delay.

**11) Inadequate planning:** Contractors appoint Project Managers who are charged with the daily running of projects. These Project Managers are expected to draw up workable project plans and modalities for their implementation. A faulty plan will lead to delay in project completion. Most Local Contractors rarely have practicable work program at the initial stage of project planning. Lack of appropriate work programs impairs monitoring of project progress against the stipulated time.

**12) Poor coordination of subcontractors:** Subcontractors supply materials at the site. There are some aspects of construction works that are subcontracted to nominated specialised subcontractors. These subcontractors must be properly

coordinated by the Prime contractor to ensure timely delivery of assigned aspects of works. A delay by subcontractor will lead to activity's delay and consequently delay the overall project completion. Contractors must therefore ensure that each subcontractor deliver at the stipulated time expected and specifications.

**13) Mistakes during construction stage:** Inexperience contractors usually make errors during construction. Sometimes, greedy contractors employ low skilled staff in order to make more profit by paying them lower salaries. Tendencies of errors by low skilled workers are higher. Clients usually insist that corrections be made for every noticeable construction mistake. Rework of an already executed aspect of a scope slows down project progress. This has serious impact if it involves execution of critical tasks.

**14) Wrong choice of bankers:** Banks provide funds for most projects. Their actions and inactions directly impact on a contractor's ability to execute his project as scheduled. Some Banks' internal processes could hinder timely release of funds. This happens especially when a contractor requires facility such as loans to finance his project. It is a major challenge in Nigeria where the banking industry is at the developing stage.

**15) Inadequate experience:** A contractor who does not possess requisite experience usually makes construction errors. These errors lead to rework and delay in activities, hence delay in the project completion time.

#### **C. Labour and equipment related issues:**

**16) Improper equipment selection and faulty equipment:** Improper equipment makes simple tasks last longer. Faulty equipment leads to delay due to the time spent to repair.

**17) Unskilled site manpower:** Employment of unskilled personnel at the project sites impedes execution of works to specification and leads to error or mistakes during construction, hence delay in project completion due to time spent to make alterations and corrections.

**18) Labour disputes:** Labour disputes such as strikes stall project execution. During disputes, construction time is spent on negotiation and settlement of grievances. All these culminate into overall delay in project completion.

**D. Materials' related issues:**

**19) Materials' shortages:** Materials at a project site are synonymous to raw materials in a factory. Their shortages imply slowed activities and sometimes temporary abandonment of sites. This loss time makes project completion delayed.

**20) Poor quality materials:** Poor quality materials lead to poor quality workmanship, thus unacceptable product. Most often, the project owners insist that correction be made or such aspect of work be completely redone. Rework takes an aspect of the construction time, thereby delaying the overall project completion.

**E. Consultants' related issues:**

**21) Inappropriate design:** Projects are executed using design drawings. Consultants are responsible for project design. Improper design stalls project execution because of the time it will take for such design to be reviewed, amended and accepted for construction works. When errors are observed in the design, works are temporary suspended until such errors are removed. This loss time culminates into delay in the project's completion. This is predominant in organisations where selection processes of vendors are compromised.

**22) Poor contract management:** Most projects have consultants as the contract managers. They liaise between the client and the contractor. Projects get delayed when the required management principles are not utilised during projects' execution.

**23) Late preparation of drawings and other contract documents:** Drawings and other contract documents such as Bill of Engineering Measurement and Evaluation (BEME) are required for a smooth execution of any project. Therefore, delay in their release stalls project activities, thus project completion.

**24) Over inspection:** Inspectors are required to track performances of project through periodical monitoring. Too much frequent inspection becomes a distraction to the contractors, hence could impede contractors' progress. This is because the time that could have been used to execute more works will be utilised for inspection and site meetings. This slows down work progress and leads to project delays.

**25) Inappropriate coordination of information:** If projects issues are not addressed on time or contractor's requests are not addressed on time and information are not properly managed, project activities would be negatively affected. There must be a good communication management plan for successes to be achieved during project execution. Site information must therefore be properly channelled and coordinated. Improper coordination of information breeds misunderstanding and misunderstanding causes conflicts. Activities' time will therefore be spent to resolve conflicts, hence delays in overall project completion.

**26) Long waiting time for inspection and testing:** Certain aspects of projects require inspection and testing before further activities could be carried out. Usually, Consultants and Clients' staff are tasked with the responsibility of coordinating such exercises. Delay by them impede project progress and thus delay completion time.

**27) Improper contract packaging/delivery strategy:** Clients usually outsource packaging/delivery of contracts to the consultants who are professionals. Errors in this task hinder the overall project performance because issues not properly captured must be addressed before project activities could progress else, there might arise issues that lead to legal redress.

**28) Late identification and resolution of drawings and specification errors and omissions:** Projects are required to be completed on schedule, within budget and according to specification. If consultants do not identify errors and omissions in the working drawings early enough, already completed activities may require alterations when such errors and omissions are discovered after project commencement. This leads to delay in overall project completion time.

**F. Communities' related issues:**

**29) Youth unrest, militancy and communal crises:** These issues are peculiar to the Niger Delta region. They were included by the researcher in view of his experience in project delivery in the region. Recently, there has been frequent unrest in the region due to agitations by the youths that their region has been deprived of basic socio-economic amenities despite huge oil and gas explorations. They resolved to take hostage of oil and other construction workers as well as some elites in the region to express their grievances. This gives a major challenge in projects execution in the region. Communal crises results in non-conducive environment for project execution hence slow pace of project works and sometimes total abandonment of project sites.

**30) Lack of community buy-in:** Benefitting communities are stakeholders in public sector project execution. These projects are carried out to boost their socio-economical lives. Proper needs assessment is therefore important for a smooth execution of these projects. People usually partner with projects they know will address their needs. It is therefore appropriate to ensure a buy-in from expected beneficiaries of projects so that they could cooperate with the Construction Companies during execution.

**31) Delay or non-payment of compensation:** People spent their life's earnings to acquire properties. Sometimes, these properties require demolition for project's objectives to be realised. In contracts, provisions are made for payment of compensations on properties on the right of way of projects. Delay in making these payments or non-payments may stall project execution because, the affected owners of such properties resist attempts for their properties to be demolished without provision for replacement.

**G. Contractual relationship and related issues:**

**32) Major disputes and negotiations:** Major disputes and negotiations between parties in project impede progress of work. Generally, aggrieved parties wait until grievances are resolved before they continue.

**33) Lack of adequate communication between parties:** Poor or inadequate communication between parties leads to misunderstanding and misrepresentation of facts. This could breed conflicts and consequently hinders smooth progress of activities.

**34) Wrong organisational structure linking to the project:** Organisational structures affect project performance (Couto, 2009). There are certain projects that cannot be managed by some kind of organisational structure. For instance, it is difficult to execute quick impact projects in a functional organisational structure because of its slow decision making processes and too much bureaucracies associated with such structure.

#### **H. External issues:**

**35) Weather condition:** Weather condition affects project progress. In areas where there is frequent rainfall, some projects activities could be delayed. This is experienced where the contractor/consultant do not possess good project management skills such as to capture weather projections in their project implementation plan.

**36) Natural disasters (flood, thunderstorm, and others):** There are locations that usually experience natural disasters such as flood, etc. These disasters are generally unpredictable. When they occur, project completion time gets pushed back. However, well established project management Organisations possess requisite skills to predict natural disasters.

**37) Change in government's leadership and policies:** Certain projects are stalled and abandoned when political leadership that initiated them change. Sometimes, change in government policies such as monetary and fiscal policies could lead to increase in cost of construction materials and equipment. Contractors will not be able to continue with the project as scheduled because of the time they will spend to get approval on price fluctuation or other review on the contract.

**38) Interference by political leaders:** This is usually experienced in Public sector projects. Some political leaders have vested interest in particular projects. They

interfere by requesting for execution of scopes that were not captured in the original design or by imposing unqualified contractors/ subcontractors to the client. The above action leads to poor project performance especially in terms of time, hence a delay in completion.

#### 2.5.6 Effects of project delay identified for investigation:

The following effects of construction project delays were identified from earlier works by Memon, *et al* (2011); Ghoddosi, *et al*(2008);Bramble and Callahan (2011); Hau (2010); Sambasivan and Soon (2007); Majid (2006); Le-Hoai, *et al* (2008); Enshassi, *et al*(2009); Al-Hamaidi and Tan (2009) and Singh (2009):

##### **Time overrun:**

Every project has a stipulated completion time. When this time is pushed forward, the project is said to have experienced time overrun.

##### **Budget overrun:**

Project is designed to be completed at a specific cost (budget). When a project is completed at a cost higher than what was budgeted, it is said to experience a budget overrun.

##### **Poor quality completed project:**

Undue delay of project completion could lead to poor quality workmanship.

##### **Bad Public Relations:**

When projects are delayed, contractors, consultants and clients could lose their reputations among the public.

##### **Litigation:**

Project delay could make aggrieved parties to visit the law court for redress especially where conflicts resulting from the delay could not be resolved amicably.

**Arbitration:**

Competent third parties are engaged where parties in a project could not settle disputes relating to delays by themselves. An Arbitrator therefore mediate for two or more parties who have disputes that is beyond their capacity to settle among themselves.

**Disputes and claims:**

Disputes and claims arise when parties feel that delay occurred because their contractual agreements were not honoured. The aggrieved parties usually resolve to make claims for the losses that they incur.

**Total abandonment:**

Total abandonment is permanent stoppage of works at the project site. Delays in project execution could lead to total abandonment if issues leading to the delays were not resolved on time.

**2.6 Summary for the chapter:**

The chapter linked the researcher to conceptual information and methodologies earlier adopted to investigate construction project delays. It was observed that, earlier researchers made significant contributions that could enhance further studies of construction project delays. However, in some of these researches, there seems to be undue generalisation of research findings. Some researches had instruments whose design/demography could not fully capture the population in which conclusions were drawn upon, these created gaps and gave opportunities for further studies. The researcher therefore, designed his research instrument (questionnaire) to capture all categories of project practitioners in the Niger Delta region, namely: public service, multinational companies and private companies. The demographic characteristics also covered major stakeholders in project execution such as consultants, contractors and clients/sponsors. This justifies making generalisations from the research study to entail all project practitioners in the Niger Delta region.

All researchers observed that construction delays are global phenomenon with negative impacts on the stakeholders. The questionnaire was therefore designed to seek responses on benefits/beneficiaries of project delays. This was to prompt a paradigm shift in the discussion on project delays from a negative view point to a positive view point.

## CHAPTER THREE

### 3 METHODOLOGY:

Trochim (2006) suggests that an appropriate research methodology should provide solutions to the statement of the problem and produce results that would meet the research objectives. Thus, this chapter gives a description and justification of the procedures and instruments utilised to conduct the research. It also discusses the approach adopted to analyse the research data.

#### 3.1 Work flow chart for the research:

According to Welman and Kruger (2001) in Aiyetan (2010), research consists of the application of several processes and skills to investigate a problem in order to proffer scientific solutions. It is a complex endeavour and thus requires proper coordination of activities and available resources.

This research is a project characterised by specific objectives and end date, therefore, a work flow chart is presented in figure 3.1.

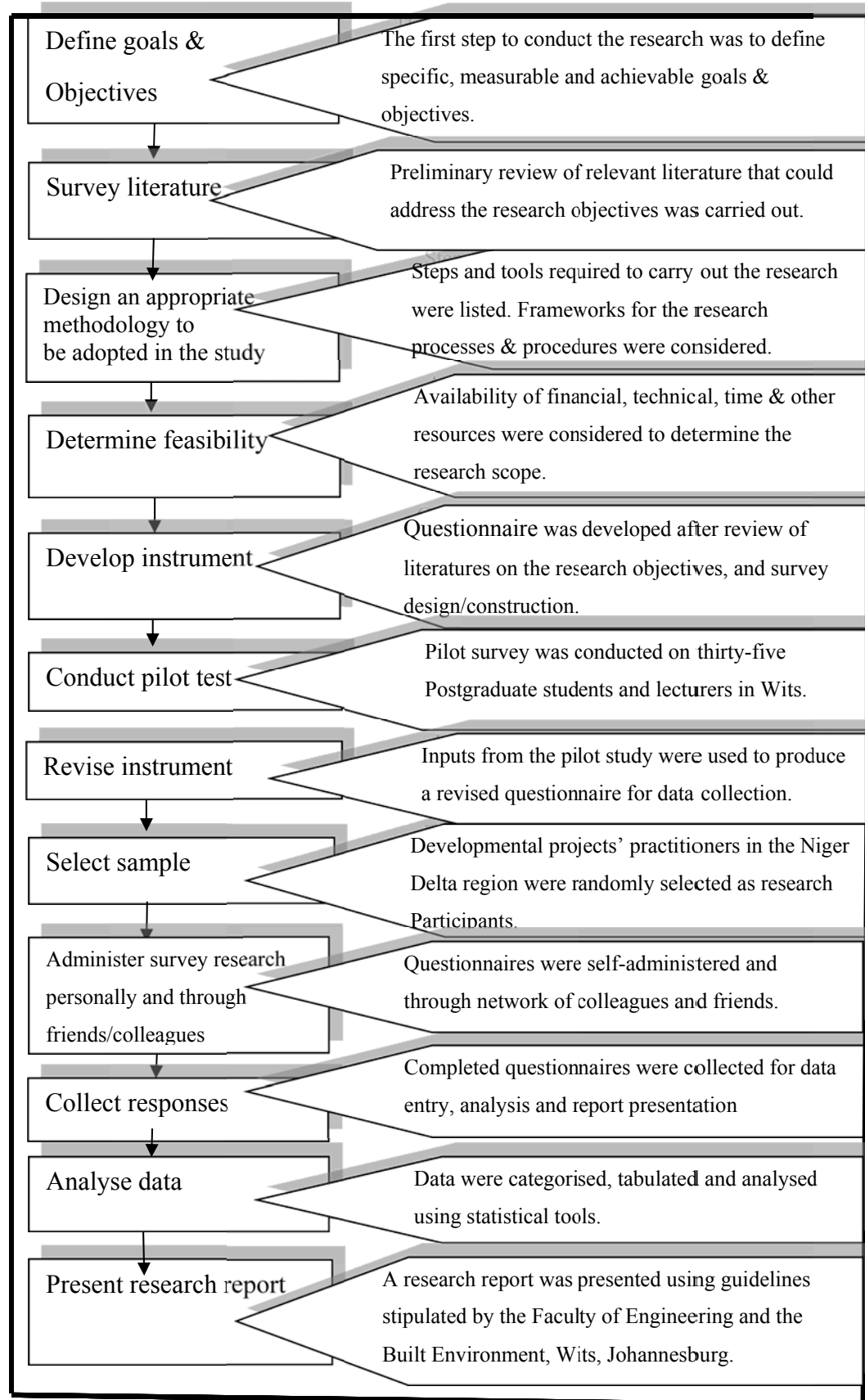
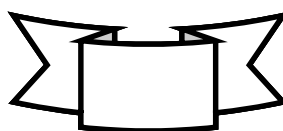


Figure 3.1 work flow chart for the research



### 3.2 Types of research methodology:

Research methods are broadly classified as quantitative and qualitative methods. A particular research could involve a combination of the two methods (Fellows and Liu, 2003; Onomehebor, 2006 and Kumar, 2005). When the two methods are combined in a research study, for the purpose of cross checking findings, it is called triangulation (Holden and Lynch, 2004).

In a research study, data collection may be qualitative but analyses could be quantitative. It all depends on the research objectives (Aiyetan, 2010). However, in this research study, data collection was quantitative and qualitative using questionnaire survey while data analysis was quantitative using relevant statistical tools.

The differences between the two types of research methodologies are shown in table 3.1:

Table 3.1 Comparison of Quantitative and Qualitative research

|                                | <b>Quantitative</b>                                       | <b>Qualitative</b>                                    |
|--------------------------------|-----------------------------------------------------------|-------------------------------------------------------|
| Philosophical foundation       | Deductive, reductionalist                                 | Inductive, holistic                                   |
| Aim                            | To test pre-test hypothesis                               | To explore complex human issues                       |
| Study plan                     | Step-wise, predetermined                                  | Iterative, flexible                                   |
| Position of the researcher     | Aims to be detached and objective                         | Integral part of the research process                 |
| Assessing quality of outcomes  | Direct tests of validity and reliability using statistics | Indirect quality assurance methods of trustworthiness |
| Measures of utility of results | Generalizability                                          | Transferability                                       |

(Source: Marshall, 1996)

Improper matching of methodology to a research problem might produce spurious results which could have negative impacts on the researcher's professionalism and the authority of his research science (Holden and Lynch, 2004).

Therefore, none of the two methods is superior to the other, what is important may include: suitability of the chosen approach to address the research objectives, characteristics of the research subjects, and the environment in which the research is conducted (Hughes and Sharrock, 1997).

**Quantitative research methodology:**

Quantitative methods involve data collection through measurements, observations and using existing quantitative data. Quantitative methods came from the objectivity school of thought. Remenyi, *et al* (1998), remark that in a quantitative methodology, a researcher sets up a study so as to reject or not reject hypothesis. The research starts with a review of existing theory and proposition of hypothesis based on established truths. Data are then collected using appropriate instruments. The results from the data analyses can then validate or reject the pre-determined hypotheses. Generalizations are therefore drawn from the results. Holden and Lynch (2004) describe quantitative methodology as a hypothetico-deductive approach. Researchers adopt quantitative methods whenever they want to gain an understanding on "what phenomenon" is occurring (Denzin, *et al*, 2005).

**Qualitative research methodology:**

Qualitative approaches use inductive reasoning. Here, a researcher starts his investigation by making generalizations, and propounds hypothesis or theory based on his findings. He makes inferences due to pattern(s) observed from his results.

Qualitative methods are used to gain insight into people's motivations, beliefs, behaviours, concerns, value system, culture or lifestyles. Qualitative approach helps a researcher to obtain in-depth information or insight about a phenomenon of interest. It is used to inform business and policy decisions and to conduct research (Ereaut, 2011). It is subjective in nature (Remenyi, *et al*, 1998).

Trochim (2006) refers to qualitative research methodology as a “bottom up” approach of conducting research. Hughes and Sharrock (1997) in Holden and Lynch (2004) describe qualitative approach as “interpretativism”.

The advantage of qualitative method over quantitative approach is that, it provides research participants an opportunity to explain phenomenon from their own point of view. Denzin, *et al* (2005) and Leedy, (1997) argue that qualitative research methodology is used to determine “why” and “how” a phenomenon exists.

**Types of qualitative methods:** There are various types of qualitative methods: Survey (interview and questionnaire), focus groups, participant observation, direct observation and case studies (Trochim, 2006, Wisker, 2007 and Ereaut, 2011).

**Surveys:** Trochim (2006) classifies survey research into two: interview and questionnaire research methods. The adoption of each method depends on available funds, time and educational background of the expected respondents.

Surveys could be undertaken using telephone interviews, mass media, postage, e-mails or other electronic media and questionnaires (Love, *et al*, 2002).

Each method has some advantages and disadvantages. For instance, interviews could quickly generate data than the questionnaire but they are costlier to execute (Walonick, 1997, Trochim, 2006). Questionnaires are relatively cheap but require longer duration to administer (Walonick, 1997; Burgess, 2001). Questionnaires can reach a larger sample than the interview method at a given time. The interview survey gives the investigator and respondent opportunity for instant clarifications (Burgess, 2001).

Survey data could be analysed using quantitative and qualitative methods. Quantitative data analysis will be adopted when questions are requesting for measureable data but when survey questions require immeasurable information such as perception, belief, etc., then the analysis method would be qualitative.

**Focus group:** Focus groups involve the gathering of relevant participants in a group session in order to hear their views on issues of interest. The researcher

coordinates the forum and keeps records using paper, tape or video. Here anonymity and confidentiality are not guaranteed during focus group discussions (Gibbs, 1997).

**Participant observation:** In participant observation, “the researcher becomes a participant in the culture and context of what is being observed. It often requires months or years of intensive work” (Kumar, 2005).

**Direct observation:** In “direct observation”, a researcher watches rather than taking part. This method takes less time than the participant observation.

**Case studies:** Case studies involve intensive study of a specific individual or specific context (Yin, 2003).

### 3.3 Selection of appropriate research method:

Delays investigation is one of the most researched, controversial and featured topics at international forums and conferences on construction industry, world-wide (Carnell, 2008; Ahmed, *et al*, 2002).

“The goal of delays investigation is to satisfy the burden of establishing causes and effects”. The investigation could commence from studies on “causes” or “effects” depending on the researcher’s discretion and the research objectives (Keane & Caletka, 2008).

Walonick (1997) recommends that a researcher should consider the under-listed factors when deciding on which method to adopt:

- Location of the research subjects
- Educational background of participants
- Available funds
- Language of the research subjects, and
- Research objectives

For the purpose of this research report, it is important to note that, in the recent times, the Niger Delta region has witnessed series of communal unrests and

militants' activities. Therefore, collection of the data at the projects sites was not feasible.

A questionnaire survey reaches larger participants than face-to-face interview. It is cheaper than face-to-face interview. Well-designed questionnaires could be used to collect vital data without accessing a project location. Thus, questionnaire survey was considered appropriate for this study.

#### 3.3.1 Questionnaire research methodology:

Consideration was given to the results that the instrument was intended to generate *vis-a-vis* the research objectives. Methods of data analyses were also considered as key factor during the instrument's design.

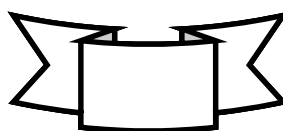
##### **Planning for questionnaire design:**

A plan of activities was created to ensure that the available time was judiciously utilized. The plan was patterned after the recommendations of Holden and Lynch (2004) on asking fundamental questions prior to commencement of a study.

The questionnaire was therefore designed with the following questions in view:

- What is this research going to address?
- How are the data going to be used?
- Who would be involved as participants?
- What is the educational exposure of the participants?
- Where are the participants located?
- What are the facilities available for survey administration and data analyses?
- How much would it cost to construct and administer the survey?

Cognizance was also taken on how responses could be increased through good instrument's design; thus, a meta-list (a list of all items to be covered in the survey) was made.



**Design of the questionnaire:**

The main objectives of the research were to determine the most important causes and effects of construction project delays as perceived by key Project Stakeholders in the Niger Delta region and to proffer solutions to project delays using the research results.

Perception is the way a person or group of persons view a phenomenon. According to Starbuck and Mezias (1996) perceptions are influenced by biases, inclinations and experiences of respondents in a study.

Perceptions could be balanced or unbalanced depending on who evaluates it. For instance, people with more years of experience in a field of specialisation see things more accurately and differently than those with little or no experience.

For credibility of a qualitative study, a researcher is required to collect responses from people with diverse experiences (Starbuck and Mezias, 1996). This forms the basis for designing the questionnaire to capture perceptions from eleven categories of developmental project practitioners in the Niger Delta region.

Dess and Robinson (1984) in Starbuck and Mezias (1996) comment that, people rarely disclose private data to the Public. Thus, research questions must seek facts rather than private or confidential information. The questions must be clear and precise. Therefore, not asking sensitive and ambiguous questions leads to unbiased responses. Furthermore, a researcher must sufficiently survey relevant literature in order to produce comprehensible questionnaire (Starbuck and Mezias, 1996).

Analyses of data in a perception study must focus on consensus and variations in the respondents' views (Starbuck and Mezias, 1996).

The demographic page was designed to capture various categories of participants as well as types of projects executed by them and locations of such projects in the region. Trochim (2006), states that appropriate design of the demographic information page is a key requisite to having a correct framework for data analysis especially during categorisation.

Thirty-eight causes of delays were grouped into eight categories –Clients’ related issues, Contractors’ related issues, labour and equipment related issues, materials related issues, Consultants’ related issues, community related issues, contractual relationship related issues and external causes. These are discussed in section 2.6.5

Eight effects of delays: time overrun, budget overrun, bad Public relations, poor quality completed project, litigation, total abandonment, disputes and claims and arbitrations were also identified for investigations.

Informal discussion between the Researcher and Professor Scott of the Faculty of Commerce, University of the Witwatersrand, prior to the design of the questionnaire raised the question on whether there were neither benefits nor beneficiaries of project delays. This led to inclusion of the sections to investigate perceptions of participants on “whether there were positive impacts of project delays” and “who benefits from delays”.

**Interpretation of the symbols used in the questionnaire:**

Some shapes used in the design of the questionnaires are interpreted in table 3.2

Table 3.2: Interpretation of symbols used in the questionnaire

| Symbol                                                                              | Interpretation                                                                                                                                             |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | Used when only one answer is required from a set of options.                                                                                               |
|  | Used when more than one answer are possible from a set of options                                                                                          |
|  | This is used when comments or unspecified items may be required from respondents. The size should be large to provide adequate space for writing comments. |

**Response rates:**

Researches have shown that response rates are affected by the factors listed below:

**Attractiveness of questionnaire:** “Response rates could increase due to attractiveness of a survey instrument because it could stand out among other questionnaires received by the respondents” (Burgess, 2001).

An attractive questionnaire is costlier in design and printing, but when value of the desired data was compared to cost of not having sufficient data, it was imperative to spend more money. Secondly, sampling errors could reduce with increase in response rates (Walonick, 1997 and Trochim, 2006).

**Length of the questionnaire:** Trochim (2006), remarks that respondents are to some extent doing a favour to a researcher because they are required to engage their time to provide information and ideas that will be used by the Researcher. People are generally very busy; therefore in designing a questionnaire, a researcher must ensure that questionnaire completion will not require unnecessarily long time. This could be achieved when factors to be investigated are adequately researched; and presented in a clear and precise manner. However, when the study objectives are of interest to the respondents, they could spend more time than usual to provide required answers. The participants in this survey were project professionals who desired solutions to project delays.

**Title of the questionnaire:** The questionnaire was given a title “A Survey on Solutions to Project Delays in the Niger Delta Region, Nigeria” boldly written on the cover page. Participants could get interested in a survey because of the title. Walonick (1997), remarks that a survey is regarded as more credible when it has a title than the one without a title.

**Situation under which questionnaire is administered:** Response rates could also be affected by the situations during which the questionnaire was administered. The hard copy questionnaires were served at a time where cases of projects abandonment and delays in completion were frequent. This could have

contributed to the fair response rate. Response rate in the online survey was extremely poor (only three responses were received). Coincidentally, during the online survey, some aggrieved stakeholders in the Niger Delta region protested against poor governance in a major public service developmental partner in the Niger Delta region by its executives. Consequently, there was a presidential panel of inquiry set up to investigate activities of the organisation. This could have been responsible for the poor response rate in the online survey. Detailed discussion on the online survey methodology is covered in section 3.11.

**Nature of questions asked:** Respondents feel unsafe when they are asked sensitive questions such as those that could delve into their personal or corporate privacy. This was avoided for ethical reasons and to forestall poor response rates. Wordings of items in the questions were clear, easy to understand and precise in line with the recommendations of Walonick (1997) and Trochim (2006).

**Graphic design of the questionnaire:** The choice of different styles and formats in graphic design with respect to each section was to hold the respondents' interest through the entire duration of completing the survey, thereby contributing to increase in response rates (Burgess, 2001 and Walonick, 1997). All pages of the questionnaires were colourfully designed with Microsoft Word.

**Arrangement of questions/ Use of words:** Walonick (1997) observes that, respond rates of long questionnaires could be increased by ingenuity. Therefore, questions were arranged in a logical sequence as shown in figure 3.2. They were also arranged based on their relative importance to the research objectives. Questions on similar factors were grouped together to show orderliness and to further sustain interest in respondents during answering. The questions were politely worded.

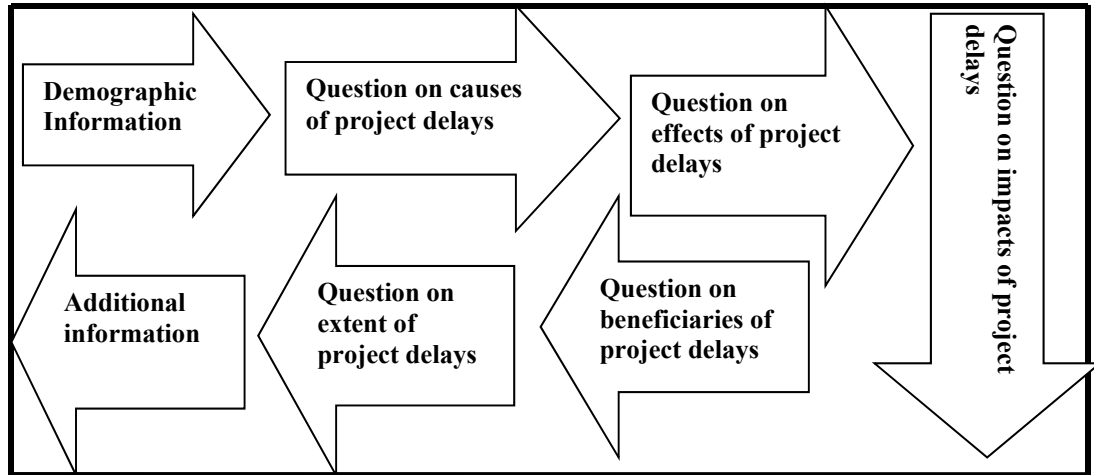


Figure 3.2 Schematic representation of questions sequence

Trochim (2006), states that where there are several categories of respondents, it is easier to generate facts and analyse data from survey with multiple choice questions than those with open-ended questions. Therefore, multiple choice questions approach was generally adopted in the design of the questionnaire to accommodate all possible responses and to enhance speedy completion. Burgess (2001), comments that, structured questionnaires restrict respondents to express ideas that could not have been requested for during its design. Thus, spaces were provided for comments alongside each question. Walonick (1997) suggests that items in structured questionnaires must be exhaustive; else the instrument may not generate sufficient data that could address the research objectives. Therefore, in this study relevant literature was surveyed to obtain sufficient facts that would be relevant to the study.

**Incentives:** Findings have shown that a promise of some reward system for completing questionnaires enhanced response rates (Peterson, 2000). To motivate participants and to increase response rate, a promise was made to deliver a free summary report of the research to the respondents by e-mail as recommended by Walonick (1997). Therefore, a space for participant's e-mail address was provided. At the end of the survey, fifty-five Participants (63% of the Respondents) gave their email addresses as indication of their interest for a summary copy of the research.

#### 3.4 Layout of the questionnaire:

The questionnaire was a twelve page document with ten sections; refer to appendix C for the structure of the questionnaire.

#### 3.5 Scaling:

Scaling is a method used to attach quantitative values to abstract items such as perception of a respondent. Stevens (1959) in Trochim (2006) defined scaling as “the assignment of objects to numbers according to a rule”.

Scaling enhances quantitative measurements and analysis of qualitative factors. Starbuck and Mezias (1996), state that adoption of scales makes ideas more specific. However, scales limit responses to questions under investigations and restrict generation of detailed facts. Provision of additional clarification on questions could enhance collection of credible responses in a scaled questionnaire (Starbuck and Mezias, 1996). Therefore, spaces were provided on the questionnaire for clarifications of options chosen by the participants.

However, provision of spaces increases time required to complete a questionnaire, hence could introduce random errors in responses because respondents might tend to rush in supplying answers. This is especially experienced in lengthy surveys. This was forestalled by asking clear and precise questions and ensuring that irrelevant items were not captured in the questionnaire.

Trochim (2006) remarked that, scales could be unidirectional or multidirectional. A Likert scale is a unidirectional scale.

A five Likert scale rating was adopted in the design of the questionnaire to investigate causes of delays, effects of delays and the degree of delays among project sectors. These were adopted so that significant factors could be quantitatively analysed.

The scales were interpreted as follows:

1=very unlikely

2=unlikely

3=likely

4=almost certain

5=certain

A Likert scale rating could be useful in the calculation of correlations and variances. For instance, Vafaiee, *et al* (2010), Sambasivan and Soon (2007), Aibinu and Jagboro (2002), Odeyinka and Yusuf (1997) used Likert scale to design questionnaire in order to investigate participants' perception of significant causes and effects of construction project delay.

Opinion boxes and open ended questions were adopted, where Likert scale of occurrence was considered inappropriate such as in questions three and four.

### 3.6 Ethical issues:

#### 3.6.1 Wits' research ethics policy:

The University of the Witwatersrand (Wits) has a clear policy on all research conducted by members of its community. The research are classified as human (non-medical), human (medical) and non-human subjects. Each category has a committee which receives applications from investigators and reviews their submissions prior to issuance of ethics' clearance certificate.

The policy stipulates that a clearance be sought prior to conducting any research in the above named categories. This is to ensure that relevant ethical issues are adequately considered in the research methodology adopted. This policy is in line with conventional research ethics observed worldwide as described by Saunders, *et al* (2007).

This research has humans as subjects; therefore all research ethics' protocols of University of the Witwatersrand, Johannesburg were observed. The University's research policy stipulates that all human survey research must be reviewed and approved by the relevant research committee before its commencement.

In this study, application for ethics' clearance was submitted to the University's Research Committee on human (non-medical) for its consideration and approval of the research instrument and methodology.

The ethics' application forms were filled and submitted with the required back-up documents such as sample copy of the questionnaire, copy of informed consent sheet seeking Participants consent to participate in the research, copy of Participants' information sheet which formally invited the Participants to participate in the survey and a brief introduction of the study (the introduction contained background information on the study, objectives of the research, the names of the investigator and supervisor, a guarantee of anonymity and confidentiality). Contact details of the supervisor were also provided on the Participants' information sheet (Refer to appendix E for a scanned copy of WITS' approved research ethics' letter).

#### 3.6.2 Other ethical issues:

The research was also carried out in consideration of other universally accepted ethical issues such as plagiarism, claiming credit for other people's work, concealing errors and objections, using framed up data as realistic data.

#### 3.7 Population:

The research involves a large population of project management practitioners in the Niger Delta region. There is no census' record on the Project Management Practitioners in the Niger Delta region (Nigerian Population Commission, 2007).

Three broad categories of participants were involved in the study. These were Public sector participants, Multinational Companies' participants and Private Companies' participants.

Participants were consultants, clients and contractors from the above business organizations. They practised one of the three different project management organizational structures (Functional, Matrix and Projectised) and were field/project staff or management staff of their organisations.

Participants understand and communicate in the English language and hold at least a first degree in a relevant engineering, project management and/ or related disciplines.

#### 3.7.1 Public service participants:

Public service participants are project practitioners who work in the government's ministries, departments and agencies. They are the clients of their respective projects because they initiate, finance and administer the projects. They are also called project owners.

#### 3.7.2 Multinational Companies' participants:

Multinational Companies' participants are project staff in the multinational oil and gas Companies and construction firms. This category of participants had clients, consultants and contractors among them depending on their nature of involvement in project execution.

#### 3.7.3 Private Companies' participants:

Private Companies' participants are project management practitioners in the construction industry. They are mostly contractors and consultants because of the nature of their involvement in project execution.

### 3.8 Sampling:

It is impossible to access every member of a population being studied. Thus, a researcher is required to select an appropriate and adequate number of participants from a research study's population. This process is called sampling (Trochim, 2006). Sampling enables a researcher to make generalisations to cover the whole population of his study. Thus, sample selection must be appropriate in size and characteristics. This contributes to credibility of a research (Walonick, 1997).

#### 3.8.1 Preparation before sampling:

Prior to the selection, a pre-survey evaluation of the nature and characteristics of the population was undertaken using relevant literature and through the experience of the researcher in project administration in the Niger Delta region.

### 3.8.2 Sampling method:

The demographic information in this study required eleven subgroups (Public service, Multinational companies, Private companies, Clients/Sponsors, consultants, contractors, Projectised organisations, Functional organisations, Matrix organisations, Management staff and Field/Project staff) in the population of project practitioners within the Niger Delta region. The spread of the sample among all subgroups was the most relevant factor considered during selection of participants.

The sample was selected conveniently and judgementally to capture the required subgroups in the population. A chance of each subgroup being selected was possible if a convenience selection approach was combined with judgemental selection method.

Convenience sampling is a method of selecting research participants based on the convenience of the investigator. It is cheap but could lead to random errors if the researcher is not cautious.

To forestall random errors in convenience sampling approach, the researcher's judgement and experience in the Niger Delta region was applied during sampling. This later approach is known as judgemental or purposeful method of sampling.

Marshall (1996) recommends that sampling could be done through the researcher's judgement if he has sufficient experience in the subject being investigated. Thus, the researcher's ten years of practical work experience in projects execution in the Niger Delta region was an added advantage in the selection of participants but, this privilege was not abused. However, these methods of sampling are limited in that their responses could not be generalised for the research population.

Walonick (1997) and Marshall (1996) observe that proper selection of a sample could assist in the calculation of confidence intervals.

### 3.8.3 Choice of location for sampling:

Port Harcourt city in Nigeria is situated in the Niger Delta region. It hosts regional offices of most developmental organisations. It is the most industrialised city in the Niger Delta region, thus most construction and consulting companies locate their administrative offices in this city but their operations reach the nine States of the Niger Delta region.

According to Project Management Institute (2006), Port Harcourt and Lagos are currently, the only two cities in Nigeria where Project Management Institute (PMI) locates its branch offices. Sampling from Port Harcourt was therefore considered representative of the entire population of Project management practitioners in the Niger Delta region.

### 3.8.4 Sample size determination:

This research involves participants whose population size is large. Marshall (1996) and Leedy & Ormrod (2005) comment that, determination of sample size is irrelevant for qualitative studies involving large populations instead; determination of sample size is only relevant for relatively small and known group of people such as members of association. Secondly, the aim of qualitative research is mostly to gain improved explanations on complex human issues rather than to generalise results (Trochim, 2006).

Marshall (1996), states that, an appropriate sample size for a qualitative research is the one that sufficiently answers research questions. Thus, one hundred and eighty-eight (188) questionnaires administered to participants with a response rate of 44% were considered adequate to address the research objectives. More so, the judgemental sampling approach enabled all categories of respondents to be surveyed.

Quantitatively, sample size could be determined using the Cochran's (1977) formulas for sample size calculation (Bartlett, *et al*, 2001): Assumed alpha level is 0.05. Margin of error is 3% (Agresti & Finlay, 2008); "t" is the value for the selected alpha level in each tail which is equal to 1.96. Also, assume a five-point scaled data.

$$n_o = [(t)^2 \times (s)^2] / (d)^2 \dots\dots\dots 3.1(a)$$

Where;  $n_o$  = required returned sample size according to Cochran's formula

$t$  = critical value for selected alpha level of 0.025 in each tail = 1.96

$s$  = estimate of standard deviation in the population = 1.25

(Estimate of variance deviation for 5 point scale calculated by using 5 [inclusive range of scale] divided by 4 [number of standard deviations that included almost all (approximately 98%) of the possible values in the range]).

$d$  = acceptable margin of error for mean being estimated = 0.15 [number of points on the primary scale (5) multiplied by the acceptable margin of error (0.03)]

(Acceptable margin of error is the error that the researcher is willing to except)

$n$  = required returned sample size because sample size is greater than 5% of population

$P$  = Population

(The alpha level of 0.05 is an indication of the level of risk that the researcher is willing to take that the true margin of error may exceed the acceptable margin of error in the study)

(Number of points on primary scale x acceptable margin of error; points on primary scale = 5; acceptable margin of error = 0.3 [error that the researcher is willing to except]).

Recall from equation 3.1 (a),

$$n_o = [(t)^2 \times (s)^2] / (d)^2 = [(1.96)^2 (1.25)^2] / (0.15)^2 = 267$$

Therefore for a population of 1250, the required sample size is 267. This exceeds 5% of the population ( $0.05 \times 1250 = 63$ ), Cochran's (1977) correction formula should be used to calculate the final sample size (Bartlett, *et al*, 2001). This is shown in equation 3.1 (b)

$$n = n_0 / [1 + (n_0 / P)] \dots\dots\dots 3.1(b)$$

[All items are as already defined & P= population]

$$n_0 = 267, P = 1250,$$

$n = 267 / [1 + (267/1250)] = 220$  which is the required minimum returned sample size.

However, it is difficult and practically impossible to record a response rate of 100% in a survey. Secondly, budget, time and other constraints could make it practically impossible to achieve the required response in a survey (Burgess, 2001).

In this research study, returned questionnaires used in the analysis were eighty-three (83). This is about 38% of the required sample size ( $83/220 = 37.7\%$ ). However, the responses in this study spread across all categories of the participants required in the demographic information as discussed in subsection 3.3. This shortfall in the required sample size implies that, conclusions in this study may be considered as perception of the respondents only. Detailed discussion on factors affecting response rate have already been covered in subsection 3.4. One major hindrance against this study is the current youth unrest and militancy in the Niger Delta region, thereby limiting the researcher's reach of potential participants.

### 3.9 Sources of data collection:

There were two sources of data for the research: primary sources and secondary sources.

#### 3.9.1 Primary sources:

According to Cooper and Schindler (2003) in Onomehebhoh (2006), primary sources of research data comprise: the original research works and the raw data without interpretations such as survey data, memos, interviews, audios, videos, laws, court decisions, government data and regulations.

In this research, primary sources of data collection were questionnaires, face-to-face conversations and telephonic discussions.

### 3.9.2 Secondary sources:

This involves sources of information that could generate data which could be interpreted to solve research questions (Onomehebor, 2006). They include text books, Encyclopaedias, Journals, Theses and Dissertations, News Paper articles, magazines and news casts.

Secondary sources of data for the research were collected from University of the Witwatersrand's Library and through the internet.

### 3.10 Pilot testing of the survey instrument:

The questionnaire was pilot tested to ascertain its reliability and validity. A Pilot study also investigated whether the questionnaire could generate desired data.

Pilot testing involves administering a sample of questionnaires to a small sample of relevant participants. This administration is usually accompanied by feedback sheets so that the pilot survey respondents could make comments as requested by the researcher. The feedbacks are then used to prepare a revised questionnaire prior to data collection.

In this study, a pilot survey was conducted from 2<sup>nd</sup> March, 2011 to 19<sup>th</sup> March, 2011- a month before the administration of the research questionnaire. The one month duration between pilot survey and the final questionnaire's administration was to allow the researcher sufficient time to revise the questionnaire prior to data collection.

#### 3.10.1 Participants for the pilot test:

The survey was carried out in the University of the Witwatersrand. Pilot study participants were postgraduate students and lecturers from the Engineering and the Built Environment, Statistics and Humanities.

The "Engineering" respondents contributed mostly on project management issues, the "Statistics" respondents considered the suitability of the questionnaires to

generate desired data that could be easily analysed to achieve the research objectives. The “Humanities” respondents contributed on the design and construction of the questionnaire according to conventional stipulations. Some participants were Niger Delta and Nigerian postgraduate’s students who studied at the University of the Witwatersrand. This addressed the issue of administering the pilot study at the Niger Delta region where the study focuses. More so travelling to carry out this could have increased cost of the research due to logistics expenditures. Participants were conveniently selected according to the judgement of the researcher.

The weakness in carrying out a pilot study in Wits, Johannesburg, is that the most participants might have understood the challenges of project execution in the Niger Delta region, Nigeria. Thus, errors could have been introduced in the results. However, since project delays are global phenomena and the questionnaire was easy to understand, these participants could have still provided objective and reliable responses.

In the pilot survey, questionnaires and feedback sheets were administered personally to reduce random errors. Trochim (2006), states that, random errors usually result from mistakes during survey administration especially where samples selection is not balanced with the overall characteristics of the population. For instance, serving the questionnaire only to the Engineering students/lecturers could have deprived the researcher from accessing useful inputs from the Statisticians who would eventually be consulted during data analysis. However, other errors could have been introduced by some respondents who hastily commented on the questionnaires in order to attend to other academic engagements.

### 3.10.3 Comments adopted from the pilot study:

The following inputs were adopted from the pilot study to prepare a revised questionnaire:

***Reduction of scope:***

NGOs' and beneficiaries' were removed from the demographic page and a section on project quality was removed because of its less relevant to the research objectives.

***Improvement of chances of occurrence:***

“2-uncertain” was replaced with “2-unlikely”.

“1-unlikely” was replaced with “1-very unlikely”.

***Word choice:***

“Wrong” and “poor” were replaced with “inappropriate” and “inadequate” respectively to forestall bias in responses.

***Pagination of the questionnaire:***

Each page on the questionnaire was given page numbers to enhance tracking in the event of detachment.

**3.10.4 Response rate for pilot survey:**

Thirty-five questionnaires were administered during pilot testing. Thirteen were returned, giving a response rate of 37%. Figure 3.3 represents the response rate from the pilot study. This falls within acceptable range of response rate for a qualitative research.

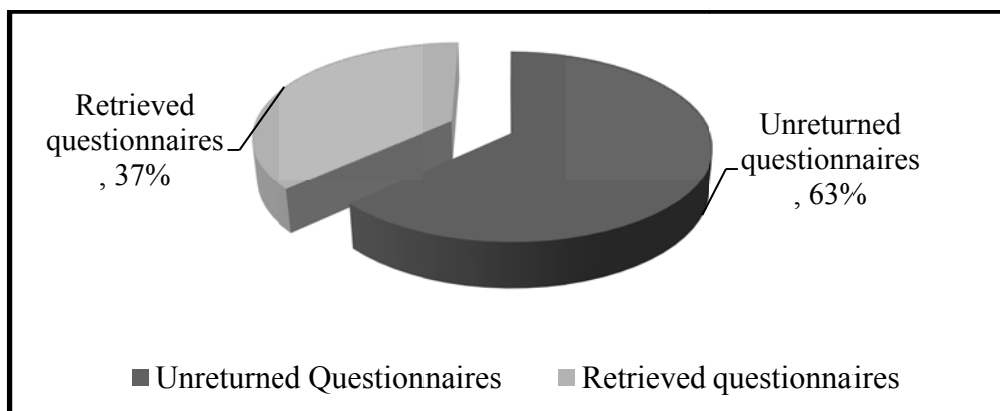
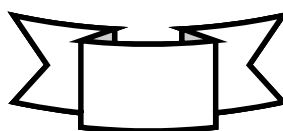


Figure 3.3 Response rate for pilot study



All respondents agreed that the questionnaire was easy to understand and could generate desired data. Detailed comments made by respondents in the pilot study are tabulated in Appendix B.

### 3.11 Questionnaire administration:

Useful comments from the pilot study's participants were adopted to produce a final copy of the questionnaire for this research study. The researcher used his judgement to choose inputs from the participants as regards to the research objectives.

Sub-section 3.12.1 explains the approach undertaken to collect data using the revised questionnaire.

#### 3.11.1 Preparations prior to administration:

This step was crucial in the research activity. Adequate preparations were therefore made to ensure that reliable and credible data were obtained. A list of potential participants and their addresses was generated. Some participants were notified prior to the commencement of the questionnaire administration.

#### **Pre-survey notifications and request for approvals:**

Notifications were made through phone calls and e-mails.

Request for an approval to administer the questionnaire to practitioners in the petroleum industry under the auspices of Oil Mineral Trade Section (OPTS) was made to the Department of Petroleum Resources (DPR). DPR regulates the activities of the stakeholders in the Nigerian Petroleum industry while OPTS is a trade union for the multinational oil and gas companies in the Niger Delta region. These companies sponsor infrastructural development projects as part of their community social responsibility programme in the region.

The DPR granted approval for administration of the questionnaire among members of the OPTS. A scanned copy of the approval is included in appendix D. The DPR's approval reduced scepticism and further enhanced responsiveness of respondents from the oil and gas multinational companies.

**Funding of the survey:**

Hard copy survey administration is more expensive than online survey system. However, hard copy survey results are more reliable when its administration is face-to-face. It could also enable participants who do not have access to the internet to participate. Online survey is cheap and could reach larger participants but its data are subject to non-random errors. The researcher therefore ensured that required funds were available prior to survey administration.

**3.11.2 Mode of administration:**

The questionnaires were served one-on-one to participants and through network of professional colleagues and friends in the construction industry.

Executive Committee of Project Management Institute in Port Harcourt, Nigeria granted permission for the survey administration during one of their general meetings in view of the relevance of the research objectives to the institute's focus.

**3.11.3 Post administration follow-up:**

The participants were followed up through phone calls, e-mails and face-to-face reminders. Though this is costly and time consuming, it could contribute to good response rate. Follow-up was also done through network of friends and colleagues in the construction industry.

**3.12 Online survey:**

Online survey is the utilisation of internet to administer survey in order to obtain data. It is advantageous because it is dynamic, has strong reach and penetration, generate fast responses, it is cost-efficient, minimises interviewers' errors, minimise interviewer's bias, control anonymity and has flexible mode of responses (Sheehan, 2002).

However, online survey has certain limitations: Inability to reach a critical mass of required participants, difficulty to access e-mail addresses of required participants and possibility of multiple responses (Sheehan, 2002).

The researcher used the services of a web page designer to produce an online version of the questionnaire using the contents and format of the hard copy version. The company was also paid to host the instrument. The online survey is available at <http://www.rsrit.co.za/surveyprojectdelays> .

Online questionnaire was administered to some project practitioners in the Niger Delta region for one month beginning from 4<sup>th</sup> July, 2011- three months after the hard copy administration was conducted.

Invitation to participate in the online survey was made via e-mails. E-mails were sent to individual addresses. E-mails were also sent to the Nigerian Society of Engineers (NSE) and Project Management Institute (PMI) in the Niger Delta region requesting them to disseminate to their members. The mails drew their attention to a hyperlink to the survey. Participants were requested to accept to participate before they commenced the survey. This is in line with the University's policy on research ethics as earlier discussed in sub-section 3.6.1. The e-mails also contained a brief introduction to the research's objectives and contacts of the researcher and the Supervisor.

#### 3.12.1 Response rate in the online survey:

Only three responses were received from fifty e-mails sent during the online survey.

The online survey was challenged by lack of access to most project practitioners' e-mail addresses. The researcher used e-mail addresses in his online data base. Sheehan (2002) states that, online surveys research methodology is challenged by a lack of national or global online directories of e-mail addresses. There are no e-mail addresses' directories of project practitioners in the Niger Delta region. The researcher used past relationship with ex-President of Project Management Institute(PMI), Port Harcourt Branch, Nigeria to solicit for members' e-mail addresses but this did not yield desired results.

Secondly, extremely poor online survey response rate was because, most public service participants did not have access to internet facilities.

Thirdly, the online survey lasted for only one month. Poor response rates could also have been as a result of short duration given for the participants to respond. Longer duration for online survey would imply increase in service charge by the Company.

Responses could have been increased if web adverts and listserv postings were made in other web sites prior to survey administration (Sheehan, 2002). However, the above could have increased the cost of carrying out the research.

### 3.13 Validity and reliability of the research instrument:

Validity and reliability are two important factors to consider in a research instrument (Leedy & Ormrod, 2005).

Trochim (2006), states that “validity is a measure of truthfulness of a measurement whereas reliability is the ability of a research instrument to be used to obtain a valid data in a similar research”.

#### 3.13.1 Validity:

There are different types of validity: Face validity, content validity and criterion-related validity (Mouton, 2001). In face validity, a researcher employs his judgement to scrutinize and modify questions to be answered to ascertain their suitability to the research objectives. In content validity, the researcher relies on experts’ judgement and literature searches to ascertain if an instrument provides adequate coverage of a study. Criterion-related validity involves the use of mathematical model to predict the dependent variable or groups of variables in a dependent/independent variable relationship (Leedy & Ormrod, 2005).

The validity of the research instrument was determined through face validity and content validity. Respondents in the pilot study confirmed that the instrument could provide adequate data to address the research objective (refer to sub-section 3.10.4). The researcher also carried out scrutiny and modification of the research instrument to arrive at a workable questionnaire.

### 3.13.2 Reliability:

Reliability indicates the extent to which an instrument could be used repeatedly in a similar research without errors in the results. It is a measure of the consistency of a research instrument (Creswell, 2002).

According to Marshall (1996), reliability of the interval is a function of how representative a sample is, as regards to the entire population and the various subgroups expected to be investigated.

In a qualitative study, a research instrument could be considered reliable if can be used repeatedly without giving variance results (Trochim, 2006).

For a quantitative data, reliability can be estimated statistically by calculating Cronbach's Alpha coefficient ( $\alpha$ ) for the factors investigated. Cronbach's Alpha coefficient ( $\alpha$ ) is a measure of internal consistencies or how closely related a set of items are, in a group of factors being investigated. It is determined for questions with two possible responses or multi-scaled questions such as those with Likert scales. Nunally (1978) gives the lowest acceptable reliability as 0.7. However, his earlier works gives lower values.

Nunally (1978) in Aiyetan (2010) gives an interpretation of the alpha ( $\alpha$ ) values as stated below:

- ❖ Alpha values less than 0.5 imply poor reliability.
- ❖ Alpha values between 0.5 and 0.7 indicate sufficient reliability.
- ❖ Alpha values above 0.7 imply good reliability.

In this study, Cronbach's Alpha coefficient was calculated for questions designed to be responded with Likert scale such as: causes of delays (question one); effects of delays (question two) and extent of delays (question four).

Results of reliability and validity analyses are presented in chapter four.

### 3.14 Method for data analysis:

“Generally, the ultimate goal of every research or scientific analysis is to find relations between variables. In philosophy of science, it is stated that there is no way of representing “meaning” except through relations between some quantities or qualities” (Marshall, 1996).

In a quantitative research data, analyses consist of data preparation, descriptive statistics and inferential statistics (Trochim, 2006). This is represented in figure 3.4. These analyses enable a researcher to find relationships between variables in the data so that conclusions could be drawn with respect to the research objectives.

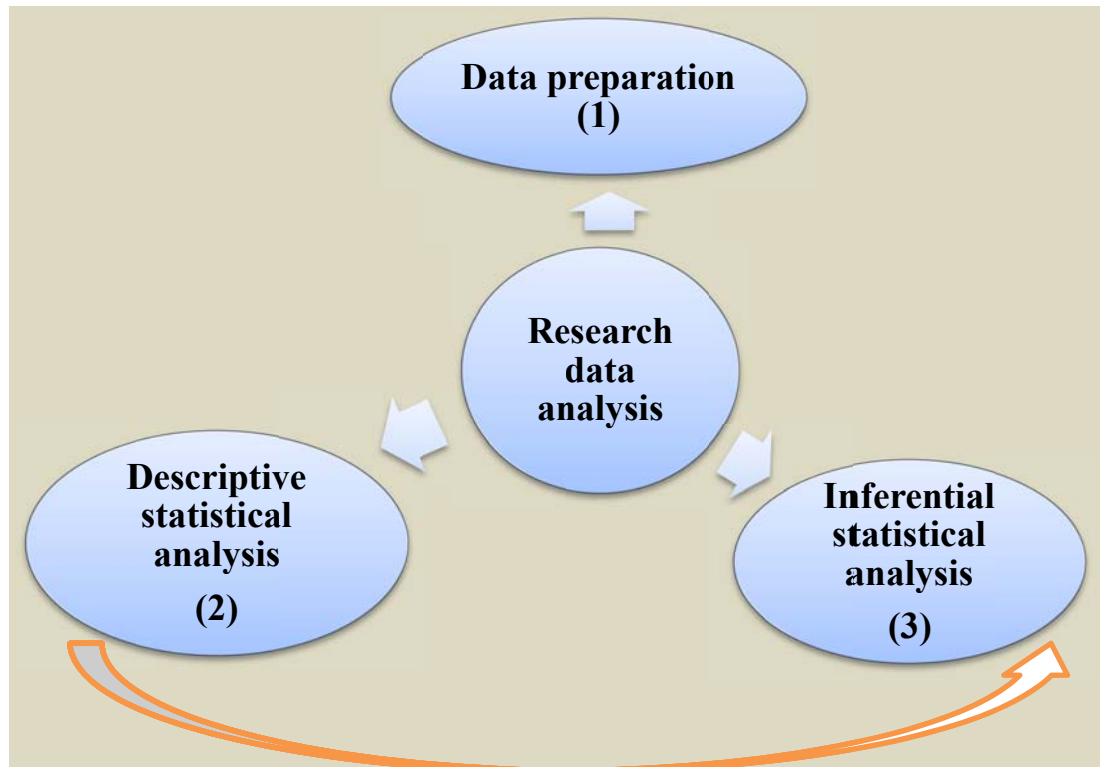
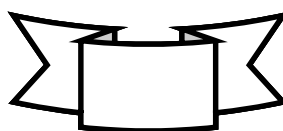


Figure 3.4: Classification of research data analysis

Variables are broadly classified as categorical and quantitative variables (Agresti & Finlay, 2008; Rowntree, 2000). Categorical variable may be ordinal (ordered) or nominal (unordered) whereas quantity variable may be discrete (counting) or continuous (measuring) data (Rowntree, 2000). Some examples of each class of the variables are represented in figure 3.5:



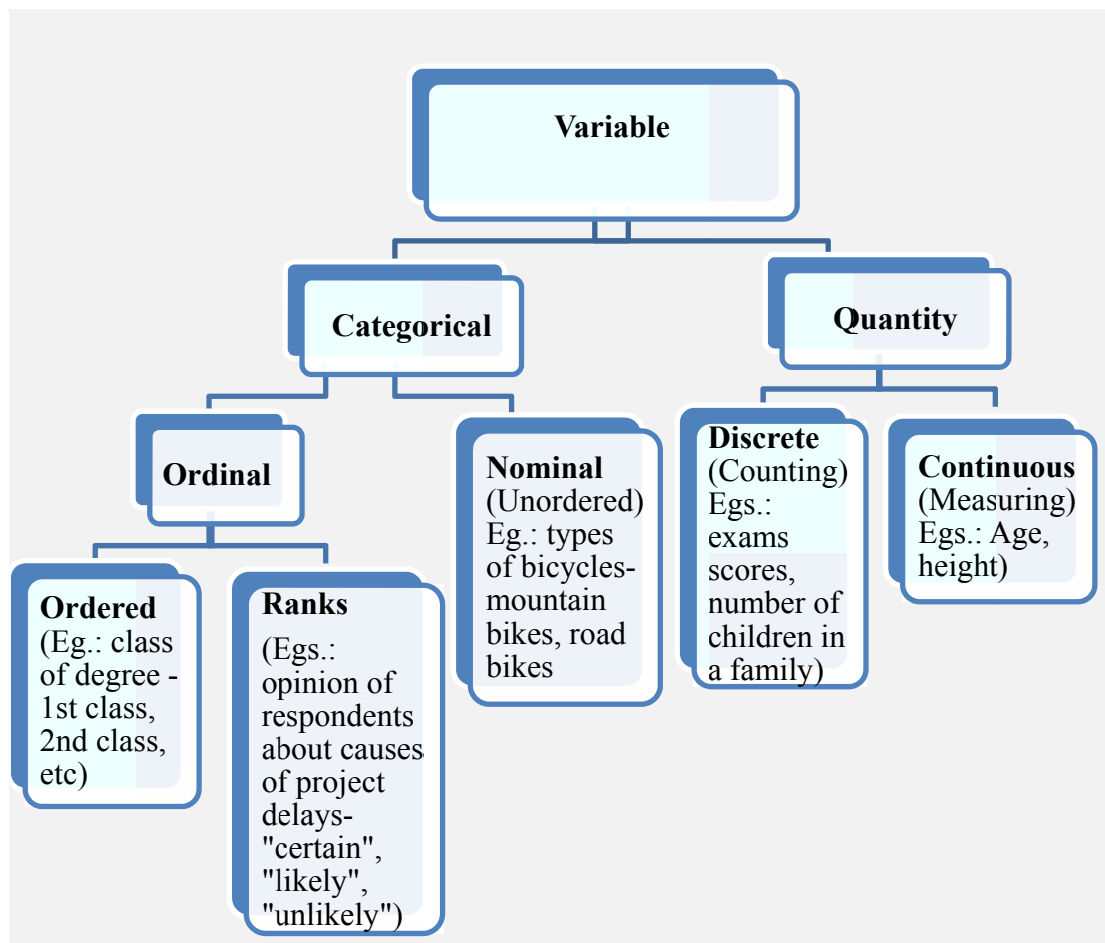


Figure 3.5: Classification of variables with examples

#### 3.14.1 Data Preparation:

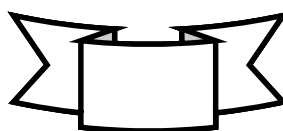
Data preparation consists of data collection, data mining, development of database structure, data entry, data tabulation and data categorisation.

##### **Data collection:**

Data was collected using hard copy structured questionnaires administered face-to-face and through network of friends/ professional colleagues in the construction industry in the Niger Delta region. Eighty-six (86) questionnaires were retrieved out of the one hundred and eighty-eight (188) served. This gave a response rate of 44% (This is represented in figure 4.1).

Completed questionnaires were retrieved by hand, postage and by e-mails.

Processes involved in data preparation as shown in figure 3.6.



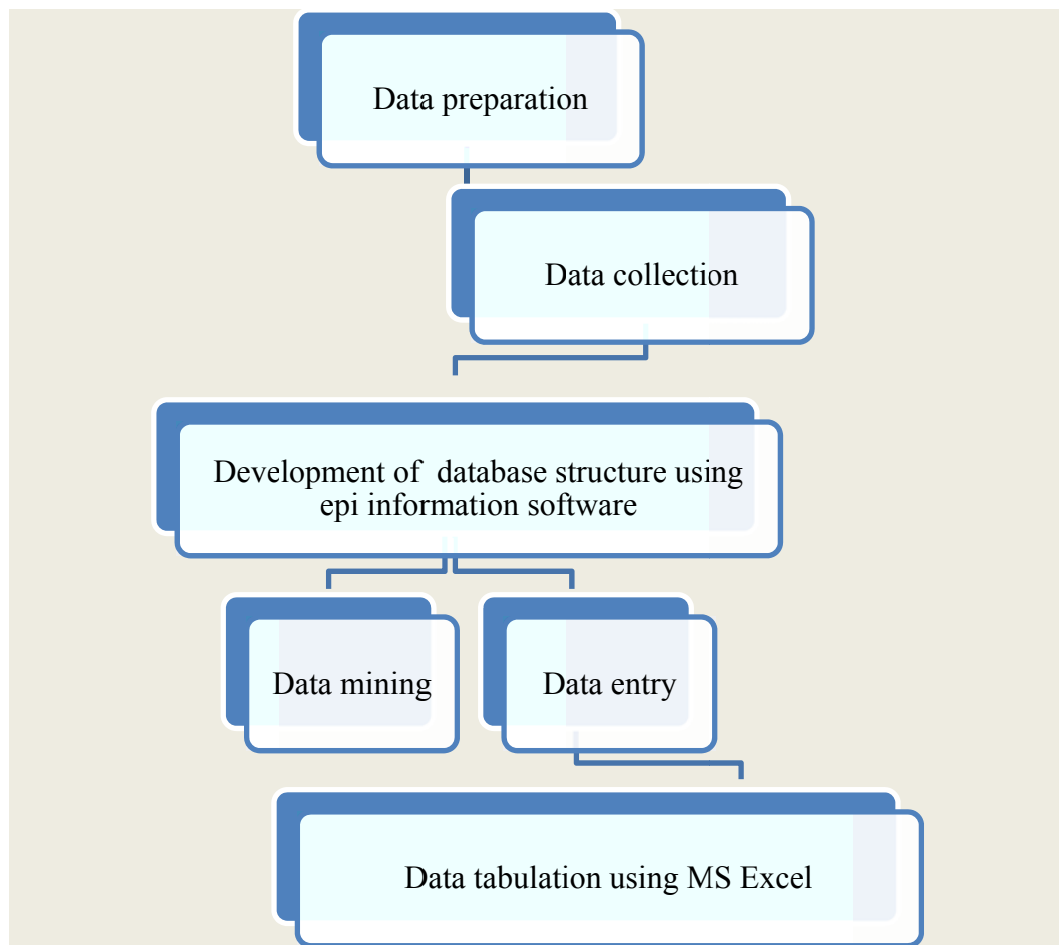


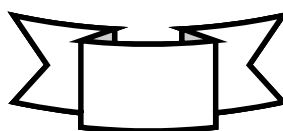
Figure 3.6: Process chart for data preparation

***Data mining:***

This involves checking each completed questionnaire to ascertain whether they were properly filled. Out of the eighty-six questionnaires (86) retrieved, three (3) were scantily filled, hence were discarded because information supplied were grossly inadequate for analysis. This left a total of eighty-three (83) questionnaires that were eligible for analyses.

***Development of database structure:***

“Epi” information database software was used to create the framework for logging data from the completed questionnaires. This software enables the user to manage data in Microsoft Access. Data in Microsoft Access can easily be



transported to Microsoft Excel or other statistical package such as SPSS for data analysis.

In this research, the questionnaire format was first created using “epi” software in order to enhance inputting of data from the responses. During this stage, codes were assigned to items covered in the questionnaire.

***Data entry:***

Responses from each questionnaire were logged into the database created with “epi”. These were automatically saved in Microsoft Access. The data were checked against each questionnaire to ensure accuracy of entry. Cross checking of the entries reduced tendencies for entry errors (Trochim, 2006).

**3.14.2 Descriptive statistical analyses:**

This section consists of what the data shows and involves its illustrative analyses (Trochim, 2006 and Onomehebbhor, 2006).

Descriptive statistics involves data distribution in frequency tables, graphs, and charts; Measurement of central tendencies such as mean or average, mode and range; and measurement of dispersion such as standard deviation and variance.

Microsoft Excel was used to import the data from Microsoft Access data base. Tabulation, categorisation and other relevant descriptive analyses were carried out using Microsoft Excel. The results are summarised in chapter four while details are presented in the appendices.

***Frequency tables:***

Conventional research protocol for analysis of categorical data requires that frequency table be first set up for easy articulation and further exploration of such data (Trochim, 2006).

In this study, frequency tables were constructed for all categories of respondents with respect to all factors being investigated. Frequency tables were also utilised

in the calculation of mean scores (MS) for causes of delays, effects of delays and extent of delays.

**Cross tabulation:**

Cross tabulation is a technique of combining two or more data tables together in order to explore the combined tables comparatively. This enables a researcher to identify relations between rows and columns in the tables. This method of exploratory data analysis is used when relatively small numbers of variables are involved (Trochim, 2006). This was adopted in the analysis of variance (ANOVA).

Data tabulation was carried- out with respect to the structure of demographic section of the questionnaire. This was to ensure that it aligns with the research objectives.

**Graphical representation of cross tabulations:** This involves representation of tables as column graphs, histograms, bar chart, pie charts and line graphs for analytic purposes. It enhances precise evaluation of variables and helps in integrating pictures of entire cross tables. It is useful in comparative analysis of variables between categories. Variables can be represented graphically in one, two or three dimensions.

**Mean scores:**

“Mean score is defined as a measure chosen such that sum of deviation from it, is zero (Montgomery and Runger, 2007). Mean score is determined by assigning numerical values to respondents’ scores in a Likert scale data (Aiyetan, 2010). For instance, the following numerical assignments were given to the scaled data collected: very high (5 points), high (4 points), moderate (3 points), low (2 points) and very low (1 point) based on the recommendations of Aiyetan (2010).

Mean score is calculated using the formula below (Pepe, *et al*, 1993; Aiyetan, 2010 and Vafaiee, *et al*, 2010):

$$MS_i = \sum (F \times S)/N \dots\dots\dots (3.2)$$

Where S= Score given to each problem by the respondents (1-5)

F = Frequency of responses to each score for each factor

N = Total number of responses in the respective groups for the respective problem

i = respective problem

Overall Mean score (OMS) was calculated for the overall respondents as follows:

$$OMS = \sum_{i=1}^5 MS_{ij} \times \{(N_i) / (N_1 + N_2 + N_3 + N_4 + \dots N_n)\} \dots\dots\dots(3.3)$$

Where i = Group 1, 2 ... 5

MS = Mean score

N<sub>i</sub> = Number of respondents in each group

J = j<sup>th</sup> item in a group

The mean scores were determined for the overall respondents and for each category of respondents as structured in the demographic page.

A Likert scale was adapted to measure respondents' perception on causes of delays, effects of delays and extent of delays in the Niger Delta region.

Mean score for each factor was calculated using the frequencies of the respondents for each point on the scale as discussed in section 3. This enabled the interpretation of frequencies relative to each scale.

From the above analyses and interpretation, a cut-off point could be fixed in order to determine most important “causes”, “effects” and “extent” of project delays from calculation of the respondents' mean scores.

**Analysis of Likert scale data:**

Summated scores from responses in the survey were analysed using inferential statistics in order to reflect the actual support for the research focus.

The five point Likert scale data could be reduced to three- positive, neutral and negative. Generally, respondents are either certain, uncertain or neutral about their perceptions. This is illustrated in figure 3.7 (Aiyetan, 2010).

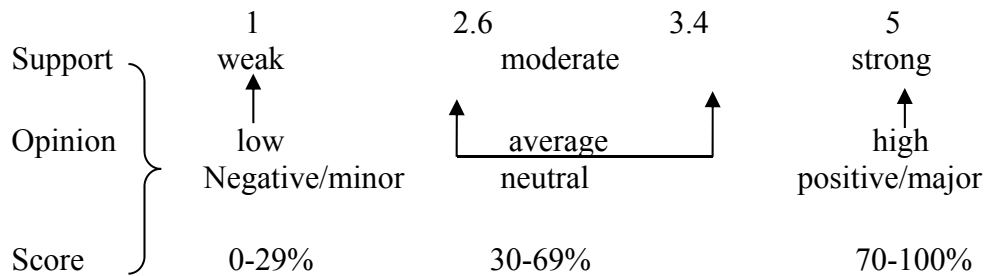


Figure 3.7: Scoring of responses on Likert scale (source: Aiyetan, 2010)

#### Cut-off point for significant factors:

From the interpretation of responses on Likert scale data in figure 3.7, a mean score of 3.5 was chosen as cut-off point for significant (most important) factors. It is equivalent to 70% which implies strong support/high opinion as shown in figure 3.7 above. Factors on causes and effects of delays with mean score greater than or equal to 3.5 would be used to frame sub-hypotheses from the main hypothesis. This is because the main hypothesis is focussed on causes and effects of delays (see sub-section 1.5.1).

#### 3.14.3 Inferential statistical analyses:

In inferential statistical analysis, conclusions, judgements, estimations and predictions are made from research data using statistical tools (Agresti & Finlay, 2008). These conclusions extend beyond the immediate data to the entire population of the study (Trochim, 2006).

Some inferential statistics adopted in this study are factor analysis, analysis of variance (ANOVA) and t-test.

**Factor analysis:**

Factor analysis was used to uncover the latent structure (dimensions) of a set of variables. It reduces a larger number of variables to a smaller number of factors and shows whether they are true reflection of the population where the sample was drawn from (Costello and Osborne, 2005). “Total variance accounted for after rotation is given for an orthogonal rotation. It is computed using sum of squares loadings; which cannot be added when factors are correlated” (Costello and Osborne, 2005).

A series of factor analyses were therefore performed to reduce number of variables in each category of causes, effects and extent of project delays.

**Significant sample size for factor loading:** Table 3.3 shows sample sizes considered significant for different results of factor loadings (Hair, *et al*, 2004 in Aiyetan, 2010)

Table 3.3: Significant factor loadings based on sample size (Hair, *et al.*, 2006 in Aiyetan, 2010)

| Factor loadings | Sample size required for significance | Factor loadings | Sample size required for significance |
|-----------------|---------------------------------------|-----------------|---------------------------------------|
| 0.30            | 350                                   | 0.55            | 100                                   |
| 0.35            | 250                                   | 0.60            | 85                                    |
| 0.40            | 200                                   | 0.65            | 70                                    |
| 0.45            | 150                                   | 0.70            | 60                                    |
| 0.50            | 120                                   | 0.75            | 50                                    |

(Source: Hair, *et al*, 2006 in Aiyetan, 2010)

All analyses were carried out with SPSS (Statistical Package for Social Sciences) version 13.

**ANOVA (Analysis of Variance)**

Analysis of Variance (ANOVA) is a statistical technique of testing whether, on average; the results of a continuous variable differ across levels of a categorical

variable with more than two levels (Kutner, *et al*, 2004). The Null hypothesis is: there is no difference between the means of the continuous variable across the different levels of the categorical variable, and the alternative hypothesis is, the means differ for at least two levels.

In this study, causes of delays were compared across the three levels of the type of business organization. The null hypothesis is that public service, multinational and private sectors rate causes of delays the same way. The alternative hypothesis is that they rate them differently. The test was carried out at 5% significant level. A p-value less than 0.05 implies that, the null hypothesis be rejected and vice versa (Aiyetan, 2010 and Onomehebor, 2006).

This approach was repeated for all categories of respondents as required in the demographic information and in question two (effects of delays) and question four (extent of delays). Results of ANOVA were used to make comparisons across the different categories of the respondents as reported in chapter four.

#### **The t-test statistics:**

The t-test is a parametric statistical analysis tool used to test for the significance of a quantitative data (Agresti & Finlay, 2008). It is generally used for normally distributed data. However, t-test could be adopted for data which are not normally distributed but under certain conditions. Normality depends on a sample size. Gryna , *et al* (2007), states that, a sample distribution tends to normality for a test involving sample size, greater than or equal to thirty (30).

The t-test is usually adopted for continuous data; however, categorical data with ordinal characteristics could be tested with the t-test. Ordinal categorical data consists of ranks data (refer to figure 3.5). Ranks data are qualitative data but could be transformed into quantitative data using scales such as a Likert scale. For instance, opinions of respondents in this research study were transformed into a quantitative data using a Likert scale (refer to sub-section 3.4 on scaling). Therefore, a sample size of eighty-three (83) and the adoption of a Likert scaled approach of data collection, justified the use of a t-test to investigate statistical significance of the research hypotheses' means.

One sample t-test was used to test whether the “mean” of causes of delays and effects of delays differ significantly from a mean value of 3. The alternative hypothesis of the “mean” greater than 3 was compared against the null hypothesis of the “mean” equal to 3. “The t-test was used to test for the presence of significant difference between variables, and comparisons were made regarding the relationships between variables” (Agresti & Finlay, 2008). The test was carried out at a 5% significance level. This significance level is the conventionally acceptable margin for researches involving social sciences such as questionnaire survey (Trochim, 2006).

**Hypothesis testing:** Thirty-eight causes of projects delays grouped under eight categories and eight effects of projects delays were identified from a preliminary surveys of relevant literatures. Significant factors were determined using a mean score of 3.5 as a cut-off point as already discussed above (see figure 3.7). Factors determined from this process were used to frame the sub-hypotheses under the main hypothesis. These were tested using the t-test statistics:

**Main hypothesis:** There is no cause/effect of project delays that is the most important.

The fourteen under listed sub-hypotheses were framed as a result of applying a cut-off point of 3.5 on the mean scores determined from the overall respondents’ scores on causes and effects of project delays (details are discussed in sections 4.3, 4.4 and 4.6):

**Sub-hypothesis 1:** Youth unrest, militancy and communal crises are not the most important cause of project delays in the Niger Delta region.

**Sub-hypothesis 2:** Inadequate planning by the contractors is not the most important cause of project delays in the Niger Delta region.

**Sub-hypothesis 3:** Delay or non-payment of compensation to the communities is not the most important cause of project delays in the Niger Delta Region.

**Sub-hypothesis 4:** Wrong choice of consultants and contractors by the clients is not the most important cause of project delays in the Niger Delta Region.

**Sub-hypothesis 5:** Weather condition is not the most important cause of project delays in the Niger Delta Region.

**Sub-hypothesis 6:** Poor contract management by the consultants is not the most important cause of project delays in the Niger Delta Region.

**Sub-hypothesis 7:** Late identification and resolution of drawings and specification errors and omissions by the consultants is not the most important cause of project delay in the Niger Delta Region.

**Sub-hypothesis 8:** Lack of community buy-in is not the most important cause of project delays in the Niger Delta Region.

**Sub-hypothesis 9:** Inappropriate design by the consultants is not the most important cause of project delays in the Niger Delta Region.

**Sub-hypothesis 10:** Unrealistic contract duration by the clients is not the most important cause of project delays in the Niger Delta Region.

**Sub-hypothesis 11:** Poor coordination of subcontractors by the contractors is not the most important cause of project delay in the Niger Delta Region.

**Sub-hypothesis 12:** Time overrun is not the most important effect of project delays in the Niger Delta Region.

**Sub-hypothesis 13:** Budget overrun is not the most important effect of project delay in the Niger Delta Region.

**Sub-hypothesis 14:** Disputes and claims are not the most important effect of project delays in the Niger Delta Region.

The t-test of the sub-hypotheses' means was carried out at 5% significant level, which implies a 95% confidence in the results.

The null hypothesis was rejected at the p-value less than 0.05; otherwise fail to reject it.

### 3.15 Summary for the chapter:

This chapter captured method analyses, justification for adopting chosen methodology and the research instrument. Analyses were made on design parameters for the research instrument, design and construction of the questionnaire, pilot testing of the questionnaire and administration of the questionnaire. Strategies for sample selection were discussed. Sources of errors that could have been introduced in the adopted method were discussed including remedies to curtail them.

Finally, concepts on selected method of data analysis were discussed. The researcher believes that, the adopted approaches were sufficient to generate reliable and valid results that could address the research's objectives.

## CHAPTER FOUR

### 4 DATA ANALYSIS AND RESULTS

Framework for data analysis and result is summarised in figure 4.1 below:

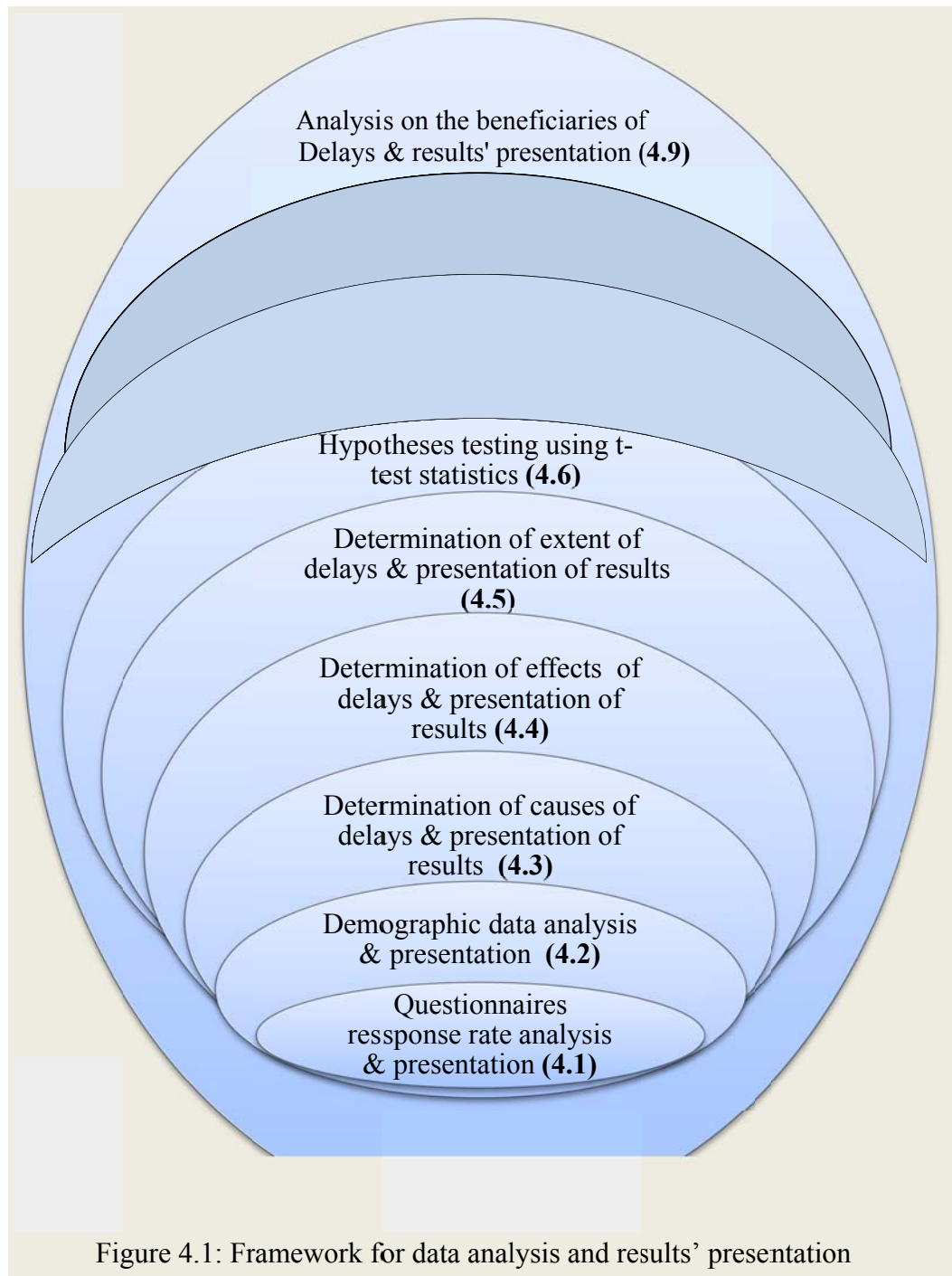
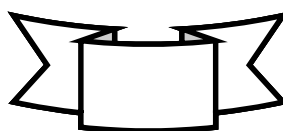


Figure 4.1: Framework for data analysis and results' presentation



The objectives of this research study as earlier stated in sub-section 1.4 were to:

1. Identify causes of project delays and determine most important ones in the Niger Delta region, Nigeria.
2. Identify effects of project delays and determine most important ones in the Niger Delta region, Nigeria.
3. Investigate extent of project delays among different types of projects in the Niger Delta region, Nigeria.
4. Investigate whether there were benefits of project delays.
5. Propose solutions to project delays in the Niger Delta region.
6. Investigate whether there were beneficiaries of delay.
7. Investigate whether delays occurs in all States of the Niger Delta region.
8. Investigate whether project delays are experienced in all types of business organisations (Public service, Multinational companies and Private companies) in the Niger Delta region.
9. Investigate whether project delays are experienced in all project management organisations (Projectised, matrix and functional organisations) in the Niger Delta region.

The research data was therefore analysed to achieve the above stated objectives. The data analyses also followed the questions' trend on the questionnaire (refer to appendix C for a scanned copy of the questionnaire).

Firstly, the data were tabulated to enhance easy manipulation of all items under investigations. This was carried out using relevant statistical tools such as MS Excel and SPSS. The analyses commenced with the calculation of response rates for the research to ascertain whether adequate sample was received. Demographic data were then analysed to show representations of various categories of the respondents in the research study. Demographic analysis' results also enabled conclusions to be drawn on research objective "number seven" above.

Reliability and validity of the research data were established using the results of the pilot study and a test of internal consistencies of items using Cronbach's alpha coefficient. Factor analysis was also carried out on identified causes, effects and extents of project delays using SPSS.

Data were presented in tabular and graphical format to enhance understanding. Inferential statistical tools such as t-test and ANOVA were adopted to test statistical significance of factors and to draw valuable conclusions from the research data, respectively.

The research hypotheses were investigated using t-test for continuous data (details are discussed in sub-section 3.14). The main hypothesis which states that “there is no cause/effect of project delays in the Niger Delta region that is most important” was subdivided into fourteen sub-hypotheses. The sub-hypotheses were framed from selecting causes and effects of delays which have mean scores of 3.5 and above (refer to sub-section 3.14 and figure 3.7 which show that a mean score of 3.5 is an indication of strong/positive opinion by the respondents). The t-testing of these means scores was to investigate whether the means were a chance occurrence or not. The test was carried out at a 95% confidence interval.

Sample calculations on the analyses are presented in the relevant sub-sections in this chapter. Their results are tabulated and presented in the relevant sub-sections while detailed calculations and results are presented in the appendices. The analyses followed the pattern outlined in figure 4.1 above.

#### 4.1 Questionnaires’ response rate analysis:

Response rate (RS) is the total number of retrieved questionnaires divided by the total number of questionnaires administered multiplied by 100 % (Onomehebor, 2006).

$$RS = 100\% \times (\text{Total number of retrieved questionnaires}) / (\text{Total number of questionnaires administered}) \dots\dots\dots (4.1)$$

$$\text{Response rate} = (83/188) \times 100\% = 44\%$$

Response rate was 44% (calculated using equation 4.1).

Follows and Lui (1997), remarked that response rate of most surveys is generally low. Thus, a 44% response rate was considered adequate for statistical analysis. This is graphically represented in figure 4.2

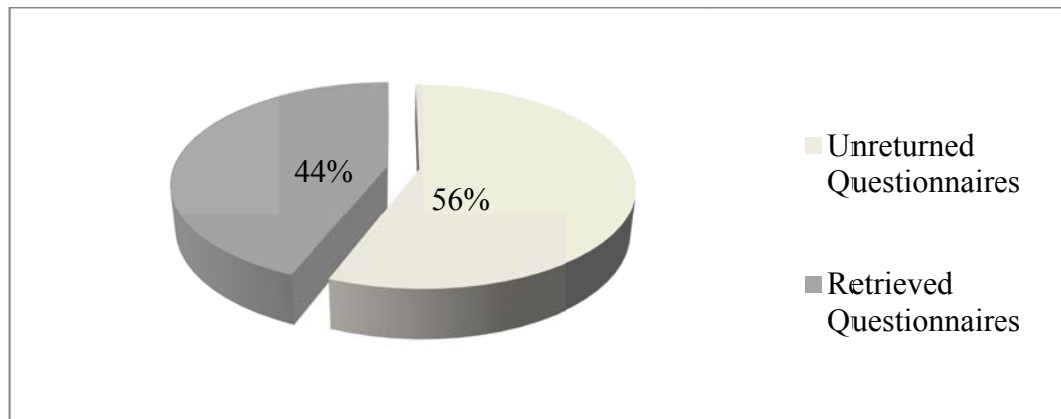


Figure 4.2: Questionnaires response rate

#### 4.2 Analysis of demographic information:

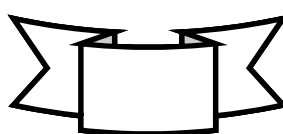
Demographic data analysis shows the distribution of the research participants within the various categories of the demographic variables. It enables the researcher to ascertain whether all categories of the research population were duly represented in the study. Secondly, it assisted in drawing conclusions on the research participants based on the trend observed from the analysis. Demographic data of various categories of the respondents were tabulated based on the frequency of scores.

Results of demographic data analyses are presented in tables 4.1(a) to 4.1 (h). These are useful in the calculation of mean scores and standard deviation.

Table 4.1 (a): Demographic analysis of respondents based types of business organisation:

| Demographic characteristics | Frequency | Percentage of overall Respondents |
|-----------------------------|-----------|-----------------------------------|
| Public service              | 34        | 41.0                              |
| Multinational Companies     | 18        | 21.7                              |
| Private Companies           | 31        | 37.3                              |
| Total                       | 83        | 100.0                             |

41% = (34/83) of the respondents were Public service project practitioners



37.30% = (18/83) of the respondents were Multinational companies' project practitioners

21.70% = (31/83) of the respondents were Private companies' project practitioners

Table 4.1 (b): Demographic analysis of respondents based nature of involvement in project execution

| Demographic characteristics | Frequency | Percentage of overall Respondents |
|-----------------------------|-----------|-----------------------------------|
| <b>Sponsor/Clients</b>      | 43        | 51.8                              |
| <b>Consultants</b>          | 17        | 20.5                              |
| <b>Contractors</b>          | 23        | 27.7                              |
| <b>Total</b>                | 83        | 100.0                             |

51.80% = (43/83) of the respondents were Sponsors/Clients.

27.70% = (17/83) of the respondents were Contractors.

20.50% = (23/83) of the respondents were Consultants.

Table 4.1(c): Demographic analysis of respondents based on position in their organisation:

| Demographic characteristics | Frequency | Percentage of overall Respondents |
|-----------------------------|-----------|-----------------------------------|
| <b>Management Staff</b>     | 36        | 43.4                              |
| <b>Field/Project Staff</b>  | 47        | 56.6                              |
| <b>Total</b>                | 83        | 100.0                             |

56.60% = (36/83) of the respondents were Field/Project Staff

43.40% = (47/83) of the respondents were Management Staff

Table 4.1 (d): Demographic analysis of respondents based on the types of project management structure

| Demographic characteristics                 | Frequency | Percentage of overall Respondents |
|---------------------------------------------|-----------|-----------------------------------|
| Organization's Project Management Structure |           |                                   |
| Functional                                  | 24        | 30.4                              |
| Projectised                                 | 14        | 17.7                              |
| Matrix                                      | 41        | 51.9                              |
| <b>Total</b>                                | <b>79</b> | <b>100.0</b>                      |

51.90% = (24/79) of the respondents were working in Matrix organisations.

30.40% = (14/79) of the respondents were working in Functional organisations.

17.70% = (14/79) of the respondents were working in Projectised organisations.

4.8% = (4/83) of the respondents did not indicate which project management organisations that they operate. Thus, total number of responses dropped to 79.

Table 4.1 (e): Demographic analysis of respondents based on types projects executed

| Demographic characteristics              | Frequency | Percentage of overall Respondents' scoring |      | Total = 83 Respondents |
|------------------------------------------|-----------|--------------------------------------------|------|------------------------|
|                                          |           | Yes                                        | No   |                        |
| Types of Projects Executed               |           |                                            |      |                        |
| Buildings                                | 50        | 60.2                                       | 39.8 | 100%                   |
| Electrification                          | 48        | 57.8                                       | 42.2 | 100%                   |
| Jetty, shore protection & channelization | 46        | 55.4                                       | 44.6 | 100%                   |
| Road/Bridge                              | 65        | 78.3                                       | 21.7 | 100%                   |
| Water                                    | 40        | 48.2                                       | 51.8 | 100%                   |

60.2% = (50/83) of the respondents were involved in building projects.

57.8% = (48/83) of the respondents were involved in electrification projects.

55.4% = (46/83) of the respondents were involved in jetty, shore protection and channelization projects.

78.3 % = (65/83) of the respondents were involved in road/bridge projects.

48.2% = (40/83) of the respondents were involved in water projects.

Table 4.1 (f): Demographic analysis of respondents based location of their projects in the Niger Delta region

| Demographic characteristics                                            | Frequency | Percentage of overall Respondents |      | Total = 83 respondents |
|------------------------------------------------------------------------|-----------|-----------------------------------|------|------------------------|
| Locations of project executed by respondents in the Niger Delta region |           | Yes                               | No   |                        |
| Abia State                                                             | 40        | 48.2                              | 51.8 | 100%                   |
| Akwa Ibom State                                                        | 44        | 53.1                              | 46.9 | 100%                   |
| Bayelsa State                                                          | 55        | 66.3                              | 33.7 | 100%                   |
| Cross River State                                                      | 34        | 41.0                              | 59.0 | 100%                   |
| Delta State                                                            | 48        | 57.8                              | 42.2 | 100%                   |
| Edo State                                                              | 35        | 42.2                              | 57.8 | 100%                   |
| Imo State                                                              | 41        | 49.4                              | 50.6 | 100%                   |
| Ondo State                                                             | 47        | 56.6                              | 43.4 | 100%                   |
| Rivers State                                                           | 69        | 83.1                              | 16.9 | 100%                   |

48.2% = (40/83) of respondents had their projects located in Abia State.

53.1% = (44/83) of respondents had their projects located in Akwa Ibom State.

66.3% = (55/83) of respondents had their project located in Bayelsa State.

41.0% = (34/83) of respondents had their projects located in Cross River State.

57.8% = (48/83) of respondents had their projects located in Delta State.

42.2% = (35/83) of respondents had their projects located in Edo State.

49.4% = (41/83) of respondents had their projects located in Imo State.

56.6% = (47/83) of respondents had their projects located in Ondo State.

83.1% = (69/83) of respondents had their projects located in Rivers state.

#### 4.3 Determination of causes of project delays:

Thirty-eight causes of project delays were identified from literature surveys (details are discussed in sub-section 2.5.5). Results of reliability test using Cronbach's Alpha coefficient are presented in table 4.2. The results of factor analysis for causes of delays are tabulated in tables 4.3 (a) and appendices F1 to F7.

##### 4.3.1 Reliability analysis for causes of delays:

Internal consistencies of items in each category of questions on causes of delays (question one); effects of delays (question two) and extents of delays (question five) were determined using Cronbach's alpha coefficient. This method is appropriate for determining the reliability of a multi-scaled data.

Cronbach's alpha coefficient is calculated using the following equation:

$$\text{Alpha } (\alpha) = k / (k-1) [1 - (1/S_T^2) \sum S_i^2] \dots\dots\dots (4.2)$$

Where k=number of questions which leads to items variances from  $S_1^2$  to  $S_k^2$

$S_i^2$  = Variance of scores on each question;

$S_T^2$  = Total variance of overall scores (not percentage's) on the entire test

Alpha coefficient varies between 0 (low consistency) and 1 (high consistency).

Internal consistency of the three items under labour and equipment's related causes of delays was determined using Cronbach's alpha coefficient equation: The labour and equipment related category contains three items, namely: (1) improper equipment selection and faulty equipment;(2) unskilled site manpower ; and (3) labour disputes.

Variance for item 1 ( $S_1^2$ ) =1.086075949;

Variance for item 2 ( $S_2^2$ ) = 1.126424;

Variance for item 3 ( $S_3^2$ ) = 1.637816456

Variance for the overall scores on all items ( $S_T^2$ ) = 6.499188575

Number of items (questions) on Labour and equipment's related causes of delays category (K) = 3

Therefore,  $\alpha = 3/(3-1)[1-(1/6.499188575)(3.850316405)] = 0.611$

Similar computations were done for other factors on causes of delays. The results are presented in table 4.2.

Table 4.2: Cronbach's Alpha coefficient for causes of project delays

| Items                                       | Number of items (questions) | Cronbach's Alpha coefficient | Reliability assessment |
|---------------------------------------------|-----------------------------|------------------------------|------------------------|
| All Causes of delays                        | 38                          | 0.923                        | Good                   |
| Clients' related issues                     | 8                           | 0.784                        | Good                   |
| Contractors' related issues                 | 7                           | 0.835                        | Good                   |
| Labour and equipment's related issues       | 3                           | 0.611                        | Adequate               |
| Materials' related issues                   | 2                           | 0.469                        | Poor                   |
| Consultants' related issues                 | 8                           | 0.854                        | Good                   |
| Community's related issues                  | 3                           | 0.563                        | Adequate               |
| Contractual relationship and related issues | 3                           | 0.735                        | Good                   |
| External causes                             | 4                           | 0.686                        | Adequate               |

Cronbach Alpha coefficient for all thirty-eight causes of delays is 0.923. An Alpha value of greater than 0.7 implies that an instrument is good in reliability (Nunally, 1978 in Aiyetan, 2010). Seven categories of causes of project delays had Alpha value of at least 0.563.

Reliability of the group of 38 causes of delays is far above 0.7. This implies that the 38 items related to the causes of delays are reliable (see subsection 3.13.2 for interpretation of Alpha values). Removing any of the questions did not have a significant effect on the value of the coefficient.

Delays related to clients' issues provide reliable questions, Alpha coefficient equals 0.784.

All the questions on materials' related issues: material shortages and the poor quality materials cannot be used on their own to assess the causes of delay. Their Alpha is 0.468 which is less than 0.59. Thus, must be used in the entire group of the 38 questions. This is because, alpha value increase as the number of items increases. Therefore, a good test must have sufficient number of items so as to achieve an appropriate measure of internal consistency as would be determined using Cronbach's alpha.

The three questions on community's related issues cannot be used on their own. This is because the items are not internally consistent, thus it could be wrong to use them to assess delays. However, these items could be combined with other items to achieve a reliable internal consistency since alpha increases with increase in the number of items. Thus, they must be in the 38 questions. Their Alpha does not increase significantly (0.70 or above) when any of the questions is removed (Aiyetan, 2010).

#### 4.3.2 Factor analysis for causes of delays:

Factor analysis was carried out on the identified causes of delays using statistical software for social sciences (SPSS). The essence was to determine significant factors out of the numerous ones being investigated and to further assure whether the research instrument was reliable.

Results of the factor analysis, indicate two coefficients for each item (factor) which ranges between “-1” and “1”. These numbers represent the correlation

coefficients variables to the factors. In practice, the higher coefficient is usually selected (Constello & Osborne, 2005). These coefficients are called factor loadings. The SPSS extracted these factors using principal component analysis method. This is the default method of factors' extraction in the SPSS and SAS. After factor extraction, they are rotated to determine the percentage variance extracted from the items (factors). Most commonly used method of items rotation is the Varimax method which is an orthogonal rotation method. The SPSS selects this method of rotation by default. To carry factor analysis in SPSS; go to "menu", left click on "analysis" and then, left click again on "factor".

Factor analysis involves a lot of complicated mathematical computations, thus it was considered inappropriate to manually engage in such activity. Therefore, the results of the factor analysis presented in this study are products of the SPSS software's analysis. Results of the factor analyses on causes of delays are presented in table 4.3(a) and appendices F1 to F7.

Table 4.3 (a): Summary of factor analysis conducted on the items for clients' related causes of delays

| <b>Factor: Clients' related issues</b><br>(Percentage of variance explained = 40.35%) | <b>Loadings</b> |
|---------------------------------------------------------------------------------------|-----------------|
| Insufficient funding                                                                  | 0.793           |
| Interference with project performance                                                 | 0.745           |
| Delay or non-payment for Completed works                                              | 0.646           |
| Impractical allocation of resources                                                   | 0.634           |
| Unrealistic contract duration                                                         | 0.752           |
| Wrong choice of Consultants & contractors                                             | 0.722           |
| Slow decision making                                                                  | 0.689           |
| Design alterations & change orders                                                    | 0.645           |

Results of the factor analyses on the thirty-eight causes of delays show that thirty-six factors have loadings greater than 0.60. Only two factors: Wrong choice of Bankers and, labour disputes each has loadings a little less than 0.6. Their loadings are 0.407 and 0.530 respectively (see table 4.3(a) and appendices F1 to F7). Hair, *et al*, 2006 in Aiyetan, 2010 state that, sample size of eighty-five is

significance for factor loading of 0.6 while a sample size of seventy is significance for a factor loading of 0.65 (refer to table 3.4 for the explanations). The response rate for this study was eighty-three (83). This implies that, items for all factor categories have good agreement and therefore adequately describe the categories of causes (Aiyetan, 2010).

4.3.3 Mean score for causes of project delays based on overall respondents: Data from the field survey are ordinal data (refer to section 3. 4). It was therefore, difficult to carry out analysis on the data unless they were appropriately transformed into the required form. Mean score method (already discussed in section 3.4) was adopted to transform the Likert data into a summated data. The mean scores (means) were used in the t-test statistical analysis of the sample means during sub-hypotheses' testing, while the average mean scores were adopted in the analysis of variance (ANOVA) on the categories of causes of project delays.

The mean scores were determined mathematically, using the formula from equation (3.2):

$$MS_i = \sum (F \times S)/N$$

Where S= Score given to each problem by the respondents (1-5)

F = Frequency of responses to each score for each factor

N = Total number of responses in the respective groups for the respective problem

i = respective problem

For example, mean scores for labour and equipment's related causes of delays are calculated thus:

Table 4.4(a): Frequency of scores for labour and equipment's related issues

| Labour & equipment related | Frequency of scores | Total responses |
|----------------------------|---------------------|-----------------|
|----------------------------|---------------------|-----------------|

| causes                                          | 1 | 2  | 3  | 4  | 5  |    |
|-------------------------------------------------|---|----|----|----|----|----|
| Improper equipment selection & faulty equipment | 4 | 8  | 29 | 26 | 13 | 80 |
| Labour disputes                                 | 6 | 15 | 21 | 16 | 22 | 80 |
| Unskilled site manpower                         | 2 | 15 | 27 | 22 | 14 | 80 |

$MS_1$  = Mean score for the first item under labour & equipment's related issues,

$MS_2$  = Mean score for the second item under labour & equipment's related issues,

$MS_3$  = Mean score for the third item under labour & equipment's related issues.

**Calculation of  $MS_1$ :** From table 4.4(a) above, four (4) respondents scored 1, eight (8) respondents scored 2, twenty-nine (29) respondents scored 3, twenty-six (26) respondents scored 4 and thirteen (13) respondents scored 5. Total responses (N) is 80

Mean score ( $MS_1$ ) =  $(4 \times 1)/80 + (8 \times 2)/80 + (29 \times 3)/80 + (26 \times 4)/80 + (13 \times 5)/80$

$MS_1 = 0.05 + 0.2 + 1.0875 + 1.3 + 0.8125 = 3.45$

Similar calculations were carried out for the other factors by inputting this formula in MS Excel. Mean score ( $MS_2$ ) = **3.41** and  $MS_3$  = **3.39**. Average mean score of the three factors under "labour and equipment's related issues" = Mean for labour and equipment's issues =  $(3.45 + 3.41 + 3.39)/3 = 3.41$ .

The average mean scores were adopted in calculations that required only categories (i.e. sub-group) of causes such as in the analysis of variance (ANOVA).

Table 4.4 (b): Frequency table and mean score for overall respondents' scoring on labour & equipment's related causes

| Factors                                         | Frequency of respondents scoring |          |        |                |         | Total number of responses | Mean score | Rank |
|-------------------------------------------------|----------------------------------|----------|--------|----------------|---------|---------------------------|------------|------|
|                                                 | 1                                | 2        | 3      | 4              | 5       |                           |            |      |
|                                                 | Very unlikely                    | Unlikely | Likely | Almost certain | Certain |                           |            |      |
| Improper equipment selection & faulty equipment | 4                                | 8        | 29     | 26             | 13      | 80                        | 3.45       | 1    |
| Labour disputes                                 | 6                                | 15       | 21     | 16             | 22      | 80                        | 3.41       | 2    |
| Unskilled site manpower                         | 2                                | 15       | 27     | 22             | 14      | 80                        | 3.39       | 3    |

From table 4.4 (b), respondents' perception is as stated thus:

Mean score for improper equipment selection and faulty equipment (MS=3.45); and labour disputes (MS= 3.41) and mean score for unskilled manpower (MS=3.39).

Average mean score for labour and equipment related issues = 3.41.

From tables G1 to G7 on appendix G, the values of means scores for all other items and categories under causes of delays are discussed thus:

**Mean scores for overall respondents' scoring on materials' related causes:**

Mean scores for material shortages (MS=3.42) and poor quality materials (MS =3.37).

Average mean score for materials' related issues = 3.39

**Mean scores for overall respondents' scoring for community's related issues:**

Youth unrest, militancy and communal crises (MS=4.33), lack of community buy-in (MS=3.55), and delay or non-payment of compensation (MS=3.69).

All factors in this category have mean scores greater than 3.5.

Average mean score for community's related causes of delays, MS=3.85

**Mean scores contractors' related issues:** Inadequate planning (MS= 3.82), poor coordination of subcontractors (MS= 3.51), incompetent site management (MS=3.49), inadequate experience (MS=3.49), inappropriate construction methods (MS= 3.21), mistakes during construction stage (MS= 3.09), and wrong choice of Bankers (MS=2.50).

Mean scores for two factors: inadequate planning (MS= 3.82) and poor coordination of subcontractors (MS=3.51) are greater than 3.5.

Average mean score for contractors' related issues = 3.34.

**Mean scores for contractual relationship and related issues:** Lack of adequate communication between parties (MS=3.42), major disputes and negotiations (MS= 3.33), and wrong organizational structure linking to the project (MS= 3.31).

All factors in this category have mean score less than 3.5.

Average mean score for contractual relationship related issues = 3.35.

**Mean scores for external issues:** Weather condition (MS=3.58), interference by political leaders (MS=3.46), change in government's leadership and policies (MS=3.01), and natural disasters (MS= 2.71).

Only one factor: weather condition has a mean score within the range  $MS \geq 3.5$  (MS= 3.58).

Average mean score for external causes of delays = 3.19.

**Mean scores for consultants' related issues:** Poor contract management (MS= 3.55), late identification of drawings and other contract documents (MS= 3.55), inappropriate design (MS=3.54), late identification and resolution of drawings, specification errors and omissions (MS= 3.42), improper coordination of information between parties (MS=3.26), long waiting time for inspection and testing (MS= 3.24), improper contract packaging/delivery strategy (MS= 3.23), and over inspection (MS= 2.17).

Only three factors: inappropriate design (MS=3.54), poor contract management (MS=3.55), late identification of drawings and other contract documents (MS=3.55) have mean scores within the range  $MS \geq 3.5$ .

Average mean score for consultants' related issues = 3.24

**Mean scores for categories of causes of delays:**

Means for all items in each category of causes of delays were calculated as the average of all the mean scores in each category and tabulated in appendix H. This result was used in the analysis of variance (ANOVA).

**Ranking of respondents' mean score for all causes:** The mean scores for all thirty-eight (38) causes of delays were ranked so as to select factors within the range:  $MS \geq 3.5$  (Mean score of 3.5 was set as a cut-off point as earlier discussed in sub-section 3.14.2). Secondly, the ranking shows strengths of respondents' perception on these factors. This is tabulated in Appendix I.

Eleven factors have mean scores within the range  $MS \geq 3.5$  (refer to appendix I). These are listed in sub-section 4.3.4.

**4.3.4 Most important causes of project delays:**

One of the objectives of this research study is to determine most important causes of delays. To achieve this, mean scores of the respondents' perceptions on causes of delays were ranked. Factors within the range of mean scores  $MS \geq 3.5$  were selected for further analyses. The results in appendix I indicate that, the eleven under listed causes of delays have mean scores of at least 3.5 (figure 3.7 explained

that a mean score of 3.5 and above indicates strong or positive opinion by the respondents):

- Youth unrest, militancy and communal crises (MS= 4.33)
- Inadequate planning by the contractors (MS=3.82 )
- Delay or non-payment of compensation to the communities (MS= 3.69)
- Wrong choice of consultants and contractors by the clients (MS=3.63 )
- Weather condition; poor contract management by the consultants (MS=3.58 )
- Late identification and resolution of drawings and specification errors and omissions by the consultants (MS= 3.55)
- Lack of community buy-in (MS=3.55 )
- Poor contract management by the consultants (MS=3.55)
- Inappropriate design by the consultants (MS=3.54 )
- Unrealistic contract duration by the clients (MS=3.52 )
- Poor coordination of subcontractors by the contractors (MS=3.51).

Statistical significance of the eleven causes was tested using the t-test statistics at a 95% confidence interval. The result is presented in table 4.12 (section 4.6).

Analysis of these factors with respect to the eight categories of causes of delays shows as follows:

- Community's related issues are 27.3% (3/11) of the perceived most important causes of delays.
- Consultants' related issues are 27.3% (3/11) of the perceived most important causes of delays.
- Contractors' related issues are 18.2% (2/11) of the perceived most important causes of delays.
- Clients' related issues are 18.2% (2/11) of the perceived most important causes of delays.
- External issues are 9.0 % (1/11) of the perceived most important causes of delays.

- No factor under materials' related issues, and contractual relationships related issues nor labour and equipment related issues were perceived as most important.

#### 4.4 Determination of effects of project delays:

Internal consistencies of effects of delays were determined using the same approach discussed in section 4.3 (that is, for causes of delays). However, respondents' scores on effects of delays were adopted in the computations. Results of reliability analysis of the effects of delays, frequency table of respondents' scores on the effect of delays and most important effects of delays as perceived by the overall respondents are also discussed.

##### 4.4.1 Cronbach's Alpha coefficient for effects of delays:

Internal consistencies of items (factors) under the effects of delays were determined using the approach adopted for the causes of delays (already described in sub-section 4.3.2). The results of internal consistencies' calculation for factors on effects of delays are therefore presented in table 4.5:

Table 4.5: Cronbach's Alpha coefficient for the effects of project delays

| <b>Factors</b>                 | <b>Cronbach's Alpha coefficient</b> | <b>Reliability assessment</b> |
|--------------------------------|-------------------------------------|-------------------------------|
| Time overrun                   | 0.790                               | Good                          |
| Budget overrun                 | 0.778                               | Good                          |
| Bad public relations           | 0.790                               | Good                          |
| Poor quality completed project | 0.788                               | Good                          |
| Litigation                     | 0.771                               | Good                          |
| Total abandonment              | 0.763                               | Good                          |

|                   |       |      |
|-------------------|-------|------|
| Disputes & claims | 0.775 | Good |
| Arbitration       | 0.769 | Good |

Cronbach's alpha coefficient ( $\alpha$ ) for all the eight factors assessed jointly = 0.801

Table 4.5 indicates that " $\alpha$ " for all items on question two is greater 0.7. Thus, the question on effects of delays (question two) is reliable. However, alpha is correct if all items on question two are assessed jointly or one-by-one, non-inclusion of any of these items reduces the value of alpha.

#### 4.4.2 Factor analysis for effects of delays:

Factor analysis on items under the effects of delays was carried out using the same approach adopted for those on causes of delays. The essence was to ascertain which of the factors were significant to the research objectives. Table 4.6 contains the results.

Factor loadings for six items on effects of project delays are above 0.65. Two items: poor quality completed projects (loading=0.593) and bad public relations (loading=0.555) have their loadings a little lower than 0.65. Required loading for a sample size of 70 is 0.65 and 0.60 for a sample size of 85 (see table 3.4 for the details).

Table 4.6: Summary of results of factor analysis for effects of project delays

| <b>Factor: Effects of delays</b> | <b>Loadings</b> |
|----------------------------------|-----------------|
| Time overrun                     | 0.760           |
| Total abandonment                | 0.738           |
| Arbitration                      | 0.711           |
| Litigation                       | 0.693           |
| Disputes & claims                | 0.672           |
| Budget overrun                   | 0.670           |

|                                |       |
|--------------------------------|-------|
| Poor quality completed project | 0.593 |
| Bad public relations           | 0.555 |

Maximum and minimum responses on effects of delay were 79 and 77 respectively. The little differences in factor loadings for poor quality completed projects (loading=0.593) and bad public relations (loading =0.555) are negligible. Thus, the factors are in good agreement with the category and therefore adequately describe them (detailed explanation is given in section 4.3.2).

#### 4.4.3 Mean score for effects of project delays:

Computations of mean scores on effects of delays were carried out in a similar way to the approach adopted on the causes of delays. However, in this case, the frequency tables for the effects of delays were adopted. Results of overall respondents' scoring, their mean scores and most important factors for effects of project delays are presented in table 4.7 and 4.8:

Table 4.7: Frequency table and mean scores for the overall respondents' scoring on effects of delays

| Effects of delays    | Frequency of Respondents scoring |          |        |                |         | Number of responses | Mean score | Rank |
|----------------------|----------------------------------|----------|--------|----------------|---------|---------------------|------------|------|
|                      | 1                                | 2        | 3      | 4              | 5       |                     |            |      |
|                      | Very unlikely                    | Unlikely | Likely | Almost certain | Certain |                     |            |      |
| Time overrun         | 3                                | 1        | 16     | 28             | 29      | 77                  | 4.03       | 1    |
| Budget overrun       | 2                                | 6        | 17     | 25             | 27      | 77                  | 3.90       | 2    |
| Disputes & claims    | 1                                | 11       | 28     | 23             | 16      | 79                  | 3.53       | 3    |
| Bad public relations | 1                                | 16       | 29     | 20             | 12      | 78                  | 3.33       | 4    |
| Total abandonment    | 4                                | 15       | 28     | 15             | 16      | 78                  | 3.31       | 5    |

|                                |   |    |    |    |    |    |      |   |
|--------------------------------|---|----|----|----|----|----|------|---|
| Poor quality completed project | 9 | 9  | 30 | 20 | 11 | 79 | 3.22 | 6 |
| Litigation                     | 8 | 18 | 33 | 11 | 9  | 79 | 2.91 | 7 |
| Arbitration                    | 7 | 25 | 26 | 13 | 8  | 79 | 2.90 | 8 |

From table 4.7, Mean score for time overrun (MS=4.03), budget overrun (MS=3.90), and disputes and claims (MS=3.53), bad public relations (MS=3.33), poor quality completed project (MS=3.31), total abandonment (MS= 3.22), litigation (MS= 2.91), and arbitration (MS=2.90).

Three factors: time overrun (MS=4.03), budget overrun (MS=3.90), and disputes and claims (MS=3.53) each has mean score greater than 3.5.

Other factors have mean scores less than 3.5.

Table 4.8: Most important effects of project delays

| Factors             | Total number of responses | Mean score | Rank | Standard deviation |
|---------------------|---------------------------|------------|------|--------------------|
| Time overrun        | 77                        | 4.03       | 1    | 1.000              |
| Budget overrun      | 77                        | 3.90       | 2    | 1.059              |
| Disputes and claims | 79                        | 3.53       | 3    | 1.011              |

Table 4.8 shows that, time overrun (MS=4.03) was perceived, the highest most important effect of delays followed by budget overrun (MS=3.90), and disputes and claims (MS= 3.53).

#### 4.5 Determination of extent of project delays:

Six categories of infrastructural projects were investigated to determine the degree of delays in their execution. Test of internal consistencies of the items using Cronbach's alpha coefficient calculations, factor analysis and calculation of means scores were carried out using the same approach in sub-section 4.3.1, 4.3.2 and 4.3.3. However, respondents' scores on the extent of delays were used. The results are therefore summarised in tables 4.9 and 4.10.

##### 4.5.1 Cronbach alpha's coefficient for extent of delays:

Internal consistencies of the factors were calculated using Cronbach alpha's coefficient. Results are tabulated in table 4.9

Table 4.9 Cronbach Alpha's coefficient for extent of delays

| <b>Factors</b>                           | <b>Cronbach's alpha coefficient</b> | <b>Reliability assessment</b> |
|------------------------------------------|-------------------------------------|-------------------------------|
| Delay in Buildings                       | 0.778                               | Good                          |
| Delay in Electrification                 | 0.755                               | Good                          |
| Delay in Jetty                           | 0.822                               | Good                          |
| Delay in Roads/Bridges                   | 0.793                               | Good                          |
| Delay in Shore Protection/Channelization | 0.796                               | Good                          |
| Delay in Water                           | 0.785                               | Good                          |

Cronbach's alpha coefficient for all items = 0.818

The results in table 4.9 show that Cronbach's alpha coefficient is greater than 0.7 for all factors. Therefore, the question is reliable. This shows that there is good inter-correlation among the items in this section (see section 3.14 for the details).

##### 4.5.2 Factor analysis for extent of delays:

Total responses on this category are in the range of 53 and 47. This drop in responses could have been due to the lengthy nature of the questionnaire. For

instance, question one (question on causes of delays) has thirty-eight sub-questions (refer to section appendix C for a layout of the questionnaire). Factor analysis was determined for items on extent of delays using the same approach adopted for the causes of delays already described in sub-section 4.3.2

Results of factor analysis for items on extent of delays are therefore presented in table 4.10

Table 4.10: Summary of factor analysis for items on extent of delays

| <b>Factor: Extent of delays<br/>(Percentage of variance explained =53.07%)</b> | <b>Loadings</b> |
|--------------------------------------------------------------------------------|-----------------|
| Delay in Jetty                                                                 | 0.940           |
| Delay in Buildings                                                             | 0.893           |
| Delay in Electrification                                                       | 0.794           |
| Delay in Roads/Bridges                                                         | 0.794           |
| Delay in Shore Protection/Channelization                                       | 0.685           |
| Delay in Water                                                                 | 0.563           |

Table 4.10 indicates that four items have loadings which range from 0.940 to 0.794. Two items have loadings of 0.685 and 0.563 respectively. Difference in these two items' loadings from the required loadings is not significant considering the loadings for other factors.

The required loading for a sample size of 50 is 0.75 (Hair, *et al*, 2006 in Aiyetan, 2010). Therefore, the factor's items are in good agreement and appropriately describe the category.

#### 4.5.3 Mean score for extents of project delays:

Questions on extents of delays were designed similar to questions on causes and effects of delays. That is using Likert scales (1-5). Therefore, analyses of these factors were carried in the same approach as those on causes and effects of delays.

Mean score was calculated using equation 3.2 as earlier discussed in sub-section 4.3.3. The essence of this analysis was to generate means for the items under extents of delays so that they could be adopted in the calculations of standard deviation, variance, and ANOVA. Results of overall respondents' scoring and their mean scores on extents of delays are presented in table 4.11:

Table 4.11: Frequency table and mean score for overall respondents' scoring on extents of delays

| Extent of delays in project sectors | Frequency of respondents' scoring |          |        |                |         | Responses | Mean score | Rank |
|-------------------------------------|-----------------------------------|----------|--------|----------------|---------|-----------|------------|------|
|                                     | 1                                 | 2        | 3      | 4              | 5       |           |            |      |
|                                     | Very unlikely                     | Unlikely | Likely | Almost certain | Certain |           |            |      |
| Roads/Bridges                       | 1                                 | 3        | 21     | 11             | 21      | 57        | 3.84       | 1    |
| Shore Protection / Channelization   | 3                                 | 1        | 15     | 12             | 18      | 49        | 3.84       | 2    |
| Buildings                           | 2                                 | 10       | 23     | 10             | 13      | 58        | 3.38       | 3    |
| Electrification                     | 2                                 | 8        | 25     | 10             | 8       | 53        | 3.26       | 4    |
| Water                               | 2                                 | 11       | 21     | 7              | 7       | 48        | 3.13       | 5    |
| Jetty                               | 4                                 | 9        | 18     | 12             | 4       | 47        | 3.06       | 6    |

Table 4.11 shows that mean score for extent of delays: roads/bridges (MS=3.84), shore protection/channelization (MS=3.84), buildings (MS=3.38), electrification (MS=3.26), water (MS=3.13), and jetty (MS=3.06).

Two projects: roads/bridges (MS=3.84), shore protection/channelization (MS=3.84) have "mean scores" greater than 3.5.

#### 4.6 Hypotheses' testing:

One-sample t-test was adopted to test the fourteen sub-hypotheses. These sub-hypotheses were derived from applying mean score of 3.5 as cut-off point for significant causes and significant effects of delays earlier discussed in section 3.14 and shown in figure 3.7. The main hypothesis and sub-hypotheses are stated thus:

**Main hypothesis:** There is no cause/effect of project delays that is the most important.

**Sub-hypotheses:** The main hypothesis was sub-divided into fourteen sub-hypotheses for testing using t-test statistics. The sub-hypotheses are listed below:

**Sub-hypothesis 1:** Youth unrest, militancy and communal crises are not the most important cause of project delays in the Niger Delta region.

**Sub-hypothesis 2:** Inadequate planning by the contractors is not the most important cause of project delays in the Niger Delta region.

**Sub-hypothesis 3:** Delay or non-payment of compensation to the communities is not the most important cause of project delays in the Niger Delta Region.

**Sub-hypothesis 4:** Wrong choice of consultants and contractors by the clients is not the most important cause of project delays in the Niger Delta Region.

**Sub-hypothesis 5:** Weather condition is not the most important cause of project delays in the Niger Delta Region.

**Sub-hypothesis 6:** Poor contract management by the consultants is not the most important cause of project delays in the Niger Delta Region.

**Sub-hypothesis 7:** Late identification and resolution of drawings and specification errors and omissions by the consultants is not the most important cause of project delay in the Niger Delta Region.

**Sub-hypothesis 8:** Lack of community buy-in is not the most important cause of project delays in the Niger Delta Region.

**Sub-hypothesis 9:** Inappropriate design by the consultants is not the most important cause of project delays in the Niger Delta Region.

**Sub-hypothesis 10:** Unrealistic contract duration by the clients is not the most important cause of project delays in the Niger Delta Region.

**Sub-hypothesis 11:** Poor coordination of subcontractors by the contractors is not the most important cause of project delay in the Niger Delta Region.

**Sub-hypothesis 12:** Time overrun is not the most important effect of project delays in the Niger Delta Region.

**Sub-hypothesis 13:** Budget overrun is not the most important effect of project delay in the Niger Delta Region.

**Sub-hypothesis 14:** Disputes and claims are not the most important effect of project delays in the Niger Delta Region.

The test was considered appropriate because of the reason earlier discussed in section 3.14. Secondly, the main hypothesis and the sub-hypotheses align with the research objectives one and two (i.e., to determine most important causes and most important effects of project delays in the Niger Delta region).

$$t = (\mu - \mu_0) / (S / [\sqrt{N}]) \dots\dots\dots (4.3)$$

Where  $\mu$  = sample mean;  $\mu_0$  = mean of the null hypothesis (reference mean) = 3;

N = Sample size (number of responses); S = Sample standard deviation.

The following conditions governed the t-tests of the sub-hypotheses in this study:

- Significance level ( $\alpha$ ) = 5%
- Confidence interval = 95%
- Mean of the null hypothesis ( $\mu_0$ ) = 3 and mean of the alternative hypothesis ( $\mu$ ) > 3.
- Reject null hypothesis if p-value is greater than 0.05, otherwise fail to reject the null hypothesis.

Means (mean scores); standard deviations and sample size were already determined and presented in appendix I.

Applying the items in appendix I give the following calculations:

For a null hypothesis that youth unrest, militancy and communal crises are not the most important causes of project delays, the t-value is calculated from equation 4.3 thus:

$$t = (\mu - \mu_0) / (S / [\sqrt{N}])$$

Where  $\mu$  = mean score for youth unrest, militancy and communal crises = 4.32,  $\mu_0$  = mean of the reference constant = 3.00, S = Standard deviation of the youth unrest, militancy & communal crises = 0.834, N = Sample size = Number of responses on youth unrest, militancy & communal crises = 77,  $t = (4.32 - 3.00) / (0.834 / [\sqrt{76}]) = 13.798$ .

The above “t” value was adopted to find a corresponding “p”-value at an “N-1” degrees of freedom (i.e. 77-1) = 76 degrees of freedom. The two- tailed p-value was selected because the hypothesis was a test of whether its mean was different from a reference constant mean of “3”.

Similar calculations were carried out for other sub-hypotheses.

A summary of t-test conducted on the mean scores of the sub-hypotheses is presented in table 4.12. The table contains number of responses (valid number), mean score (mean), standard deviation, t-value and p-value.

Table 4.12: Results of t-tests conducted on the sub-hypotheses:

| Null hypotheses                                                                                                                         | Test of means against reference constant<br>(test value= 3) |               |                       |         |             |
|-----------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|---------------|-----------------------|---------|-------------|
|                                                                                                                                         | Valid<br>number                                             | Mean<br>score | Standard<br>deviation | t-value | p-<br>value |
| Youth unrest, militancy and communal crises are not the most important cause of project delays                                          | 77                                                          | 4.32          | 0.834                 | 13.798  | 0.000       |
| Inadequate planning by contractors is not the most important cause of project delays                                                    | 81                                                          | 3.51          | 1.014                 | 4.4985  | 0.000       |
| Delay or non-payment of compensation to host communities is not the most important cause of project delays                              | 77                                                          | 3.69          | 1.016                 | 5.9205  | 0.000       |
| Wrong choice of consultants and contractors is not the most important cause of project delays                                           | 80                                                          | 3.63          | 1.151                 | 4.865   | 0.000       |
| Weather condition is not the most important cause of project delays                                                                     | 78                                                          | 3.58          | 1.111                 | 4.581   | 0.000       |
| Late identification and resolution of drawings and specification errors and omissions by consultants is not the most important cause of | 77                                                          | 3.55          | 0.994                 | 4.824   | 0.000       |

|                                                                                               |    |      |       |        |       |
|-----------------------------------------------------------------------------------------------|----|------|-------|--------|-------|
| project delays                                                                                |    |      |       |        |       |
| Poor contract management by the consultants is not the most important cause of project delays | 77 | 3.55 | 0.994 | 4.824  | 0.000 |
| Lack of community buy-in is not the most important cause of project delays                    | 77 | 3.55 | 1.02  | 4.701  | 0.000 |
| Time overrun is not the most important effect of project delays                               | 77 | 4.03 | 1.000 | 9.0382 | 0.000 |
| Budget overrun is not the most important effect of project delays                             | 77 | 3.90 | 1.059 | 7.4574 | 0.000 |
| Disputes & claims are not the most important effect of project delays                         | 79 | 3.53 | 1.011 | 4.6594 | 0.000 |

Table 4.12 indicates that based on the conditions earlier stated:

- All the fourteen null sub-hypotheses were rejected because their p-values are less than 0.05
- The t-tests of their means gave a p-value of “0” for each sub-hypothesis.

#### 4.7 Analysis of variance (ANOVA):

The ANOVA test reveals whether differences in means of samples in a category happened by chance or by sampling error.

ANOVA’s computation consists of two “variability”; namely “within-group” and “between-group”. The variability within-group is the residual sum of squares. It is also called sum squared errors (Gryna, *et al*, 2007).

Comparison of groups' differences in a categorical data with combined nominal and ordinal components is determined using analysis of variance  $F$  statistic or simply ANOVA  $F$  statistic. Here a null hypothesis ( $H_0$ ):  $\mu_1 = \mu_2 = \dots \mu_g$  is tested against an alternative hypothesis ( $H_a$ ) in which the population means for at least one group is different.

The " $F$ " test statistics is calculated by dividing the estimate of variance of "between-group" by the estimate of variance of "within-group".

**Between-group estimate of variance:** This is calculated by first determining the between-group sum of squares:

Between-group sum of squares =

$$SS = n_1 (\mu_1 - \mu)^2 + n_2 (\mu_2 - \mu)^2 + \dots + n_g (\mu_g - \mu)^2 \dots \dots \dots (4.4)$$

Where  $n_1$  is sample size for the first group,  $n_2$  is sample size for the second group and  $n_g$  is sample size for " $g^{th}$ " group;  $g$  is the number of group;  $\mu$  is the sample mean;  $\mu_1$  is the mean for group one;  $\mu_2$  is the mean for group two ;  $\mu_g$  is the mean for the " $g^{th}$ " group.

The between-group estimate of variance is between –group sum of squares divided by " $g-1$ ". " $g-1$ " is called the between-group degree of freedom.

Mean square is the "square" of the sum of squares.

$$\text{Between- group estimate of variance} = (\text{between-group SS}) / (g-1) \dots \dots \dots (4.5)$$

**Estimate of variance of within-group:** Determination of estimate of variance of within-group is similar to that for "between-group". Here sample size for the entire population is utilised to calculate the degree of freedom. This degree of freedom is the sum of the degree of freedom of the various groups in which their variances are being investigated.

$$\text{That is, } df = (n_1-1) + (n_2-1) + \dots + (n_g-1) = (n_1+n_2+\dots+n_g)-g = N-g \dots \dots \dots (4.6)$$

$N-g$  = Total sample size minus number of groups

Within-group estimate of the population variance is

$$S^2 = \text{Within-group sum of squares (SS) divided by the degree of freedom (df) or} \\ (\text{Within-group SS}) / (N-g) \dots \dots \dots (4.7)$$

Within-group sum of squares equals summation of each group's square of observation about their sample means with  $(n-1)$  degrees of freedom. For instance, sum of square for group one equals  $\sum(\mu - \mu_1)^2$ , with  $n_1 - 1$  degrees of freedom.

Therefore, within-group estimate of population variance =  $S^2$

$$S^2 = [(n_1-1) S_1^2 + (n_2-1) S_2^2 + \dots + (n_g-1) S_g^2] / [N-g] \dots \dots \dots (4.8)$$

Appendices J, K and L contain computations and summaries of ANOVA on respondents' perceptions on causes of delays, effects of delays and extents of delays based on the study's demographic parameters, respectively. The essence is to test if there were variances in their perceptions on these factors. The analysis of variance (ANOVA) was conducted at a significance level of 0.05.

The null hypothesis is: there is no variation in the means of the continuous variable across the different levels of the categorical variables, and the alternative hypothesis is: there is variation in the means of the continuous variable across the different levels of the categorical variables. Thus, a p-value less than 0.05 imply rejection of the null hypothesis. Rejection of the hypothesis means that different categories of respondents disagreed in their perceptions on factors and vice versa.

#### **ANOVA on causes of delays based on types of business organization:**

Applying equations 4.7 and 4.8 on clients' related causes of delays as perceived by respondents in the public service, multinational companies and private companies:

#### **Between-group sum of squares SS =**

$$SS = n_1 (\mu_1 - \mu)^2 + n_2 (\mu_2 - \mu)^2 + n_3 (\mu_3 - \mu)^2$$

From the demographic analyses in section 4.2;

Total responses for public service =  $n_1 = 33$

Total responses for multinational companies =  $n_2 = 18$

Total responses for private companies =  $n_3 = 29$

Total responses for this category =  $N = 80$

Mean scores for public service =  $\mu_1 = 3.32197$

Mean scores for multinational Companies =  $\mu_2 = 3.25694$

Mean scores for private Companies =  $\mu_3 = 3.2931$

Overall mean scores for types of business organisation  $=\mu = 3.29688$

$$SS = 33(3.32197 - 3.29688)^2 + 18(3.25694 - 3.29688)^2 + 29(3.2931 - 3.29688)^2$$

$$SS = 0.0207737673 + 0.0287136648 + 0.0004143636$$

$SS = 0.049901$  or 0.05 approximately.

Between- group estimate of variance = (between-group SS)/ (g-1)..... (4.9)

Here g= number of groups = 3

Therefore, between-group estimate of variance =  $0.05 / (3-1) = 0.025$

Within-group estimate of population variance =  $S^2$

$$S^2 = [(n_1-1) S_1^2 + (n_2-1) S_2^2 + (n_3-1) S_3^2] / [N-g] \dots \dots \dots (4.10)$$

$S_1$  = Standard deviation for public service = 0.6861

$S_2$  = Standard deviation for multinational companies = 0.926997

$S_3$  = Standard deviation for private companies = 0.722159

$$S^2 = [(33-1) (0.6861)^2 + (18-1)(0.926997)^2 + (29-1)(0.722159)^2] / (80-3)$$

$$S^2 = (15.0634 + 14.6084 + 14.6023) / 77 = 44.274 / 77 = 0.5749$$

Therefore  $S^2 = 0.575$ , approximately.

ANOVA  $F$  = ratio of between-group estimate of variance and within-group estimate of variance =  $0.575 / 0.025 = 0.043$ . The equivalent p-value for the ANOVA  $F = 0.043$  is  $p = 0.958$ .

Similar calculations were carried out for all other categories of causes of delays and the respective demographic variables. Results are presented in table 4.13

Table 4.13: ANOVA on causes of delays based on types of business organization

| Factors                     | Categories of respondents | N         | Mean           | Std. Deviation  | P-value |
|-----------------------------|---------------------------|-----------|----------------|-----------------|---------|
| Clients' related issues     | Public service            | 33        | 3.32197        | 0.686100        | 0.958   |
|                             | Multinational             | 18        | 3.25694        | 0.926997        |         |
|                             | Private                   | 29        | 3.29310        | 0.722159        |         |
|                             | <b>Total</b>              | <b>80</b> | <b>3.29688</b> | <b>0.749043</b> |         |
| Contractors' related issues | Public service            | 33        | 3.68398        | 0.652465        | 0.002   |
|                             | Multinational             | 17        | 3.30252        | 0.859939        |         |

|                                           |                |           |                |                 |       |
|-------------------------------------------|----------------|-----------|----------------|-----------------|-------|
|                                           | Private        | 29        | 2.98522        | 0.746561        |       |
|                                           | <b>Total</b>   | <b>79</b> | <b>3.34539</b> | <b>0.789653</b> |       |
| Labour and equipment's related issues     | Public service | 34        | 3.33333        | 0.883824        | 0.244 |
|                                           | Multinational  | 17        | 3.72549        | 0.929720        |       |
|                                           | Private        | 29        | 3.33333        | 0.745356        |       |
|                                           | <b>Total</b>   | <b>80</b> | <b>3.41667</b> | <b>0.851077</b> |       |
| Materials' related issues                 | Public service | 33        | 3.25758        | 0.919589        | 0.500 |
|                                           | Multinational  | 17        | 3.41176        | 0.955826        |       |
|                                           | Private        | 29        | 3.53448        | 0.905647        |       |
|                                           | <b>Total</b>   | <b>79</b> | <b>3.39241</b> | <b>0.918719</b> |       |
| Consultants' related issues               | Public service | 33        | 3.45455        | 0.731422        | 0.063 |
|                                           | Multinational  | 17        | 2.98529        | 0.720626        |       |
|                                           | Private        | 28        | 3.12054        | 0.722074        |       |
|                                           | <b>Total</b>   | <b>78</b> | <b>3.23237</b> | <b>0.743130</b> |       |
| community' s related issues               | Public service | 33        | 4.01010        | 0.642720        | 0.152 |
|                                           | Multinational  | 16        | 3.60417        | 0.762246        |       |
|                                           | Private        | 28        | 3.80952        | 0.711045        |       |
|                                           | <b>Total</b>   | <b>77</b> | <b>3.85281</b> | <b>0.701905</b> |       |
| Contractual relationship's related issues | Public service | 34        | 3.41176        | 0.808452        | 0.581 |
|                                           | Multinational  | 16        | 3.14583        | 0.750000        |       |
|                                           | Private        | 29        | 3.32184        | 0.914967        |       |
|                                           | <b>Total</b>   | <b>79</b> | <b>3.32489</b> | <b>0.833717</b> |       |
| External factors                          | Public service | 33        | 3.19697        | 0.856404        | 0.736 |
|                                           | Multinational  | 16        | 3.04688        | 0.975614        |       |
|                                           | Private        | 29        | 3.25862        | 0.822352        |       |
|                                           | <b>Total</b>   | <b>78</b> | <b>3.18910</b> | <b>0.861502</b> |       |

Table 4.13 shows that p-values are greater than 0.05 for all factors except for contractors' related issues which have a p-value of 0.002. The null hypothesis is therefore not rejected. This implies that respondents in the three business organisations generally agreed on the causes of projects delays in the Niger Delta region.

Appendix J shows the following:

- **Categories of respondents based on nature of involvement in project execution:** p-values for all causes of delays as perceived by sponsors/clients, consultants and contractors are greater than 0.05. The null hypothesis is therefore not rejected. It is inferred that, these categories of respondents agreed on causes of project delays in the Niger Delta region.
- **Categories of respondents based on position in project execution:** p-values are greater than 0.05, thus, the null hypothesis is not rejected. It is therefore inferred that, management staff and field/project staff respondents agreed on causes of delays in the Niger Delta region.
- **Categories of respondents based on project management organisations:** Appendix J also shows that, p-values for seven out of the eight categories of causes of delays are greater than 0.05. Hence, the null hypothesis is not rejected. It implies that, respondents in all project management organizations generally agreed on the causes of project delays in the Niger Delta region.

**ANOVA on effects of delays:** Appendix K shows that;

- For categories of respondents based on types of business organization, p-value for six out of the eight factors are greater than 0.05, thus the null hypothesis is not rejected. It is inferred that respondents from the three types of business organizations generally agreed on the effects of delays. The effect of p-value from the two factors with value less than 0.05 is negligible.
- For categories of respondents based on nature of involvement in project execution, p-values for all factors are greater than 0.05. Thus, the null hypothesis is not rejected. This implies that, respondents in this category were in agreement on the effects of delays in the region
- For categories of respondents based on position in project execution, p-values for all factors are greater than 0.05. The null hypothesis is

therefore not rejected. This implies that, management staff and field/project staff respondents agreed on the effects of project delays in the Niger Delta region.

- For categories of respondents based on project management organizations, p-values are greater than 0.05 for all factors except “bad public relations”. The null hypothesis is therefore not rejected. This implies that, respondents in all project management organizations generally agreed on the effects of project delays in the Niger Delta region.

**ANOVA on extents of delays:** Similarly, Appendix L contains analyses of variance for the extents of delays. Inferences are summarised thus:

- p-values for all categories of projects are greater than 0.05, thus the null hypothesis is not rejected. It is therefore inferred that respondents from all types of business organizations agreed on the extents of project delays in the Niger Delta region.
- p-values for all categories of projects are greater than 0.05 except for jetty project (p-value = 0.05). Thus the null hypothesis is not rejected. It is therefore inferred that sponsors/clients, consultants and contractors generally agreed on the extents of project delays in the Niger Delta region.
- p-values for all categories of projects are greater than 0.05, thus the null hypothesis is not rejected. It is therefore inferred that management staff and field/project staff respondents agreed on the extents of project delays in the Niger Delta region.
- p-values for all categories of projects are greater than 0.05 except for roads/bridges (p-value= 0.005). Thus the null hypothesis is not rejected. It is therefore inferred that respondents from all types of project management organizations generally agreed on the extents of project delays in the Niger Delta region.

#### 4.8 Benefits of delays:

Question three on the questionnaires requested respondents to state whether there were positive impacts of delays on projects. “Option question” approach was adopted. The result is presented in figure 4.3.

**Question: Do delays have positive impacts on the project(s)?**

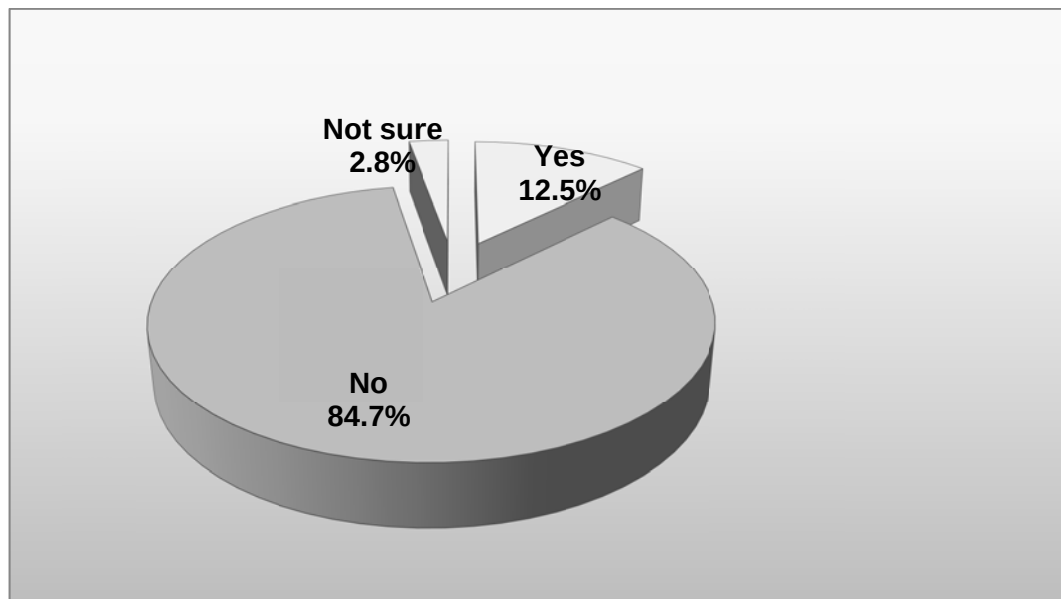
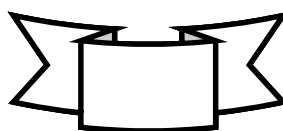


Figure 4.3: Analysis of responses on whether there were benefits of delays

- Seventy-two (72) respondents participated in this section of the survey.
- 12.50% (9/72) of respondents perceived that there were benefits of delays.
- 84.70% (61/72) of respondents perceived that there were no benefits of delays.
- 2.80% (2/72) of respondents were not sure whether there were benefits of delays.

#### 4.9 Beneficiaries of delays:

Respondents were requested to give their opinion about who benefits from project delays. They were given options to choose from the four major stakeholders in infrastructural projects' execution, namely: Sponsors/clients, consultants, contractor and benefitting community.



**Question: Who benefits from your project delays?**

Various opinions of respondents on the above question are tabulated in table 4.14:

Table 4.14: Analysis of responses on beneficiaries of delays

| Beneficiaries of delays  | Frequency of Responses |      |    |      | Total = 83 respondents |
|--------------------------|------------------------|------|----|------|------------------------|
|                          | Yes                    | %    | No | %    |                        |
| Sponsors/clients         | 8                      | 9.6  | 75 | 81.4 | 100 %                  |
| Consultants              | 24                     | 28.9 | 59 | 71.1 | 100%                   |
| Contractors              | 40                     | 48.2 | 43 | 51.8 | 100%                   |
| Project host communities | 17                     | 20.5 | 66 | 79.5 | 100%                   |

- 9.60% (8/83) of respondents perceived sponsors/clients as beneficiaries of delays.
- 28.90% (24/83) of respondents perceived consultants as beneficiaries of delays.
- 48.20% (40/83) of respondents perceived contractors as beneficiaries of delays.
- 20.50% (17/83) of respondents perceived benefitting communities as beneficiaries of delays. Some benefits derived by communities because of project delays are: Extended duration of employment for their indigenes.
- Some respondents selected more than one stakeholder as beneficiaries of delays.

4.10 Qualitative data analysis:

The research questionnaire was also designed to collect written explanations from respondents in addition to the choices made for each question. Generally, most respondents did not provide comments on the spaces provided. Non-provision of

explanations/additional comments could have been due to the lengthy nature of the questionnaire (reasons and implications have earlier been explained in section 3). Secondly the detailed and multi-choice nature of most questions could have been the reason for non-supply of comments by the respondents (Burgess, 2001). However, the few additional comments supplied by some respondents did not follow any particular pattern that could enable qualitative analysis. They were merely points of emphasis on the items already captured in the questionnaire. In view of the above, qualitative data analysis was not carried out in this research study.

#### 4.11 Summary for the chapter:

In this chapter, the raw field data was transformed into valuable forms which enabled appropriate descriptive and inferential statistical analyses. The five –point Likert data was converted into summated mean scores using MS Excel. Validity of the research instrument was ascertained through the outcome of the pilot study. Reliability and factor analyses of items on causes, effects and extents of delays indicated generally strong correlations among the items. Eleven most important Causes and three most important effects of delays were determined by ranking of mean scores derived from setting a cut-off point of 3.5 (A mean score of 3.5 on a Likert scale implies strong opinion as earlier discussed in section 3.14) and through statistical testing of their means using the t-test. Analysis of the fourteen sub-hypotheses showed that eleven out of the thirty-eight identified causes of delays are most important in the Niger Delta region whereas three out of the eight identified effects of delays are most important. Results of the research data analyses also show that all objectives of this research study were achieved. Discussions and findings are therefore presented in chapter five.

## CHAPTER FIVE

### 5 DISCUSSIONS AND RESEARCH FINDINGS

This chapter covers discussion on the results of data analyses presented in chapter four. This chapter is patterned after the frame works of research data analysis in figure 4.1 and the research's objectives in section 1.4. The discussions are focussed on the most important factors on causes, effects, benefits, beneficiaries and extents of delays determined statistically. Discussions on the implications of outcome of the sub-hypotheses' testing are also captured in this chapter. Finally findings from this research study are outlined.

#### 5.1 Discussions:

##### 5.1.1 Response rate in the survey:

The response rate for this study was 44%. This is good for analysis because Follows and Lui (1997) states that response rate of most survey research is generally low. Similarly, Burgess (2001) recommends that, in a questionnaire survey research, a responses rate of 30% -40% is acceptable for data analysis. Marshall (1996) also states that, in a qualitative research (such as questionnaire survey), appropriate sample size (response rate in this case) is the one that sufficiently answers the research questions. In this study, all the research questions have been appropriately answered. However, quantitatively, this response rate does not suit the required sample size (earlier determined in section 3.8.4); therefore the results could be considered as perceptions of the respondents.

It was also observed that responses to questions dropped as the number of questions increased and peaked at the last questions on benefits/beneficiaries of delays. This confirms earlier works by Burgees (2001) and Trochim (2006) that a lengthy questionnaire reduces response rate. The increase in responses to questions on benefits /beneficiaries of delays shows that, interest could increase responses to questions in a survey.

#### 5.1.2 Validity and reliability of the research instrument:

Validity of the instrument was ascertained by face value. That is all respondents in the pilot study agreed that the research instrument was appropriately designed and that it could generate the desired data (refer to section 3.12).

Also, pilot test results showed that, the research instrument could be used repeatedly in a similar research (see appendix B for feedback from pilot study).

Results of reliability analyses using measurement of internal consistencies' approach showed that seven (7) out of the eight (8) Cronbach's Alpha coefficients for all factors were greater than 0.7. These fall within the acceptable value considered for a research instrument's reliability (see section 3.13).

Thus, it could be inferred that the questionnaire could be used in a similar study and that its results are dependable.

#### 5.1.3 Most important (significant) causes of project delays:

Results from mean score analyses using a score of 3.5 as a cut-off point for significant factors and the sub-hypotheses' testing showed that the respondents perceived that the under listed eleven factors were most important causes of project delays in the Niger Delta region:

- Youth unrest, militancy and communal crises
- Inadequate planning by the contractors
- Delay or non-payment of compensation to the communities
- Wrong choice of consultants and contractors by the clients
- Weather condition; poor contract management by the consultants
- Late identification and resolution of drawings and specification errors and omissions by the consultants
- Lack of community buy-in
- Poor contract management by the consultants
- Inappropriate design by the consultants
- Unrealistic contract duration by the clients
- Poor coordination of subcontractors by the contractors.

These are represented in figure 5.1:

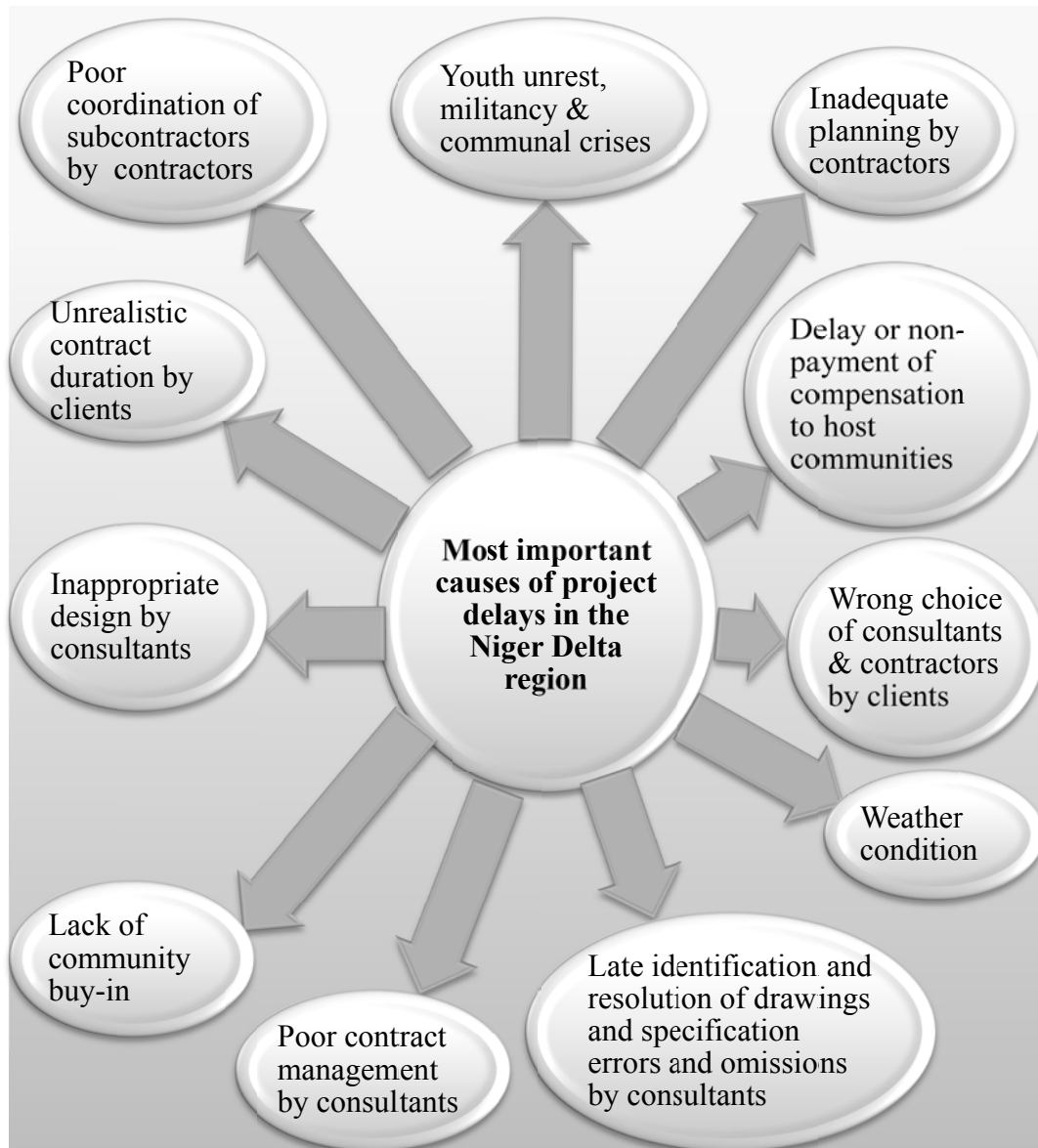
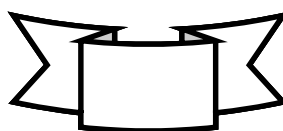


Figure 5.1: Most important (significant) causes of project delays

**Youth unrest, militancy and communal crises:**

In recent times, project activities in the Niger Delta region have been disrupted by incessant kidnappings of People, taking People hostage and series of communal disturbances (UNDP, 2006 and Ejibunu, 2007). The T-test conducted on the mean score gave a p-value of zero (0) which is less than 0.05. It could therefore be



inferred that youth unrest, militancy and communal crises are major causes of project delays in the Niger Delta region.

**Inadequate planning by contractors:**

Contractors are employed by the clients or project owners to carry out construction works according to design specifications within agreed cost and time. To actualise the project objective, adequate plans must be put in place. This is achieved through the use of planning tools such as Ghannt charts and bar charts. These enable projects' timelines to be met. Planning enhances focus during project works and helps a contractor to achieve set milestones. Inadequate/insufficient plan could lead to difficulty in timely resolutions of challenges hampering project implementation, hence delays in execution of required phases of project. This leads to the overall delay in completion.

Earlier researchers such as Faridi and El-Sayegh, 2006; Majid, 2006; Sambasivan and Soon, 2007; and Okpala and Anikekwu, 1988, all agreed that inadequate planning is a significant cause of project delays.

The T-test conducted on the mean score gave a p-value of zero (0) which is less than 0.05. It could therefore be inferred that inadequate planning by contractors is a major cause of project delays in the Niger Delta region.

**Delay or non-payment of compensation to the communities:**

Projects are executed to better the socio-economic lives of the host communities. Sometimes, properties of the dwellers lie on the right of way of construction projects. When this happens, it is necessary that such properties be demolished and carted away. The Law stipulates that, legally recognised owners of such properties be adequately compensated at the current market rate. The project's client usually provide for payment of compensations in the contractor's scope of work. Compensations must be paid on time. This would contribute to a smooth execution of project. Delay in compensation's payments could cause grievances among qualified persons or organisations. Settlement of grievances may consume part of the project time and resources and thus, lead to delays in project execution.

The T-test conducted on the mean gave a p-value of zero (0) which is less than 0.05. It could therefore be inferred that delay or non-payment of compensation to communities is a major cause of project delays in the Niger Delta region.

**Wrong choice of consultants and contractors by the clients:**

Clients are initiators and drivers of projects (Aiyetan, 2010). They conceptualise projects and make choices on vendors for consultancy and contracting services. Sometimes, clients make wrong decisions on choice of vendors based on sentiments or because of lack of capacity to select appropriately (Jo and Barry, 2008). The researcher believes that, the foundation of a successful project is tied to proper selection of a right set of vendors. Wrong choices deprive the client of the benefits of using the skills and methods of qualified vendors. Additionally, wrong choice of vendors could result in poor quality workmanship and frequent reworks, thus delays in project completion.

The T-test conducted on the mean score gave a p-value of zero (0) which is less than 0.05. It could therefore be inferred that clients' wrong choice of consultants and contractors is a major cause of project delays in the Niger Delta region.

**Weather condition:**

Construction works are carried out in an open environment, thus they are considered weather-sensitive (Aiyetan, 2010). Productivity is directly proportional to weather (Mohamed and Srinavin, 2004). Thomas, *et al* (1999) expressed the opinion that, adverse weather leads to thirty percent (30%) reduction in productivity. Adverse weather such as extreme heat or cold could affect human health, equipment functionality and cause inconveniences at the project sites. In the Niger Delta region, there is consecutive rainfall for nine months in a year (Adejuwon, 2012). This hinders project execution and could lead to flooding. Weather challenges become grave when inexperienced contractors or consultants are the project executors. However, the experienced vendors utilise the services of weather experts during construction works, this curtails the negative impacts of weather on their project delivery time.

The T-test conducted on the mean score gave a p-value of zero (0) which is less than 0.05. It could therefore be concluded that weather condition is a major cause of project delays in the Niger Delta region.

**Poor contract management by the consultants:**

Clients employ the services of relevant consultants to management project execution at the sites. These consultants supervise the contractors and drive the day-to-day activities of the project sites. They are skilled personnel and therefore guide the contractors on jobs' execution as stipulated in the contract documents. Consultants liaise between the client and the contractor. They manage communication, quality, finances, human resources, etc. Poor contract management by consultants therefore lead to unmet timelines in project activities and thus overall delays in project duration. Frimpong, *et al* (2004) and Hau (2010), agreed that poor contract management was a significant cause of project delays.

The T-test conducted on the mean gave a p-value of zero (0) which is less than 0.05. It could therefore be inferred that poor contract management by the consultants is a major cause of project delays in the Niger Delta region.

**Late identification and resolution of drawings and specification errors and omissions by the consultants:**

Consultants are usually engaged by the clients to study, design and document project scope as conceptualised by the clients. Sometimes, errors and omissions could accompany these documents. Copies of these documents are handed over to the contractors to use at the project sites. If errors and omissions are not identified and resolved on time, there would be delays in execution of activities that are linked to the errors and omissions. This is critical because, activities executed outside contract specifications could lead to outright rejection by the client or alterations by the contractor to achieve the required specifications. Alterations require additional resources and time, thus could lead delays.

The T-test conducted on the mean score gave a p-value of zero (0) which is less than 0.05. It could therefore be inferred that late identification and resolution of

drawings and specification errors and omissions is a major cause of project delays in the Niger Delta region.

**Lack of community buy-in:**

Developmental projects are provided to boost socio-economic lives of the benefitting communities. These communities understand the needs most critical to their survival. It is therefore important that clients seek their inputs before final decisions are made on the type of projects to execute. According to UNDP (2006), “full participation in development planning will ensure that everyone has a stake”. Therefore, projects which are executed without inputs from the expected beneficiary communities especially during conceptualisation, may not receive a full commitment from such communities. This could cause a lack of desired cooperation between the communities and contractors. Consequently, making project execution challenging and could eventually lead to delays.

The T-test conducted on the mean score gave a p-value of zero (0) which is less than 0.05. It could therefore be concluded that lack of community buy-in is a major cause of project delays in the Niger Delta region.

**Inappropriate design by the consultants:**

Clients sometimes appoint consultants who are not technically sound to design a project. The product of such decision is poor deliverables. The use of wrong design could lead to faulty output(s) and thus, dissatisfaction by the clients. Clients usually insist on alterations to suit their original project concept. Review and re-design of inappropriate design is costly and time consuming. This activity may lead to delays in project completion because on-going construction works may be stalled or slowed down until such review is completed. Ahmed, *et al* (2002), Toor and Ogunlana (2008) and Le-Hoai, *et al* (2008), all agreed that project delays are caused by design issues.

The T-test conducted on the mean score gave a p-value of zero (0) which is less than 0.05. It could therefore be inferred that inappropriate design by the consultants is a major cause of project delays in the Niger Delta region.

**Unrealistic contract duration by the clients:**

Clients could fix contract duration without proper consultation with relevant persons or adequate negotiations with their contractors. When project completion period is imposed on the contractor, tendencies of requests for extension of time are usually high. Extension of project completion time implies delays in its completion. The T-test conducted on the mean gave a p-value of zero (0) which is less than 0.05. Earlier works by Majid (2006) and Hau (2010) also confirmed that this is significant cause of project delays.

It could therefore be inferred that unrealistic contract duration is a major cause of project delays in the Niger Delta region.

**Poor coordination of subcontractors by the contractors:**

Kaliba, *et al* (2009), Sambasivan and Soon (2007), state that poor coordination of subcontractors is a major cause of project delays. Contractors are responsible for engagement and management of subcontractors at the project sites. These subcontractors could be suppliers of specialised equipment or suppliers of materials or suppliers of specialised services. Different types of subcontractors are required during different phases of a project. Their actions could positively or negatively impact on project work plan. The prime contractors are therefore required to properly coordinate the sub-contractors in order to ensure execution of project according to stipulated milestones. Prime contractors must effectively manage cash flow to the subcontractors and must maintain effective communication with them to avoid conflicts and delays in activities' performances. Proper cash flow management entails timely release of funds and appropriate channelling of such funds.

The T-test conducted on the mean gave a p-value of zero (0). This is less than 0.05. It could therefore be inferred that poor coordination of subcontractors is a major cause of project delays in the Niger Delta region.

#### 5.1.4 Most important effects of delays:

The analyses of the respondents' mean scores and results of sub-hypotheses' testing indicated that there were three most important effects of project delays in the Niger Delta region, namely:

- ✓ Time overrun
- ✓ Budget (Cost) overrun, and
- ✓ Disputes and claims

Figure 5.2 represents these most important effects of project delays in the Niger Delta region, Nigeria.

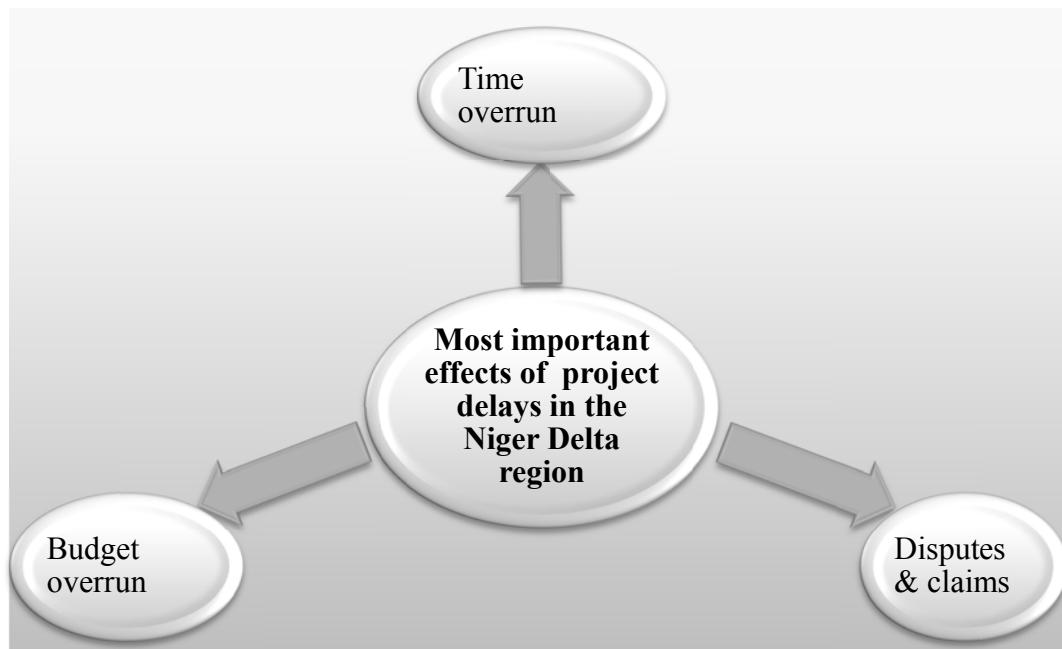
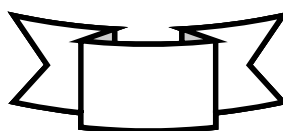


Figure 5.2: Most important (significant) effects of project delays

#### **Time overrun:**

Overall respondents ranked time overrun as the first most important effect of project delays (mean score = 4.03). The t-test results indicates that, this is significant in the Niger Delta region (p-value=0 at 5% significance level). Researchers such as Singh (2009), Enshassi, *et al* (2009), Majid (2006), Sambasivan and Soon (2007), Hau (2010), Ghoddosi, *et al* (2008), Memon, *et al*



(2011), Aibinu and Jagboro (2002) all concluded that, time overrun was one major effect of construction project delays.

**Budget (Cost) overrun:**

Overall respondents ranked budget overrun as the second most important effect of construction project delays (mean score=3.90). The t-test of mean score at 5% significance level gave a “p-value” = 0.

Delays in project lead to budget overrun because cost of materials, equipment and personnel increases by the year. This may be caused by increase in inflation rate or change in fiscal/monetary policy of the government. As project completion date gets pushed back, personnel may ask for increase in allowances. Secondly, delays could lead to damage of executed works. To amend the works, additional funds that were not provided in the original budget would be required. Many researchers such as Frimpong (2003), Manavizha and Adhikarib (2002), Aibinu and Jagboro (2002), Kaliba, *et al* (2008), Singh (2009), Le-Hoai, *et al* (2008), Majid, (2006) all confirmed that budget or cost overrun was a significant effect of project delays.

**Disputes and claims:**

Overall respondents ranked disputes and claims as third most important effects of project delays (mean score= 3.53). Results of the t-test on the mean score at 5% significance gave a p-value of “0” which implies that this is one of the significant effects of project delays in the Niger Delta region. Delays in construction projects generate grievances among the stakeholders. Therefore, aggrieved parties could make claims to remedy damages that they incurred. Al-Hamaidi and Tan (2009), Enshassi, *et al* (2009), Brambles and Callahan (2011), Memon, *et al* (2011) support that disputes and claims are significant effects of project delays.

**5.1.5 Benefits of project delays:**

- Most respondents (84.7%) perceived delays to be unbeneficial.
- Few respondents (12.5%) perceived that there were some benefits of delays.
- 2.80% of respondents were not sure whether there were benefits of delays.

**Opinion 1: There are no benefits of project delays:**

Hau, (2010); Memon, *et al*, (2011); Ghoddosi, *et al*, (2008); Bramble and Callahan, (2011); Sambasivan and Soon, (2007); Enshassi, *et al*, (2009); Frimpong, (2003); Aibinu and Jagboro, (2002) state that project delays are risky, have negative economic impacts, lead to poor quality end products, lead to disputes, create bad relationship among project stakeholders, lead to inefficiency and lost productivity by the contractor, lead to claims and abandonment or termination of the project. Delays are therefore a major challenge in the construction industry because of these negative impacts (Pourrostan, *et al*, 2011). Majority of the respondents were therefore in agreement with the findings of previous researchers.

PMBOK<sup>®</sup> Guide (2004) defines project as a temporary endeavour undertaken to create a unique product, service, or result. Delays therefore negate project objectives.

**Opinion 2: There are some benefits of project delays:**

Few respondents (12.5%) expressed the opinion that some benefits of project delays include: proper consolidations of earthworks on road projects especially in the Niger Delta region where most of the area are wet lands. The researcher believes that these categories of respondents might not have been well vested with proper understanding of construction procedure and processes in the Niger Delta region. For instance, proper design and good selection of materials by the clients and consultants would address this.

**5.1.6 Beneficiaries of project delays:**

Some respondents expressed the opinion that project stakeholders derive some form of benefits from project delays. These opinions are discussed below:

**Contractors as beneficiaries of project delays:**

48.2% of the overall respondents perceived contractors as beneficiaries of delays. They expressed their opinion that when projects are delayed, contractors ask for upward review of their contract sum, thus could make more profit as a result of the revised contract price. The researcher believes that this does not happen in all

cases. Sometimes, clients or project owners demand claims from contractors for delaying their projects. Secondly, when the negative impact of project delays such as poor public relation, litigation and many others are compared with the benefit that may be a result of contract price's review. The contractor does not really benefit from project delays. For instance, contracting firm who delay projects may be seen by the public and potential clients as bad contractors. This could lead to loss of future business opportunities by the contractor.

**Consultants as beneficiaries of project delays:**

28.9% of the overall respondents perceived consultants as beneficiaries of delays. They expressed the opinion that, when projects are delayed supervising consultants request for extension of their contract duration with the clients. This gives them the opportunity to make more income. Delays in completing a particular project by a consultant could hinder future offer of new jobs opportunities to such firms.

**Host communities as beneficiaries of delays:**

20.5% of respondents perceived projects' host communities as beneficiaries of delays. Most unskilled workers are usually sourced from host communities to encourage community-contractor cooperation. Some respondents commented that when projects are delayed, workers who are indigenes of the host community continue to stay on employment until such projects are completed. Secondly, they remarked that, delays in project execution could reveal poor quality workmanship which could have not been noticed until after defect liability period. If poor quality executed works are noticed early, there would be call for rework before final project completion.

Projects are executed to achieve an objective or a set of objectives, most often of huge benefits to the communities and the national economy. Delays therefore, hinder realisation of these benefits. Cost- benefit-analysis could confirm that projects objectives are more benefitting to communities than the benefits derived from project delays. Secondly, poor quality workmanship could be eliminated if

good vendors are engaged by the clients. Thus, the researcher believes that delays do not benefit the community.

**Sponsors/clients as beneficiaries of delays:**

9.6% of respondents perceived sponsors/clients as beneficiaries of delays.

These categories of respondents believed that, sponsors/clients could make claims from the contractors for delays caused by them. The researcher is of the opinion that, demand for claims could not be compared to actualisation of the project objectives. Therefore, sponsors/clients do not derive any benefit from project delays.

**5.1.7 Extent of project delays:**

Respondents perceived that, project delays mostly occur in roads/bridges, and shore protection/channelization projects. Construction works in the Niger Delta is challenged by weather. Adejuwon (2012) states that Niger Delta region experiences rainfall for eight months of the year. Since the above constructions are carried out externally, there is a high tendency for these projects to be delayed especially if the contractors and consultants do not have sufficient experience and skills in construction works in the Niger Delta terrain.

Roads/bridges constructions involve a lot of earth works while shore protection/channelization involves dredging and sand filling works, and the use of imported construction materials such as Reno mattresses, steel sheet piles and others. All these are weather-dependent activities, thus strict planning is required to meet project timelines. Constructions works in these categories of projects require more specialised equipment and manpower than the other types of infrastructures. The use of inexperienced vendors as contractors and consultants could therefore, negatively impact on the smooth execution of the project.

**5.2 Findings from the research study:**

This section contains an outline of findings from the research data analyses:

- The research instrument was considered generally valid and reliable.
- Project delays occur in all Niger Delta states (refer to table 4.1(f)).

- The main hypothesis and all sub-hypotheses were rejected. This implies that there are eleven significant causes of project delays and three significant effects of project delays in the Niger Delta region.
- Results of ANOVA show that all categories of respondents generally agreed on causes of delays, effects of delays, and extent of delays.
- Delays are experienced in all categories of business organizations (public service, multinational and private Companies)
- Respondents perceived that eleven causes of delays as most important out of the thirty-eight causes of project delays identified from literatures review.
- Respondents perceived that three effects of project delays as most important out of the eight effects of project delays identified from literature survey.
- Respondents perceived that roads/bridges, shore protection and channelization projects mostly experience delays.
- Most respondents (84.7%) perceived delays to be unbeneficial to the project objectives.
- Few respondents (12.5%) perceived that there were some benefits of delays.
- Some respondents believed that project stakeholders derive some form of benefits from delays.
- 48.2% of the overall respondents perceived contractors as beneficiaries of delays.
- 28.9% of the overall respondents perceived consultants as beneficiaries of delays.
- 20.5% of respondents perceived projects' host communities as beneficiaries of delays.
- 9.6% of respondents perceived sponsors/clients as beneficiaries of delays.
- 63% of the overall respondents expressed interest for a summary copy of the research to be sent to them.

### 5.3 Summary for the chapter:

The research questions and objectives have been successfully addressed in this study. Significant causes and effects of project delays in the Niger Delta region have been determined. Projects which mostly experience delays have also been ascertained. The above is sufficient to enable proposal to curtail/eliminate construction project delays in the Niger Delta region, Nigeria. This proposal is presented in chapter six.

## CHAPTER SIX

### 6.0 CONCLUSIONS AND RECOMMENDATIONS:

This chapter covers the implications of the research findings on the research objectives. It contains limitations of the research and contributions of the research to the existing body of knowledge. Recommendations are made on how to curtail construction project delays in the Niger Delta region. Finally, areas of further studies are highlighted.

#### 6.1 Conclusions:

Conclusions drawn from the discussions in chapter five and the research findings are presented thus:

##### 6.1.1 Causes of project delays:

Project delays are universal phenomenon. Thirty-eight causes of project delays were identified from related literatures. Respondents perceived that eleven causes were most important in the Niger Delta region, namely:

- Youth unrest, militancy and communal crises
- Inadequate planning by the contractors
- Delay or non-payment of compensation to the community
- Wrong choice of consultants and contractors by the clients
- Weather condition; poor contract management by the consultants
- Late identification and resolution of drawings and specification errors and omissions by the consultants
- Lack of community buy-in
- Poor contract management by the consultants
- Inappropriate design by the consultants
- Unrealistic contract duration by the clients
- Poor coordination of subcontractors by the contractors.

#### 6.1.2 Effects of project delays:

Effects of project delays are negative. Eight effects of delays were identified from a review of related literatures. Three effects were perceived by the respondents as most important (significant), namely:

- Time overrun
- Budget overrun
- Disputes and claims

#### 6.1.3 Extent of project delays:

Seven categories of infrastructural projects were investigated in this study. Respondents perceived that delays were mostly prominent in the following two categories of projects:

- Roads/bridges
- Shore protection and channelization.

#### 6.1.4 Occurrences of project delays in different organisations:

Project delays were experienced in the three major types of business organisations (Public service, multinational companies and private companies). Delays were also experienced in all types of project management organisations (Projectised, matrix and functional organisations).

#### 6.1.5 Perceptions of the stakeholders on project delays:

All major stakeholders: Sponsors/clients, consultants and contractors agreed on the causes and effects of project delays identified from literature surveys.

#### 6.1.6 Project delays in the Niger Delta states:

Respondents perceived that, all nine states of the Niger Delta region experience delays in project execution.

#### 6.1.7 Benefits of project delays:

There are no significant benefits of project delays. The perceived benefits to stakeholders are negated by the impacts of project delays.

#### 6.2 Limitations of the study:

This research study was carried out on developmental projects in the Niger Delta region. Literatures and questionnaire surveys were the methods used to source for data. The research study was also limited by the activities of militants in the Niger Delta region which hindered collection of data at the various project sites.

#### 6.3 Contributions of the research to the existing body of knowledge:

The following are the contributions of this research study to the existing body of knowledge:

- Design and construction of a questionnaire that could be adapted for the collection of multivariate data from project practitioners in the Niger Delta region.
- Determination of most important causes of project delays in the Niger Delta region.
- Determination of most important effects of construction project delays in the Niger Delta region.
- Determination of projects that mostly experience construction delays.
- Establishing that there were no tangible benefits of construction project delays.

#### 6.4 Recommendations:

The recommendations for this study are organised into two: recommendations to reduce project delays and recommendations for further studies.

##### 6.4.1 Recommendations to reduce construction project delays:

Recommendations are made based on the major causes of project delays determined from the study; these recommendations are considered as solutions to construction project delays in the Niger Delta region:

##### **Solutions to youth unrest, militancy and communal crises:**

The Amnesty and ex-militants' rehabilitation programme of the Federal Government of Nigeria should be sustained. Stakeholders in the Niger Delta region should intensify efforts in social re-orientation programme against violence

and violent related behaviours. Youths should be encouraged to participate in project conceptualisation and execution. Negative impacts of youth unrest, militancy and communal crises should be incorporated into school's curricula at all levels. Provisions for security should be made during project design. Youths of the project communities should be engaged and trained as project's police. There should be a systematic and careful management of communal crises in the region through the adoption of modern conflict resolution strategies such as non-violent communication (NCV) and dialogue. The Federal Government should proactively tackle the concerns of the Niger Delta youths rather than being reactionary. The Government should promote peace agenda in the region such as through education on importance of peace to socio-economic development, access to justice and more equitable distribution of resources (UNDP, 2006). There must be concerted efforts by the Niger Delta stakeholders towards full implementation of the Niger Delta regional Master Plan. Ejibunu (2007), states that full implementation of the Niger Delta Master Plan could end agitation by its People. Dialogue must be adapted to resolve communal crises. Niger Delta stakeholders should collaborate among themselves to execute corporate social responsibility projects. Ejibunu (2007) observes that, this approach could reduce agitations by aggrieved youths in the Niger Delta region.

**Solutions to inadequate planning by the contractors:**

Risk management planning must be done at the early stage of a project, communication management planning, All assumptions on the project must be carried out at the planning stage; All relevant stakeholders must be involved at the planning stage of the project. Contractors must set up framework for cash management at the planning stage, identify quality standards and work out modalities on how to satisfy them (PMBOK® Guide, 2004).

**Solution to delay or non-payment of compensation to the community:**

It is established that the Niger Delta region is volatile (Onomehebor, 2006). Payment of compensation funds should be made early enough so that the affected persons could be resettled on time. Thus less or no interference during

demolitions of structures on the project's right of way. There must adequate budgetary provisions for settlement of compensations claims.

**Solution to wrong choice of consultants and contractors by the clients:**

Clients should properly pre-qualify contractors and consultants before engaging them. The procurement laws of the Federal Government must be strictly followed. Toor and Ogunlana (2008) recommend reforms in procurement systems, value chain management and stakeholders' management as strategies to curtail construction delays.

**Solution to weather condition:**

Services of the weather forecaster should be employed during design, planning and execution stages of every construction project.

**Solutions to poor contract management by the consultants:**

Consultants should employ skilled project managers with requisite understanding in public sector project administration and management (Wirick, 2009). They must also adopt appropriate project management practices (Kaliba, *et al*, 2009).

**Solutions to late identification and resolution of drawings and specification errors and omissions by the consultants:**

All contract documents should be reviewed critically prior to award. Consulting firms should engage qualified and experienced manpower as staff. "Consultants should prepare and approve drawings on time, and monitor the work closely by making inspections at appropriate times" (Sambasivan and Soon, 2007).

**Solutions to lack of community buy-in:**

Project sponsors/clients should adequately consult with the expected beneficiaries of developmental projects so as to enhance their buy-ins. This should be undertaken during needs assessment and conceptualisation phase of every project.

UNDP (2006) recommends that, there should be a participatory planning and people-centred development agenda as a remedy to lack of community buy-in in socio-economic intervention programmes.

**Solutions to inappropriate design by the consultants:**

Consultants should engage in capacity building development programmes for their project staff (Abdul-Raham, 2008). “There should be a proper project conceptualization” (Obideyi, 2010).

**Solutions to unrealistic contract duration by the clients:**

Clients, contractor and consultants should negotiate and agree on realistic contract duration. Project kick-off meeting should be held before commencement of every project. During these meetings errors and omissions could be identified and resolved immediately. Contract duration can also be re-negotiated and agreed upon prior to commencement of execution.

**Solutions to poor coordination of subcontractors by the contractors:**

Contractors should employ experienced and skilled manpower as contract managers (Sambasivan and Soon, 2007). Subcontractors should be pre-qualified before engagement (Jo and Barry, 2008). There must be adequate communication between contractors and subcontractors. Project implementation plans should be prepared and discussed with the subcontractors.

**6.4.2 Recommendations for further studies:**

Further studies should be carried out using quantitative approach of data collection through the use of projects (secondary) data from the relevant organisations.

Comparative studies on extents of delays among the different types of business organisations and project management organisations should be investigated. This would enable researchers to ascertain the degree to which organisational structures impact on project completion timelines in the Niger Delta region, Nigeria.

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## **APPENDIX A: DEFINITION OF TERMS**

### **A1 Project:**

A Project is defined by Project Management Body of Knowledge as any undertaking with a defined starting point and clear objectives by which completion is identified. It also means a discrete undertaking with finite objectives such as time, cost and technical performance goals (PMBOK Guide, 2004).

Projects are broadly classified as private sector and public sector projects. Private sector projects are those undertaken by individuals and private companies while public sector projects are those undertaken to boost socio-economic lives of the people (Wirick, 2009).

### **A2 Project Management:**

“Project management means planning and controlling of schedules, costs and quality for a unique set of activities that will yield a defined outcome such as complex product or service” (Gryna, *et al*, 2007). For a project to be capable of

being managed, it must have a beginning, middle and an end. If there are no clearly defined aspirations along with a clear definition of the project and completion criteria, uncertainty will prevail and likelihood of arriving at an intended completion date on time will be reduced (Keane and Caletka, 2008).

**A3 Project stakeholders:**

Individuals or group of individuals who share a stake or an interest in the project are termed project stakeholders. They are those who are directly influenced by the project decisions or those who influence project decisions. They include: project team, contractors, consultants, customers (Haughey, 2010).

**A4 Project delays:**

A project is delayed when the planned schedule is not achieved (Ralls, 2005).

**A5 Phases of a project:**

“A Project phase is the division of a project time frame (or project life cycle) into the largest logical collection of related activities” (Onomehbor, 2006).

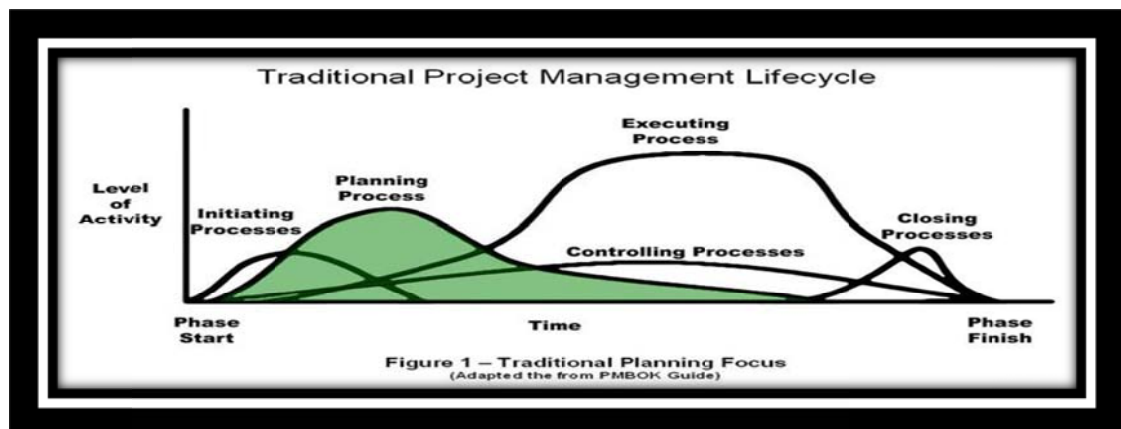
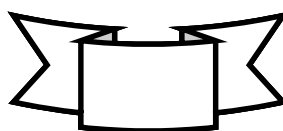


**Figure A1: Project life cycle** (Source: PMBOK, 2009)

Figure “A1” implies that any delay in a phase of the project leads to the overall project delay.



**A6 Developmental Partners in the Niger Delta region:**

Developmental partners are government and their agencies, multinational companies, private companies and Non- Governmental Organisations (NGO's) who carry out socio-economic projects for the region (NDDC, 2009). They sponsor construction of developmental projects in the region.

**A7 Public service:**

The Various tiers of governments and their agencies make up the public service.

**A8 Multinational Companies:**

Oil and gas companies and construction companies, who do businesses in many countries and have decentralised management structure, make up the multinational companies.

**A9 Private Companies:**

Non- public companies that operate within Nigeria or have their branches in other countries but without decentralised management structure make up the private companies. They include limited liability companies and registered business ventures that provide services in the construction industry.

## APPENDIX B: FEEDBACK FROM PILOT SUDY

**Table B1: Comments by respondents in the pilot survey**

| Survey code | Comments by respondents                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 001         | <ul style="list-style-type: none"> <li>• The questionnaire was easy to read. Ethics and why you are doing the survey are clear. Division and sub-division of questions are clear</li> <li>• There are some grammar and spelling mistakes that may be unclear</li> <li>• Repetitions can be avoided by stating things at the beginning of the question</li> <li>• Tell the interviewee that an explanation sheet is provided at the back, as they may only see it once they have answered the questions</li> <li>• The word “please” in front of questions is unnecessary and confusing</li> </ul> |
| 002         | <ul style="list-style-type: none"> <li>• The questionnaire was easy to understand</li> <li>• The survey should be taken to people in the field</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 007         | <ul style="list-style-type: none"> <li>• Use four level of choice instead of five</li> <li>• Remove beneficiary from the demographic data section. These people are not relevant in providing answers to this type of survey.</li> <li>• Frequently your wording is very negative (for example “poor”, “wrong”). This may make the respondents to give erroneous answers especially when they are the causes of delays</li> </ul>                                                                                                                                                                 |
| 010         | <ul style="list-style-type: none"> <li>• Include page numbering in the questionnaire</li> <li>• Remove “please” at the beginning of questions</li> <li>• Change “1- unlikely” and “2-uncertain” to “1- very unlikely” and “2- unlikely”</li> <li>• Give a white background for participant’s e-mail to be written.</li> </ul>                                                                                                                                                                                                                                                                     |

|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 016 | <ul style="list-style-type: none"><li>• It seems great, easy to understand</li><li>• The design is great and it seems very thorough</li><li>• There are some grammatical problems.</li><li>• The chances of awareness need to be improved. “Uncertain” should be taken off the scale because it does not fall between unlikely and likely- it is more of a “not applicable” answer, instead you should replace it with “somewhat likely”.</li><li>• Also in question 4(a) you should take off the please and just start the question with “Do delays ...”</li><li>• Great job!</li></ul>                                         |
| 018 | <ul style="list-style-type: none"><li>• Yes the survey was easy to understand. The survey is sufficient in its choice of question as it reflects the Nigerian project environment</li><li>• The survey will enhance project completion and as such reduce overhead by the time the recommendation of this survey is applied.</li><li>• Certain section of the survey could be administered to site workers to get first- hand information on issue of community for example. Otherwise, the projects managers may misinform by either understating the effect of community unrest on project completion in the region.</li></ul> |
| 020 | <ul style="list-style-type: none"><li>• Yes it was easy to understand</li><li>• It’s a way of exposing those loopholes in contract delays and completion</li><li>• They could have created a section dwelling on corruption as a factor to the Delta in particular and the Nation in general in completion of projects.</li></ul>                                                                                                                                                                                                                                                                                                |
| 021 | <ul style="list-style-type: none"><li>• The survey was easy to understand. The subject matter is of important.</li><li>• Simple language used and the flow of the questionnaire is logical</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                             |

|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|     | <ul style="list-style-type: none"> <li>• The survey is quite long, may need to reduce to the most likely parameter of interest.</li> <li>• The survey assumes completely, that there is always a delay; does not give options to organization who think they don't have any delay. A question stating thus "Do you experience delays in your project should be included. If "YES", Then the respondent to continue with the rest of the questions</li> <li>• What constitute a delay should be defined.</li> <li>• The questions should be coded appropriately early to ease data capturing, processing and analysis.</li> </ul>                                                  |
| 025 | <ul style="list-style-type: none"> <li>• The survey was fairly easy to understand and very politely worded.</li> <li>• The layout should be made simpler</li> <li>• Make grammatical corrections as stated on the questionnaire</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 027 | <ul style="list-style-type: none"> <li>• I think this is a good questionnaire. Jacob will be able to have some useful information to enable him carry out his research.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 029 | <ul style="list-style-type: none"> <li>• Remove "please" at the beginning of questions</li> <li>• Include "clear scope of work" as client related issues on causes of project delays.</li> <li>• Include risk allowance (financial) on project budget</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 032 | <ul style="list-style-type: none"> <li>• As the questionnaire sits now, I find that the research questions are far too broad for a Masters. In order to answer the research questions adequately, I feel there should be tighter emphasis on specific role players within the management of projects. For instance, who are the key role players in project management who would best answer the questions set out in the questionnaire? By this I mean, is the sponsor or the consultant most important? Is it the contractor? To ask all of them to answer the question would undermine the clarity of the questions. I would narrow to two category of involvement.</li> </ul> |

|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|     | <ul style="list-style-type: none"><li>• I would also say that there needs to be more specificity in terms of the organizations that would be pertinent to answering the research questions adequately. Public service, multinational, private and NGO projects come from different perspectives, and have different requirements. It is asking perhaps a bit much of a Master's thesis to answer for so many different types of organizational project management</li><li>• I would recommend choosing two types of organization and two "natures of involvement in project execution". This makes answering the research questions far more manageable.</li><li>• Should the questionnaire be kept as it is, then there should be enough data for a PhD thesis, rather than a Master's thesis. Perhaps then, the paper should be converted to a PhD? This is a question for Jacob to answer for himself.</li></ul> |
| 033 | <ul style="list-style-type: none"><li>• It was easy to understand. I thought it is time consuming</li><li>• It covers all aspects of project management</li><li>• It must not be too long</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

**APPENDIX C: SCANNED COPY OF RESEARCH QUESTIONNAIRE**

Reference no. \_\_\_\_\_



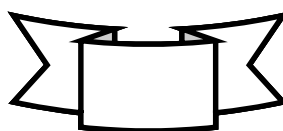
**A SURVEY ON SOLUTIONS TO PROJECT DELAYS IN THE  
NIGER DELTA REGION, NIGERIA**

**BY**

**UNWANA JACOB**  
*[MSc(Eng), Industrial Engineering candidate]*

SCHOOL OF MECHANICAL, INDUSTRIAL AND AERONAUTICAL ENGINEERING,  
UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG, SOUTH AFRICA

MARCH, 2011



**INTRODUCTION:**

I am Mr Unwana Jacob, an MSc (Eng) candidate in the faculty of Engineering and the Built Environment, University of the Witwatersrand, Johannesburg, South Africa.

I am conducting a survey titled: "SOLUTIONS TO PROJECT DELAYS IN THE NIGER DELTA REGION, NIGERIA". This survey has been approved by the human research ethics' committee of the University (Protocol number: H100 1115).

Project delay is one of the most recurring problems in the construction industry all over the world. Several attempts by the project professionals and construction specialists to tackle them have proven unsuccessful (Carnell, 2008 & Yang, et' al, 2010). The effect of project delays is a major concern in the Niger Delta region, where provisions of infrastructures and facilities is key to a sustained socio-economic development of the region and the entire Nigerian nation at large in view of the obvious reason- crude oil exploration which provides 80% of the country's income.

**RESEARCH OBJECTIVES:**

The objectives of this research are: (a) To determine the causes of delays and their effects on construction projects in the Niger Delta Region. (b) To investigate how the delays could be eliminated or minimised. (c) To investigate whether there are benefits of project delays.

**INFORMATION TO THE PARTICIPANTS:**

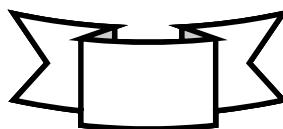
- ❖ I will like to invite you to participate in this study by answering this short survey.
- ❖ I expect that this questionnaire would take about **15 minutes** to complete.
- ❖ All the information gathered here will be kept strictly confidential and will be used only for research and analysis without mentioning a person's or a company's name.
- ❖ Your participation is voluntary. Refusal to participate will involve no penalty or loss of benefits to which you are entitled to. You may discontinue your participation at any time without penalty or loss of benefits.
- ❖ There are no foreseeable risks, discomforts, side effects or benefits in this study but the information you provide may be useful in the future for policy formulation and advice.
- ❖ When you submit this questionnaire, it will not be possible for anyone to establish your identity. Your responses will be combined with those of other participants and will be reported by me as "Solutions to project delays in the Niger Delta Region, Nigeria" None of the reported data will capture individual participant's responses.
- ❖ A free summary report will be delivered to you. Please indicate your interest by supplying your e-mail address at the end of the survey.
- ❖ Please mail or post the answered questionnaire as soon as you can, as timely reply is very crucial for our analysis. Upon completion of the study, the final report will be submitted to my university for examination purpose and may be published at a later date.

*For more details, please contact:*

Mr. Unwana Jacob (MSc candidate, WITS)/  
Asst. Manager, PMS (Western Division)  
NDDC, 167 Aba Road, Port Harcourt  
Tel: +2348033367999(SMS only); +27783800537  
E-mail: [unwana.jacob@yahoo.com](mailto:unwana.jacob@yahoo.com)

Ms. Bernadette P. Sunjka  
Supervisor/Senior Lecturer,  
School of Mechanical, Industrial & Aeronautical  
Engineering, University of the Witwatersrand  
(WITS), Johannesburg, South Africa  
Tel: +27117177367 E-mail: [Bernadette.Sunjka@wits.ac.za](mailto:Bernadette.Sunjka@wits.ac.za)

THANK YOU FOR YOUR TIME



CONSENT FORM:

I hereby agree to participate in this survey on "SOLUTIONS TO PROJECT DELAYS IN THE NIGER DELTA REGION, NIGERIA".

I understand that I am participating freely and without being coerced in any way to do so. I also understand that I can stop completing the questionnaire at any time and withdraw as participant in the research.

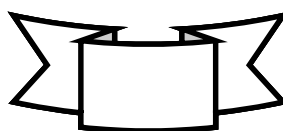
I have received the details of a person to contact should I need to speak about any issue which may arise from this survey.

I understand that my answers will be anonymous and will remain entirely confidential.

If you agree with the above, please endorse your signature below:

Signature.....

Date.....



**DEMOGRAPHIC INFORMATION:**

**TYPE OF BUSINESS ORGANIZATION:** Choose which is appropriate to you by indicating with an x

Public Service ☐

Multinational ☐

Private ☐

**NATURE OF INVOLVEMENT IN PROJECT EXECUTION:** How is your organization involved in project execution? Choose which is appropriate to you by indicating with an x

Sponsor (Client) ☐

Consultant ☐

Contractor ☐

**POSITION IN THE ORGANIZATION:** What is your job position in your organization? Choose which is appropriate to you by indicating with an x

Management Staff ☐

Field/Project Staff ☐

**ORGANIZATION'S PROJECT MANAGEMENT STRUCTURE:** Please choose which is appropriate to your organization by indicating with an x

Projectized ☐

Functional ☐

Matrix(Combined Functional & Projectized) ☐

Not sure (Please explain)

**TYPE OF PROJECTS EXECUTED:** Indicate which project(s) is (are) executed by your organization by marking with an x

Building ☐

Electrification ☐

Water ☐

Road & Bridges ☐

Jetty, Shore Protection & Channelization ☐

Others (Please specify)

**LOCATIONS OF PROJECTS IN THE NIGER DELTA:** Which state(s) does (do) your organization execute projects? Indicate with an x

ABIA ☐

AKWA IBOM ☐

BAYELSA ☐

CROSS RIVER ☐

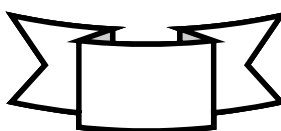
DELTA ☐

EDO ☐

IMO ☐

ONDO ☐

RIVERS ☐

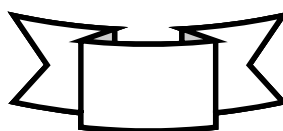


**QUESTION 1 (a):** Indicate which of these are the most important causes of delays in your project(s)?

Please rate them accordingly by marking with an x.

Scale of Chance of Occurrence: 1-Very Unlikely, 2-Unlikely, 3-Likely, 4-Almost certain, 5-Certain

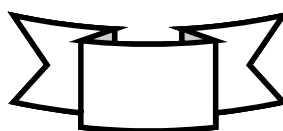
|                                                 | 1                     | 2                     | 3                     | 4                     | 5                     | (If you are unsure of the meaning, refer to the attached sheets on Appendices i & ii for explanations on the issues)<br>You may clarify your choice here |
|-------------------------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>CLIENTS RELATED ISSUES</b>                   |                       |                       |                       |                       |                       |                                                                                                                                                          |
| Impractical allocation resources                | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                                          |
| Design alterations & change orders              | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                                          |
| Insufficient funding                            | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                                          |
| Delay or Non-payment For Completed works        | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                                          |
| Slow decision making                            | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                                          |
| Wrong choice of Consultants & contractors       | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                                          |
| Interference with project performance           | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                                          |
| Unrealistic contract duration                   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                                          |
| <b>CONTRACTORS RELATED ISSUES</b>               |                       |                       |                       |                       |                       |                                                                                                                                                          |
| Incompetent site management                     | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                                          |
| Inappropriate construction methods              | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                                          |
| Inadequate planning                             | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                                          |
| Poor coordination of subcontractors             | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                                          |
| Mistakes during construction stage              | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                                          |
| Wrong choice of Bankers                         | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                                          |
| Inadequate experience                           | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                                          |
| <b>LABOUR AND EQUIPMENT RELATED ISSUES</b>      |                       |                       |                       |                       |                       |                                                                                                                                                          |
| Improper equipment selection & Faulty equipment | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                                          |
| Unskilled site manpower                         | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                                          |
| Labour disputes                                 | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                                          |
| <b>MATERIALS RELATED ISSUES</b>                 |                       |                       |                       |                       |                       |                                                                                                                                                          |
| Material shortages                              | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                                          |
| Poor quality materials                          | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                                          |



**QUESTION 1(a) CONT'D:** Indicate which of these are the most important causes of delays in your Project? Please rate them accordingly by marking with an x.

Scale of Chance of Occurrence: 1-Very unlikely, 2-Unlikely, 3-Likely, 4-Almost certain, 5-Certain

|                                                                                 | 1                     | 2                     | 3                     | 4                     | 5                     | (If you are unsure of the meaning, refer to the attached sheets on appendices i & ii for explanations on the issues)<br>You may clarify your choice here |
|---------------------------------------------------------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>CONSULTANTS RELATED ISSUES:</b>                                              |                       |                       |                       |                       |                       |                                                                                                                                                          |
| Inappropriate design                                                            | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                                          |
| Poor contract management                                                        | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                                          |
| Late preparation of drawings and other contract documents                       | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                                          |
| Over inspection                                                                 | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                                          |
| Inappropriate coordination of information                                       | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                                          |
| Long waiting time for inspection & testing                                      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                                          |
| Improper contract packaging/delivery strategy                                   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                                          |
| Late identification & resolution of drawings & specification errors & omissions | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                                          |
| <b>COMMUNITY RELATED ISSUES:</b>                                                |                       |                       |                       |                       |                       |                                                                                                                                                          |
| Youth unrest, Militancy & communal crises                                       | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                                          |
| Lack of community buy-in                                                        | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                                          |
| Delay or Non-payment of Compensation                                            | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                                          |
| <b>CONTRACTUAL RELATIONSHIP &amp; RELATED ISSUES:</b>                           |                       |                       |                       |                       |                       |                                                                                                                                                          |
| Major disputes & negotiations                                                   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                                          |
| Lack of adequate communication between the parties                              | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                                          |
| Wrong organizational structure linking to the project                           | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                                          |
| <b>EXTERNAL CAUSES:</b>                                                         |                       |                       |                       |                       |                       |                                                                                                                                                          |
| Weather condition                                                               | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                                          |
| Natural disasters (Flood, thunderstorm, etc)                                    | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                                          |
| Change in government's leadership & policies                                    | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                                          |
| Interference by political leaders                                               | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                                          |



**QUESTION TWO:** Indicate which of these are mostly, the effects of delays on your project(s)?  
Please rate them by marking with an x.

(Scale of Chance of Occurrence: 1-Very unlikely, 2-Unlikely, 3-Likely, 4-Almost certain, 5-Certain)

|                                | 1                     | 2                     | 3                     | 4                     | 5                     | You may clarify your choice here |
|--------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|----------------------------------|
| Time overrun                   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                  |
| Budget overrun                 | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                  |
| Bad public relations           | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                  |
| Poor quality completed project | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                  |
| Litigation                     | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                  |
| Total abandonment              | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                  |
| Disputes & claims              | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                  |
| Arbitration                    | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                  |
| Others (specify & explain)     |                       |                       |                       |                       |                       |                                  |

**QUESTION THREE (a):** Do delays in your project(s) have positive impacts on the project(s)? Please indicate which is appropriate to you by marking with an x

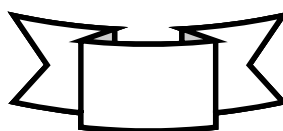
YES ☐

NO ☐

NOT SURE ☐

Please explain briefly

|  |
|--|
|  |
|--|



**QUESTION THREE (b):** Indicate who benefits from your project(s) delays? Choose which is appropriate by marking with an x

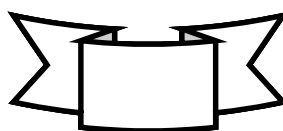
CLIENT ☐ CONSULTANT ☐ CONTRACTOR ☐ BENEFITTING COMMUNITY ☐

What are these benefits?  
Please explain

**QUESTION FOUR:** Indicate which of your projects usually experience delays? Choose which is most appropriate to your organization by marking with an x

(Scale of Chance of Occurrence: 1-Very unlikely, 2-Unlikely, 3-Likely, 4-Almost certain, 5-Certain)

|                                 | 1                     | 2                     | 3                     | 4                     | 5                     |
|---------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Buildings                       | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Electrification                 | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Jetty                           | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Roads/Bridges                   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Shore Protection/Channelization | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Water                           | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Others (please specify)         | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

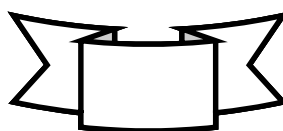


ADDITIONAL COMMENTS:

Please provide comments on what you think are generally the problems affecting timely completion of your projects. (You may attach additional sheet):

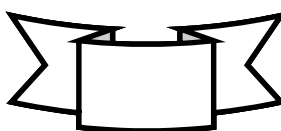
**PARTICIPANT'S E-mail** Please write your e-mail address here if you would like a summary copy of this research to be sent to you

.....



**BRIEF CLARIFICATION ON THE FACTORS CAUSING PROJECTS DELAYS**

| <b>CLIENTS' RELATED ISSUES:</b>                                                |                                                                                                                                                                                            |
|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Impractical resources allocation                                               | Funds, manpower, materials, equipment, etc allotted are inadequate to complete the project                                                                                                 |
| Design alterations & change orders                                             | Change in specifications and scope which were not considered originally                                                                                                                    |
| Insufficient funding                                                           | Funds are not adequately released during relevant phases of project execution                                                                                                              |
| Delay or Non-payment for completed works                                       | Milestones payments are not made on time, may be due to organizational lapses or bureaucracy                                                                                               |
| Slow decision making                                                           | Management takes long time more than necessary to give approval or make decisions on requests                                                                                              |
| Wrong choice of consultants & contractors                                      | Consultants & contractors with irrelevant experiences are appointed to partake in project design or/and execution                                                                          |
| Interference with project performance                                          | Project team is not given free hand to run the project professionally                                                                                                                      |
| Unrealistic contract duration                                                  | Contract duration stipulated cannot be achieved                                                                                                                                            |
| <b>CONSULTANTS' RELATED ISSUES:</b>                                            |                                                                                                                                                                                            |
| Poor design                                                                    | Design is faulty: does not capture construction site's situation such as topography or terrain & cannot meet conventional standards. This will require amendments during project execution |
| Poor contract management                                                       | Contract management processes & procedures are inadequate or not in place. This includes wrong deployment of staff                                                                         |
| Late preparation of drawings and other contract document                       | Drawings and other contract documents are not delivered on time especially after change orders have been made                                                                              |
| Over inspection                                                                | Inspections of site activities are done too often especially joint inspection which requires contractor's staff. This leads to loss of contractor's man hours                              |
| Poor coordination of information                                               | Wrong routing of mails and late/ non response to correspondences.                                                                                                                          |
| Long waiting time for inspection & testing                                     | Time lag between request for inspection or testing and when actual inspection or testing is carried-out especially for critical tasks.                                                     |
| Improper contract packaging/delivery strategy                                  | All relevant contractual provisions are not captured and /or detailed descriptions of the stakeholders' responsibilities are not made.                                                     |
| Late identification & resolution of drawing & specification errors & omissions | Delay in the resolution of errors implies delay in work completion especially for critical tasks.                                                                                          |
| <b>CONTRACTUAL RELATIONSHIP &amp; RELATED ISSUES:</b>                          |                                                                                                                                                                                            |
| Major disputes & negotiations                                                  | Disputes that involve law courts take time to resolve. This stalls work progress especially when there is a "stop work order".                                                             |
| Lack of adequate communication between the parties                             | Effective communication is key to project success. When parties don't have good channels of communication, issues can't be resolved on time.                                               |
| Wrong organizational structure linking to the project                          | Organizational structures without any or with inadequate project management methodologies and project execution strategies can never meet projects schedule                                |



**CONTRACTORS' RELATED ISSUES:**

|                                                |                                                                                                                                                                                                                                                                                           |
|------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Incompetent site management                    | Inability to follow work plan and approved construction processes                                                                                                                                                                                                                         |
| Poor construction methods                      | This introduces errors, hence rework and waste of resources.                                                                                                                                                                                                                              |
| Poor planning                                  | Failure to prepare a realistic work plan and relevant pre-construction documents in line with approved professional standards                                                                                                                                                             |
| Poor coordination of subcontractors & payments | When subcontractors are not properly coordinated and paid as at when due, materials supply to site will be delayed. Specialised work will not be delivered on time.                                                                                                                       |
| Mistakes during construction stage             | This leads to rework and use of resources meant for other activities                                                                                                                                                                                                                      |
| Wrong choice of Bankers                        | Choosing banks without good organizational structure to run projects. Hence funds are not released to the contractor on time.                                                                                                                                                             |
| Inadequate experience                          | Type and magnitude of such a project has not been previously handled or no such project has been previously handled in the project environment. This implies that some time will be spent for learning. This also means a high tendency for construction errors and subsequently reworks. |

**LABOUR AND EQUIPMENT RELATED ISSUES:**

|                                                 |                                                                                                                  |
|-------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| Improper equipment selection & Faulty equipment | Wrong use of equipment may lead to time lags and faulty equipment causes loss of time due to repairs             |
| Unskilled site manpower                         | The use of unskilled manpower introduces construction errors, hence rework                                       |
| Labour disputes                                 | Strikes by labour union for better incentives, During strike action tools are down and site will be work stalled |

**MATERIALS RELATED ISSUES:**

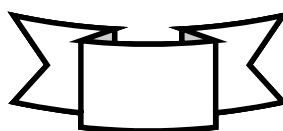
|                        |                                                                                          |
|------------------------|------------------------------------------------------------------------------------------|
| Materials shortages    | Shortages in basic materials like sand, cement, gravel, etc can hinder work progress     |
| Poor quality materials | Use of poor quality materials leads to poor workmanship, hence rework to make amendments |

**COMMUNITY RELATED ISSUES:**

|                                           |                                                                                                                                                                                          |
|-------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Youth unrest, Militancy & communal crises | These lead to construction site's insecurity, frequent stoppage of work and sometimes total abandonment                                                                                  |
| Lack of community buy-in                  | Projects which do not meet the immediate needs of the beneficiary community may experience lack of cooperation from the community. People only protect what they find valuable.          |
| Delay or Non-payment of Compensation      | When compensation issues are not settled on time, owners of compensable items may refuse their demolition and if the items are on the right of way or critical, work progress may stall. |

**EXTERNAL CAUSES:**

|                                              |                                                                                                                                                                                                                                                                                               |
|----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Weather condition                            | More rain than expected                                                                                                                                                                                                                                                                       |
| Natural disasters (Flood, Thunderstorm, etc) | Flood, Thunderstorm, hurricane, etc                                                                                                                                                                                                                                                           |
| Change in government's leadership & policies | Change in government leadership may lead to change in policy on procurement, changes in fiscal & monetary policies, changes in prices of materials, equipment, etc. Any change in prices of major petroleum products will increase cost of construction materials and cost of equipment hire. |
| Interference by political leaders            | Requests by the political leaders (For example Governors, Senators, House of Representative members, etc) for execution of scope outside those captured in the original contract.                                                                                                             |



**LETTER OF INTRODUCTION FROM THE UNIVERSITY**



Private Bag 3  
WITS  
2050  
South Africa

17<sup>th</sup> November, 2010

To Whom It May Concern

**LETTER OF INTRODUCTION – JACOB UNWANA NYONG (399946)**

This letter serves to confirm that JACOB UNWANA NYONG (399946) is conducting a research project as a requirement for the completion of the degree of Master of Science in Engineering, in the School of Mechanical, Industrial & Aeronautical Engineering, for which he is registered. He is being supervised in this project by me, Ms. Bernadette Sunjka.

The research project is an investigation into PROJECT DELAYS in the Niger Delta region, Nigeria. He will, thus, require access to project data and project personnel from the developmental partners in order to facilitate his research.

This research will be conducted within the conventional ethical standard requirements for research as specified by the Human Research Ethics Committee (NON-MEDICAL) of the University of the Witwatersrand, Johannesburg, South Africa.

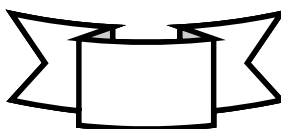
Your assistance and co-operation in the facilitation of Unwana Nyong's research would be much appreciated.

Yours faithfully,

A handwritten signature in black ink, appearing to read 'B. P. Sunjka', written over a horizontal line.

**B. P. Sunjka**  
**Senior Lecturer**  
*Supervisor/Postgraduate coordinator,  
School of Mechanical, Industrial and Aeronautical Engineering*

E-mail: [Bernadette.Sunjka@wits.ac.za](mailto:Bernadette.Sunjka@wits.ac.za)  
Tel: +27117177367



## APPENDIX D: WITS' RESEARCH ETHIC CLEARANCE LETTER

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

Division of the Deputy Registrar (Research)

HUMAN RESEARCH ETHICS COMMITTEE (NON MEDICAL)  
R14/49 Jacob

CLEARANCE CERTIFICATE

PROTOCOL NUMBER H100 1115

PROJECT

Projects delay in the Niger delta region Nigeria

INVESTIGATORS

Mr U Jacob

DEPARTMENT

Engineering

DATE CONSIDERED

12.11.2010

DECISION OF THE COMMITTEE\*

Approve Unconditionally

NOTE:

Unless otherwise specified this ethical clearance is valid for 2 years and may be renewed upon application

DATE 31.01.2011

CHAIRPERSON

(Professor R Thornton)

cc: Supervisor : Ms BP Sunjka

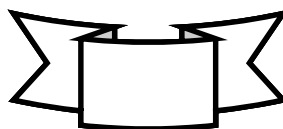
### DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10005, 10th Floor, Senate House, University.

I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. I agree to a completion of a yearly progress report.

Signature

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES



**APPENDIX E: DPR's APPROVAL LETTER FOR COLLECTION OF  
ACADEMIC DATA IN THE OIL & GAS COMPANIES**

**MINISTRY OF PETROLEUM RESOURCES**

DEPARTMENT OF PETROLEUM RESOURCES  
4 - 9 MOSCOW ROAD  
PORT HARCOURT.

P. M. B. No. 5103  
Telegrams PETRES  
Telephone 034-231876, 238418  
Telex 61139 NG.



PI/PH.BRS.5090/S.5/ 44

Ref: No.....

11<sup>TH</sup> MAY, 2011

Date .....

Chairman,  
OPTS,  
167 Aba Road,  
Port Harcourt  
Rivers State

Dear Sir,

**REQUEST FOR ACADEMIC DATA**

**MR. UNWANA NYONG JACOB** is Postgraduate Student of the Department Mechanical and Aeronautical Engineering, University of Witwatersrand Johannesburg.

He has applied for clearance to enable him obtain data required for his research project titled: **"SOLUTIONS TO PROJECT DELAYS IN THE NIGER DELTA REGION, NIGERIA."**

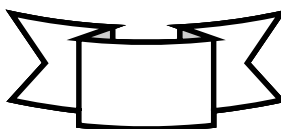
In view of the above, please provide **MR. UNWANA NYONG JACOB** with the necessary data, to enable him fulfills the academic requirement of the University.

He has been advised to handle the data with very strict confidentiality and to submit a copy each of his final report to this office and your Organization.

Yours faithfully,

  
**R.Y. AYAH**

For: Operations Controller, PHC



## APPENDIX F: RESULTS OF FACTOR ANALYSIS

Table F1: Summary of factor analysis conducted on the items for labour and equipment related causes of delays

| <b>Factor: Labour and equipment related issues</b><br>(Percentage of variance explained = 59.43%) | <b>Loadings</b> |
|---------------------------------------------------------------------------------------------------|-----------------|
| Unskilled site manpower                                                                           | 0.919           |
| Improper equipment selection & Faulty equipment                                                   | 0.811           |
| Labour disputes                                                                                   | 0.530           |

Table F2: Summary of factor analysis conducted on the items for contractors' related causes of delays

| <b>Factor: Contractors' related issues</b><br>(Percentage of variance explained = 53.60%) | <b>Loadings</b> |
|-------------------------------------------------------------------------------------------|-----------------|
| Poor coordination of subcontractors                                                       | 0.831           |
| Inappropriate construction methods                                                        | 0.824           |
| Inadequate planning                                                                       | 0.809           |
| Inadequate experience                                                                     | 0.749           |
| Mistakes during construction stage                                                        | 0.724           |
| Incompetent site management                                                               | 0.691           |
| Wrong choice of Bankers                                                                   | 0.407           |

Table F3: Summary of factor analysis conducted on the items for materials' related causes of delays

| <b>Factor: Materials' related issues</b><br>(Percentage of variance explained = 65.33%) | <b>Loadings</b> |
|-----------------------------------------------------------------------------------------|-----------------|
| Poor quality materials                                                                  | 0.808           |
| Material shortages                                                                      | 0.808           |

Table F4: Summary of factor analysis conducted on the items for consultants' related causes of delays

| <b>Factor: Consultants' related issues</b><br>(Percentage of variance explained = 50.91%) | <b>Loadings</b> |
|-------------------------------------------------------------------------------------------|-----------------|
| Inappropriate design                                                                      | 0.838           |
| Poor contract management                                                                  | 0.830           |
| Late identification & resolution of drawings & specification errors & omissions           | 0.738           |
| Late preparation of drawings and other contract documents                                 | 0.688           |
| Improper contract packaging/delivery strategy                                             | 0.677           |
| Over inspection                                                                           | 0.840           |
| Long waiting time for inspection & testing                                                | 0.720           |
| Inappropriate coordination of information                                                 | 0.612           |

Table F5: Summary of factor analysis conducted on the items for community related causes of delays

| <b>Factor: Community related issues</b><br>(Percentage of variance explained = 53.39%) | <b>Loadings</b> |
|----------------------------------------------------------------------------------------|-----------------|
| Lack of community buy-in                                                               | 0.804           |
| Delay or Non-payment of Compensation                                                   | 0.751           |
| Youth unrest, Militancy & communal crises                                              | 0.627           |

Table F6: Summary of factor analysis conducted on the items for contractual relationship related causes of delays

| <b>Factor: Contractual relationship related issues</b><br>(Percentage of variance explained = 65.84%) | <b>Loadings</b> |
|-------------------------------------------------------------------------------------------------------|-----------------|
| Lack of adequate communication between the parties                                                    | 0.881           |
| Major disputes & negotiations                                                                         | 0.783           |
| Wrong organizational structure linking to the project                                                 | 0.766           |

Table F7: Summary of factor analysis conducted on the items for external causes of delays

| <b>Factor: External issues</b><br>(Percentage of variance explained = 52.72%) | <b>Loadings</b> |
|-------------------------------------------------------------------------------|-----------------|
| Weather condition                                                             | 0.810           |
| Change in government's leadership & policies                                  | 0.806           |
| Natural disasters (Flood, thunderstorm, etc)                                  | 0.647           |
| Interference by political leaders                                             | 0.620           |

# APPENDIX G: FREQUENCY TABLE AND MEAN SCORES FOR THE OVERALL RESPONDENTS' SCORING ON CAUSES OF DELAYS

Table G1: Frequency table and mean score for overall respondents' scoring on clients' related causes of project delays

| Factors                                   | Frequency of respondents' Scoring |          |        |                |         | Number of responses | Mean score | Rank |
|-------------------------------------------|-----------------------------------|----------|--------|----------------|---------|---------------------|------------|------|
|                                           | 1                                 | 2        | 3      | 4              | 5       |                     |            |      |
|                                           | Very unlikely                     | Unlikely | Likely | Almost certain | Certain |                     |            |      |
| Wrong choice of consultants & Contractors | 3                                 | 12       | 19     | 24             | 22      | 80                  | 3.63       | 1    |
| Unrealistic Contract duration             | 3                                 | 19       | 17     | 17             | 25      | 81                  | 3.52       | 2    |
| Design alterations & change orders        | 5                                 | 8        | 28     | 22             | 17      | 80                  | 3.48       | 3    |
| Slow decision making                      | 2                                 | 11       | 33     | 18             | 16      | 80                  | 3.44       | 4    |
| Delay or non-payment of completed works   | 7                                 | 17       | 28     | 11             | 18      | 81                  | 3.20       | 5    |
| Interference with Project performance     | 6                                 | 13       | 34     | 10             | 15      | 78                  | 3.19       | 6    |
| Impractical allocation of resources       | 6                                 | 13       | 36     | 13             | 9       | 77                  | 3.08       | 7    |
| Insufficient funding                      | 11                                | 22       | 16     | 16             | 16      | 81                  | 3.05       | 8    |

Table G2: Frequency table and mean score for overall respondents' scoring on community related causes of project delays

| Factors                                   | Frequency of respondents' scoring |          |        |                |         | Number of responses | Mean score | Rank |
|-------------------------------------------|-----------------------------------|----------|--------|----------------|---------|---------------------|------------|------|
|                                           | 1                                 | 2        | 3      | 4              | 5       |                     |            |      |
|                                           | Very unlikely                     | Unlikely | Likely | Almost certain | Certain |                     |            |      |
| Youth unrest, militancy & communal crises | 1                                 | 0        | 12     | 24             | 40      | 77                  | 4.33       | 1    |
| Delay or non-payment of compensation      | 2                                 | 7        | 22     | 28             | 18      | 77                  | 3.69       | 2    |
| Lack of community buy-in                  | 2                                 | 8        | 29     | 22             | 16      | 77                  | 3.55       | 3    |

Table G3: Frequency table and mean score for overall respondents' scoring on Materials' related causes of project delays

| Factors                | Frequency of respondents' scoring |          |        |                |         | Total number of responses | Mean score | Rank |
|------------------------|-----------------------------------|----------|--------|----------------|---------|---------------------------|------------|------|
|                        | 1                                 | 2        | 3      | 4              | 5       |                           |            |      |
|                        | Very unlikely                     | Unlikely | Likely | Almost certain | Certain |                           |            |      |
| Material shortages     | 5                                 | 10       | 25     | 25             | 14      | 79                        | 3.42       | 1    |
| Poor quality materials | 4                                 | 15       | 24     | 20             | 16      | 79                        | 3.37       | 2    |

Table G4: Frequency table and mean score for overall respondents' scoring on Contractors' related causes of project delays

| Factors                             | Frequency of respondents' scoring |          |        |                |         | Number of responses | Mean score | Rank |
|-------------------------------------|-----------------------------------|----------|--------|----------------|---------|---------------------|------------|------|
|                                     | 1                                 | 2        | 3      | 4              | 5       |                     |            |      |
|                                     | Very unlikely                     | Unlikely | Likely | Almost certain | Certain |                     |            |      |
| Inadequate planning                 | 1                                 | 10       | 19     | 24             | 27      | 81                  | 3.82       | 1    |
| Poor coordination of subcontractors | 0                                 | 15       | 26     | 24             | 16      | 81                  | 3.51       | 2    |
| Incompetent site management         | 3                                 | 10       | 26     | 25             | 15      | 79                  | 3.49       | 3    |
| Inadequate experience               | 7                                 | 6        | 29     | 17             | 21      | 80                  | 3.49       | 4    |
| Inappropriate construction methods  | 6                                 | 11       | 34     | 15             | 12      | 78                  | 3.21       | 5    |
| Mistakes during construction stage  | 0                                 | 15       | 39     | 17             | 7       | 78                  | 3.09       | 6    |
| Wrong choice of Bankers             | 17                                | 25       | 15     | 11             | 12      | 80                  | 2.50       | 7    |

Table G5: Frequency table and mean score for overall respondents' scoring on contractual relationship related causes of project delays

| Factors                                        | Frequency of respondents' scoring |          |        |                |         | Number of responses | Mean score | Rank |
|------------------------------------------------|-----------------------------------|----------|--------|----------------|---------|---------------------|------------|------|
|                                                | 1                                 | 2        | 3      | 4              | 5       |                     |            |      |
|                                                | Very unlikely                     | Unlikely | Likely | Almost certain | Certain |                     |            |      |
| Lack of adequate communication between parties | 2                                 | 9        | 37     | 16             | 15      | 79                  | 3.42       | 1    |

|                                                       |   |    |    |    |    |    |      |   |
|-------------------------------------------------------|---|----|----|----|----|----|------|---|
| Major disputes & negotiations                         | 5 | 12 | 25 | 24 | 12 | 78 | 3.33 | 2 |
| Wrong organizational structure linking to the project | 1 | 15 | 30 | 23 | 9  | 78 | 3.31 | 3 |

Table G6: Frequency table and mean score for overall respondents' scoring on external causes of project delays

| Factors                                             | Frequency of respondents' scoring |          |        |                |         | Number of respondents | Mean score | Rank |
|-----------------------------------------------------|-----------------------------------|----------|--------|----------------|---------|-----------------------|------------|------|
|                                                     | 1                                 | 2        | 3      | 4              | 5       |                       |            |      |
|                                                     | Very unlikely                     | Unlikely | Likely | Almost certain | Certain |                       |            |      |
| Weather condition                                   | 2                                 | 13       | 20     | 24             | 19      | 78                    | 3.58       | 1    |
| Interference by political leaders                   | 5                                 | 10       | 28     | 14             | 21      | 78                    | 3.46       | 2    |
| Change in government's leadership & policies        | 10                                | 12       | 34     | 11             | 11      | 78                    | 3.01       | 3    |
| Natural disasters (flood, thunderstorm, and others) | 15                                | 23       | 22     | 6              | 12      | 78                    | 2.71       | 4    |

Table G7: Frequency table and mean score for overall respondents' scoring on consultants' related causes of project delays

| Factors                                                                         | Frequency of respondents' scoring |          |        |                |         | Number of respondents | Mean score | Rank |
|---------------------------------------------------------------------------------|-----------------------------------|----------|--------|----------------|---------|-----------------------|------------|------|
|                                                                                 | 1                                 | 2        | 3      | 4              | 5       |                       |            |      |
|                                                                                 | Very unlikely                     | Unlikely | Likely | Almost certain | Certain |                       |            |      |
| Poor contract management                                                        | 1                                 | 8        | 33     | 18             | 17      | 77                    | 3.55       | 1    |
| Late identification & resolution of drawings & specification errors & omissions | 1                                 | 10       | 27     | 24             | 15      | 77                    | 3.55       | 1    |
| Inappropriate design                                                            | 2                                 | 15       | 21     | 20             | 21      | 79                    | 3.54       | 2    |
| Late preparation of drawings & other contract documents                         | 2                                 | 9        | 37     | 16             | 15      | 79                    | 3.42       | 3    |
| Inappropriate coordination of information                                       | 4                                 | 10       | 38     | 16             | 11      | 79                    | 3.26       | 4    |
| Long waiting time for inspection & testing                                      | 4                                 | 15       | 28     | 20             | 11      | 78                    | 3.24       | 5    |
| Improper contract packaging/delivery strategy                                   | 5                                 | 15       | 28     | 19             | 12      | 79                    | 3.23       | 6    |
| Over inspection                                                                 | 26                                | 26       | 14     | 8              | 3       | 77                    | 2.17       | 7    |

**APPENDIX H: MEAN SCORES AND STANDARD DEVIATIONS FOR CAUSES OF DELAYS**

Table H: Mean scores and standard deviation for categories of causes of delays

| Categories of causes of delays   | Valid number | Mean score | Standard deviation |
|----------------------------------|--------------|------------|--------------------|
| Clients' related                 | 80           | 3.33       | 0.749043           |
| Contractors' related             | 79           | 3.34       | 0.789653           |
| Labour & equipment related       | 80           | 3.41       | 0.851077           |
| Materials' related               | 79           | 3.39       | 0.918719           |
| Consultants' related             | 78           | 3.24       | 0.74313            |
| Community related                | 77           | 3.85       | 0.701905           |
| Contractual relationship related | 79           | 3.35       | 0.833717           |
| External issues                  | 78           | 3.19       | 0.861502           |

## APPENDIX I: RANKING OF MEAN SCORES ON CAUSES OF DELAYS

**Table I: Ranking of respondents' mean scores for all causes of delays**

| <b>Factors</b>                                                                  | <b>Number of Responses</b> | <b>Mean</b> | <b>Rank</b> | <b>Standard deviation</b> |
|---------------------------------------------------------------------------------|----------------------------|-------------|-------------|---------------------------|
| Youth unrest, militancy & communal crises                                       | 77                         | 4.33        | 1           | 0.834                     |
| Inadequate planning                                                             | 81                         | 3.82        | 2           | 1.074                     |
| Delay or non-payment of compensation                                            | 77                         | 3.69        | 3           | 1.020                     |
| Wrong choice of consultants & Contractors                                       | 80                         | 3.63        | 4           | 1.151                     |
| Weather condition                                                               | 78                         | 3.58        | 5           | 1.111                     |
| Lack of community buy-in                                                        | 77                         | 3.55        | 6           | 1.016                     |
| Poor contract management                                                        | 77                         | 3.55        | 6           | 0.994                     |
| Late identification & resolution of drawings & specification errors & omissions | 77                         | 3.55        | 6           | 0.994                     |
| Inappropriate design                                                            | 79                         | 3.54        | 7           | 1.152                     |
| Unrealistic Contract duration                                                   | 81                         | 3.52        | 8           | 1.256                     |
| Poor coordination of subcontractors                                             | 81                         | 3.51        | 9           | 1.014                     |
| Inadequate experience                                                           | 80                         | 3.49        | 10          | 1.212                     |
| Incompetent site management                                                     | 79                         | 3.49        | 10          | 1.061                     |
| Design alterations & change orders                                              | 80                         | 3.48        | 11          | 1.125                     |
| Interference by political leaders                                               | 78                         | 3.46        | 12          | 1.203                     |
| Improper equipment selection & faulty equipment                                 | 80                         | 3.45        | 13          | 1.042                     |
| Slow decision making                                                            | 80                         | 3.44        | 14          | 1.041                     |
| Late preparation of drawings & other contract documents                         | 79                         | 3.42        | 15          | 1.008                     |

|                                                       |    |      |    |       |
|-------------------------------------------------------|----|------|----|-------|
| Material shortages                                    | 79 | 3.42 | 16 | 1.116 |
| Lack of adequate communication between parties        | 79 | 3.42 | 16 | 1.008 |
| Labour disputes                                       | 80 | 3.41 | 17 | 1.280 |
| Unskilled site manpower                               | 80 | 3.39 | 18 | 1.061 |
| Poor quality materials                                | 79 | 3.37 | 19 | 1.157 |
| Major disputes & negotiations                         | 78 | 3.33 | 20 | 1.113 |
| Wrong organizational structure linking to the project | 78 | 3.31 | 21 | 0.958 |
| Inappropriate coordination of information             | 79 | 3.26 | 22 | 1.019 |
| Long waiting time for inspection & testing            | 78 | 3.24 | 23 | 1.083 |
| Improper contract packaging/delivery strategy         | 79 | 3.23 | 24 | 1.120 |
| Inappropriate construction methods                    | 78 | 3.21 | 25 | 1.109 |
| Delay or non-payment of completed works               | 81 | 3.20 | 26 | 1.249 |
| Interference with Project performance                 | 78 | 3.19 | 27 | 1.163 |
| Mistakes during construction stage                    | 78 | 3.09 | 28 | 0.858 |
| Impractical allocation of resources                   | 77 | 3.08 | 29 | 1.061 |
| Insufficient funding                                  | 81 | 3.05 | 30 | 1.350 |
| Change in government's leadership & policies          | 78 | 3.01 | 31 | 1.179 |
| Natural disasters (flood, thunderstorm, and others)   | 78 | 2.71 | 32 | 1.300 |
| Wrong choice of Bankers                               | 80 | 2.50 | 33 | 1.354 |
| Over inspection                                       | 77 | 2.17 | 34 | 1.129 |

## APPENDIX J: ANOVA ON CAUSES OF DELAYS

**Table J1: ANOVA on causes of delays based on respondents' types of business organisation**

|                                                  |                       | <b>Sum of Squares</b> | <b>df</b> | <b>Mean Square</b> | <b>F</b> | <b>Sig.</b> |
|--------------------------------------------------|-----------------------|-----------------------|-----------|--------------------|----------|-------------|
| <b>Clients' related issues</b>                   | <b>Between Groups</b> | 0.05                  | 2         | 0.025              | 0.043    | 0.958       |
|                                                  | <b>Within Groups</b>  | 44.274                | 77        | 0.575              |          |             |
|                                                  | <b>Total</b>          | 44.324                | 79        |                    |          |             |
| <b>Contractors' related issues</b>               | <b>Between Groups</b> | 7.576                 | 2         | 3.788              | 7.012    | 0.002       |
|                                                  | <b>Within Groups</b>  | 41.061                | 76        | 0.54               |          |             |
|                                                  | <b>Total</b>          | 48.637                | 78        |                    |          |             |
| <b>Labour and equipment's related issues</b>     | <b>Between Groups</b> | 2.059                 | 2         | 1.029              | 1.437    | 0.244       |
|                                                  | <b>Within Groups</b>  | 55.163                | 77        | 0.716              |          |             |
|                                                  | <b>Total</b>          | 57.222                | 79        |                    |          |             |
| <b>Materials' related issues</b>                 | <b>Between Groups</b> | 1.192                 | 2         | 0.596              | 0.701    | 0.500       |
|                                                  | <b>Within Groups</b>  | 64.644                | 76        | 0.851              |          |             |
|                                                  | <b>Total</b>          | 65.835                | 78        |                    |          |             |
| <b>Consultants' related issues</b>               | <b>Between Groups</b> | 3.017                 | 2         | 1.508              | 2.864    | 0.063       |
|                                                  | <b>Within Groups</b>  | 39.506                | 75        | 0.527              |          |             |
|                                                  | <b>Total</b>          | 42.523                | 77        |                    |          |             |
| <b>Community's related issues</b>                | <b>Between Groups</b> | 1.858                 | 2         | 0.929              | 1.932    | 0.152       |
|                                                  | <b>Within Groups</b>  | 35.585                | 74        | 0.481              |          |             |
|                                                  | <b>Total</b>          | 37.443                | 76        |                    |          |             |
| <b>Contractual relationship's related issues</b> | <b>Between Groups</b> | 0.77                  | 2         | 0.385              | 0.547    | 0.581       |
|                                                  | <b>Within Groups</b>  | 53.447                | 76        | 0.703              |          |             |
|                                                  | <b>Total</b>          | 54.217                | 78        |                    |          |             |
| <b>External factors</b>                          | <b>Between Groups</b> | 0.466                 | 2         | 0.233              | 0.308    | 0.736       |
|                                                  | <b>Within Groups</b>  | 56.682                | 75        | 0.756              |          |             |
|                                                  | <b>Total</b>          | 57.148                | 77        |                    |          |             |

**Table J 2: ANOVA on causes of delays based on respondents' involvement in project execution**

| Factors                               | Categories of respondents | N  | Mean  | Std. Deviation | Std. Error | 95% Confidence Interval for Mean |             | Minimum | Maximum |
|---------------------------------------|---------------------------|----|-------|----------------|------------|----------------------------------|-------------|---------|---------|
|                                       |                           |    |       |                |            | Lower Bound                      | Upper Bound |         |         |
| Clients' related issues               | Sponsor/Client            | 43 | 3.200 | 0.64037        | 0.097656   | 3.0035                           | 3.39766     | 2.000   | 5.0     |
|                                       | Consultant                | 15 | 3.275 | 0.789439       | 0.203832   | 2.83782                          | 3.71218     | 1.875   | 4.5     |
|                                       | Contractor                | 22 | 3.500 | 0.901388       | 0.192177   | 3.10035                          | 3.89965     | 1.625   | 5.0     |
|                                       | Total                     | 80 | 3.296 | 0.749043       | 0.083746   | 3.13018                          | 3.46357     | 1.625   | 5.0     |
| Contractors' related issues           | Sponsor/Client            | 42 | 3.534 | 0.684071       | 0.105555   | 3.32084                          | 3.74719     | 2.000   | 5.0     |
|                                       | Consultant                | 15 | 3.057 | 0.590992       | 0.152593   | 2.72986                          | 3.38442     | 2.000   | 4.0     |
|                                       | Contractor                | 22 | 3.181 | 1.005507       | 0.214375   | 2.736                            | 3.62763     | 1.571   | 5.0     |
|                                       | Total                     | 79 | 3.345 | 0.789653       | 0.088843   | 3.16852                          | 3.52226     | 1.571   | 5.0     |
| Labour and equipment's related issues | Sponsor/Client            | 42 | 3.365 | 0.864254       | 0.133357   | 3.09576                          | 3.6344      | 1.667   | 5.0     |
|                                       | Consultant                | 15 | 3.155 | 0.547239       | 0.141297   | 2.8525                           | 3.45861     | 2.667   | 4.3     |
|                                       | Contractor                | 23 | 3.681 | 0.945368       | 0.197123   | 3.27235                          | 4.08997     | 1.667   | 5.0     |
|                                       | Total                     | 80 | 3.416 | 0.851077       | 0.095153   | 3.22727                          | 3.60606     | 1.667   | 5.0     |
| Materials' related issues             | Sponsor/Client            | 42 | 3.333 | 0.845841       | 0.130516   | 3.06975                          | 3.59692     | 1.500   | 5.0     |
|                                       | Consultant                | 15 | 3.466 | 0.972234       | 0.25103    | 2.92826                          | 4.00507     | 2.000   | 5.0     |
|                                       | Contractor                | 22 | 3.454 | 1.045502       | 0.222902   | 2.991                            | 3.91809     | 1.500   | 5.0     |
|                                       | Total                     | 79 | 3.392 | 0.918719       | 0.103364   | 3.18662                          | 3.59819     | 1.500   | 5.0     |
| Consultants' related issues           | Sponsor/Client            | 42 | 3.303 | 0.736744       | 0.113682   | 3.07399                          | 3.53316     | 1.875   | 5.0     |
|                                       | Consultant                | 15 | 3.083 | 0.670931       | 0.173234   | 2.71178                          | 3.45488     | 2.000   | 4.2     |
|                                       | Contractor                | 21 | 3.196 | 0.818317       | 0.178571   | 2.82394                          | 3.56892     | 1.625   | 4.6     |
|                                       | Total                     | 78 | 3.232 | 0.74313        | 0.084143   | 3.06482                          | 3.39992     | 1.625   | 5.0     |
| community's related issues            | Sponsor/Client            | 41 | 3.869 | 0.752323       | 0.117493   | 3.63246                          | 4.10738     | 2.000   | 5.0     |
|                                       | Consultant                | 15 | 3.755 | 0.58373        | 0.150718   | 3.4323                           | 4.07881     | 3.000   | 4.6     |
|                                       | Contractor                | 21 | 3.888 | 0.701849       | 0.153156   | 3.56941                          | 4.20837     | 2.667   | 5.0     |
|                                       | Total                     | 77 | 3.852 | 0.701905       | 0.07999    | 3.6935                           | 4.01213     | 2.000   | 5.0     |

**Table J 2 cont'd: ANOVA on causes of delays based on respondents' involvement in project execution**

|                                                  |                       |    |       |          |          |         |         |       |     |
|--------------------------------------------------|-----------------------|----|-------|----------|----------|---------|---------|-------|-----|
| <b>Contractual relationship's related issues</b> | <b>Sponsor/Client</b> | 41 | 3.398 | 0.771793 | 0.120534 | 3.15477 | 3.64198 | 2.000 | 5.0 |
|                                                  | <b>Consultant</b>     | 16 | 3.104 | 0.795532 | 0.198883 | 2.68026 | 3.52808 | 2.000 | 4.6 |
|                                                  | <b>Contractor</b>     | 22 | 3.348 | 0.973062 | 0.207457 | 2.91705 | 3.77992 | 1.667 | 5.0 |
|                                                  | <b>Total</b>          | 79 | 3.324 | 0.833717 | 0.093801 | 3.13815 | 3.51164 | 1.667 | 5.0 |
| <b>External factors</b>                          | <b>Sponsor/Client</b> | 41 | 3.091 | 0.918144 | 0.14339  | 2.80166 | 3.38127 | 1.000 | 5.0 |
|                                                  | <b>Consultant</b>     | 16 | 3.343 | 0.670044 | 0.167511 | 2.98671 | 3.70079 | 2.25  | 4.5 |
|                                                  | <b>Contractor</b>     | 21 | 3.261 | 0.889087 | 0.194015 | 2.8572  | 3.66661 | 1.75  | 4.7 |
|                                                  | <b>Total</b>          | 78 | 3.189 | 0.861502 | 0.097546 | 2.99486 | 3.38334 | 1.000 | 5.0 |

**Table J 3: Results of ANOVA on causes of delays based on respondents' involvement in project execution**

|                                              |                       | Sum of Squares | df | Mean Square | F     | Sig.  |
|----------------------------------------------|-----------------------|----------------|----|-------------|-------|-------|
| <b>Clients' related issues</b>               | <b>Between Groups</b> | 1.314          | 2  | 0.657       | 1.176 | 0.314 |
|                                              | <b>Within Groups</b>  | 43.011         | 77 | 0.559       |       |       |
|                                              | <b>Total</b>          | 44.324         | 79 |             |       |       |
| <b>Contractors' related issues</b>           | <b>Between Groups</b> | 3.329          | 2  | 1.665       | 2.792 | 0.068 |
|                                              | <b>Within Groups</b>  | 45.308         | 76 | 0.596       |       |       |
|                                              | <b>Total</b>          | 48.637         | 78 |             |       |       |
| <b>Labour and equipments' related issues</b> | <b>Between Groups</b> | 2.743          | 2  | 1.372       | 1.939 | 0.151 |
|                                              | <b>Within Groups</b>  | 54.479         | 77 | 0.708       |       |       |
|                                              | <b>Total</b>          | 57.222         | 79 |             |       |       |
| <b>Materials' related issues</b>             | <b>Between Groups</b> | 0.314          | 2  | 0.157       | 0.182 | 0.834 |
|                                              | <b>Within Groups</b>  | 65.521         | 76 | 0.862       |       |       |
|                                              | <b>Total</b>          | 65.835         | 78 |             |       |       |
| <b>Consultants' related issues</b>           | <b>Between Groups</b> | 0.573          | 2  | 0.287       | 0.512 | 0.601 |
|                                              | <b>Within Groups</b>  | 41.949         | 75 | 0.559       |       |       |

|                                                          |                       |        |    |       |       |       |
|----------------------------------------------------------|-----------------------|--------|----|-------|-------|-------|
|                                                          | <b>Total</b>          | 42.523 | 77 |       |       |       |
| <b>community' s<br/>related issues</b>                   | <b>Between Groups</b> | 0.181  | 2  | 0.091 | 0.180 | 0.836 |
|                                                          | <b>Within Groups</b>  | 37.262 | 74 | 0.504 |       |       |
|                                                          | <b>Total</b>          | 37.443 | 76 |       |       |       |
| <b>Contractual<br/>relationship's<br/>related issues</b> | <b>Between Groups</b> | 1.013  | 2  | 0.507 | 0.724 | 0.488 |
|                                                          | <b>Within Groups</b>  | 53.203 | 76 | 0.700 |       |       |
|                                                          | <b>Total</b>          | 54.217 | 78 |       |       |       |
| <b>External<br/>factors</b>                              | <b>Between Groups</b> | 0.885  | 2  | 0.442 | 0.590 | 0.557 |
|                                                          | <b>Within Groups</b>  | 56.263 | 75 | 0.750 |       |       |
|                                                          | <b>Total</b>          | 57.148 | 77 |       |       |       |

**Table J4: Summary of ANOVA on causes of delays based on respondents' involvement in project execution**

| <b>Factors</b>                        | <b>Categories of respondents</b> | <b>N</b>  | <b>Mean</b>    | <b>Std. Deviation</b> | <b>P- value</b> |
|---------------------------------------|----------------------------------|-----------|----------------|-----------------------|-----------------|
| Clients' related issues               | Sponsor/Client                   | 43        | 3.20058        | 0.640370              | 0.314           |
|                                       | Consultant                       | 15        | 3.27500        | 0.789439              |                 |
|                                       | Contractor                       | 22        | 3.50000        | 0.901388              |                 |
|                                       | <b>Total</b>                     | <b>80</b> | <b>3.29688</b> | <b>0.749043</b>       |                 |
| Contractors' related issues           | Sponsor/Client                   | 42        | 3.53401        | 0.684071              | 0.068           |
|                                       | Consultant                       | 15        | 3.05714        | 0.590992              |                 |
|                                       | Contractor                       | 22        | 3.18182        | 1.005507              |                 |
|                                       | <b>Total</b>                     | <b>79</b> | <b>3.34539</b> | <b>0.789653</b>       |                 |
| Labour and equipment's related issues | Sponsor/Client                   | 42        | 3.36508        | 0.864254              | 0.151           |
|                                       | Consultant                       | 15        | 3.15556        | 0.547239              |                 |
|                                       | Contractor                       | 23        | 3.68116        | 0.945368              |                 |
|                                       | <b>Total</b>                     | <b>80</b> | <b>3.41667</b> | <b>0.851077</b>       |                 |
| Materials' related issues             | Sponsor/Client                   | 42        | 3.33333        | 0.845841              | 0.834           |
|                                       | Consultant                       | 15        | 3.46667        | 0.972234              |                 |
|                                       | Contractor                       | 22        | 3.45455        | 1.045502              |                 |
|                                       | <b>Total</b>                     | <b>79</b> | <b>3.39241</b> | <b>0.918719</b>       |                 |

|                                           |                |           |                |                 |       |
|-------------------------------------------|----------------|-----------|----------------|-----------------|-------|
| Consultants' related issues               | Sponsor/Client | 42        | 3.30357        | 0.736744        | 0.601 |
|                                           | Consultant     | 15        | 3.08333        | 0.670931        |       |
|                                           | Contractor     | 21        | 3.19643        | 0.818317        |       |
|                                           | <b>Total</b>   | <b>78</b> | <b>3.23237</b> | <b>0.743130</b> |       |
| community' s related issues               | Sponsor/Client | 41        | 3.86992        | 0.752323        | 0.836 |
|                                           | Consultant     | 15        | 3.75556        | 0.583730        |       |
|                                           | Contractor     | 21        | 3.88889        | 0.701849        |       |
|                                           | <b>Total</b>   | <b>77</b> | <b>3.85281</b> | <b>0.701905</b> |       |
| Contractual relationship's related issues | Sponsor/Client | 41        | 3.39837        | 0.771793        | 0.488 |
|                                           | Consultant     | 16        | 3.10417        | 0.795532        |       |
|                                           | Contractor     | 22        | 3.34848        | 0.973062        |       |
|                                           | <b>Total</b>   | <b>79</b> | <b>3.32489</b> | <b>0.833717</b> |       |
| External factors                          | Sponsor/Client | 41        | 3.09146        | 0.918144        | 0.557 |
|                                           | Consultant     | 16        | 3.34375        | 0.670044        |       |
|                                           | Contractor     | 21        | 3.26190        | 0.889087        |       |
|                                           | <b>Total</b>   | <b>78</b> | <b>3.18910</b> | <b>0.861502</b> |       |

**Table J5: ANOVA on causes of delays based on respondents' positions in organization**

|                             |                      | N         | Mean           | Std. Deviation  | Std. Error    | 95% Confidence Interval for Mean |               | Minimum     | Maximum     |
|-----------------------------|----------------------|-----------|----------------|-----------------|---------------|----------------------------------|---------------|-------------|-------------|
|                             |                      |           |                |                 |               | Lower Bound                      | Upper Bound   |             |             |
| Clients' related issues     | Manageme nt staff    | 35        | 3.35357        | 0.599851        | 0.1013        | 3.1475                           | 3.5596        | 1.87        | 4.87        |
|                             | Field/Proje ct staff | 44        | 3.26705        | 0.855722        | 0.1290        | 3.0068                           | 3.5272        | 1.62        | 5.00        |
|                             | <b>Total</b>         | <b>79</b> | <b>3.30538</b> | <b>0.749932</b> | <b>0.0843</b> | <b>3.1374</b>                    | <b>3.4733</b> | <b>1.62</b> | <b>5.00</b> |
| Contractors' related issues | Manageme nt staff    | 35        | 3.26122        | 0.753133        | 0.1273        | 3.0025                           | 3.5199        | 1.71        | 4.71        |
|                             | Field/Proje ct staff | 43        | 3.4186         | 0.828545        | 0.1263        | 3.1636                           | 3.6735        | 1.57        | 5.00        |
|                             | <b>Total</b>         | <b>78</b> | <b>3.34799</b> | <b>0.794425</b> | <b>0.0899</b> | <b>3.1688</b>                    | <b>3.5271</b> | <b>1.57</b> | <b>5.00</b> |

|                                                   |                            |    |         |          |          |         |         |       |       |
|---------------------------------------------------|----------------------------|----|---------|----------|----------|---------|---------|-------|-------|
| <b>Labour and equipment's related issues</b>      | <b>Management staff</b>    | 36 | 3.25926 | 0.773001 | 0.1288   | 2.9977  | 3.5208  | 1.66  | 4.66  |
|                                                   | <b>Field/Project staff</b> | 43 | 3.55039 | 0.908175 | 0.1384   | 3.2708  | 3.8298  | 2.00  | 5.00  |
|                                                   | <b>Total</b>               | 79 | 3.41772 | 0.856463 | 0.0963   | 3.2258  | 3.6095  | 1.66  | 5.00  |
| <b>Materials' related issues</b>                  | <b>Management staff</b>    | 35 | 3.25714 | 0.81684  | 0.1380   | 2.9765  | 3.5377  | 1.5   | 5     |
|                                                   | <b>Field/Project staff</b> | 43 | 3.5     | 1        | 0.1524   | 3.1922  | 3.8077  | 1.5   | 5     |
|                                                   | <b>Total</b>               | 78 | 3.39103 | 0.924583 | 0.1046   | 3.1825  | 3.5994  | 1.5   | 5     |
| <b>Consultants' related issues</b>                | <b>Management staff</b>    | 35 | 3.27143 | 0.753964 | 0.1274   | 3.0124  | 3.5304  | 1.875 | 4.875 |
|                                                   | <b>Field/Project staff</b> | 43 | 3.20058 | 0.74159  | 0.1130   | 2.9735  | 3.4288  | 1.625 | 5     |
|                                                   | <b>Total</b>               | 78 | 3.23237 | 0.74313  | 0.0841   | 3.0648  | 3.3999  | 1.625 | 5     |
| <b>community' s related issues</b>                | <b>Management staff</b>    | 35 | 3.8     | 0.784657 | 0.1326   | 3.5304  | 4.0695  | 2     | 5     |
|                                                   | <b>Field/Project staff</b> | 42 | 3.89683 | 0.631118 | 0.0973   | 3.7001  | 4.0935  | 2.667 | 5     |
|                                                   | <b>Total</b>               | 77 | 3.85281 | 0.701905 | 0.0799   | 3.6935  | 4.0121  | 2     | 5     |
| <b>Contractual relationship' s related issues</b> | <b>Management staff</b>    | 36 | 3.23148 | 0.779986 | 0.129998 | 2.96757 | 3.4953  | 1.667 | 4.667 |
|                                                   | <b>Field/Project staff</b> | 43 | 3.4031  | 0.877581 | 0.13383  | 3.13302 | 3.67318 | 1.667 | 5     |
|                                                   | <b>Total</b>               | 79 | 3.32489 | 0.833717 | 0.093801 | 3.13815 | 3.51164 | 1.667 | 5     |
| <b>External factors</b>                           | <b>Management staff</b>    | 35 | 3.09286 | 0.92967  | 0.157143 | 2.7735  | 3.41221 | 1     | 4.5   |
|                                                   | <b>Field/Project staff</b> | 43 | 3.26744 | 0.804369 | 0.122665 | 3.01989 | 3.51499 | 1.75  | 5     |
|                                                   | <b>Total</b>               | 78 | 3.1891  | 0.861502 | 0.097546 | 2.99486 | 3.38334 | 1     | 5     |

**Table J6: Results of ANOVA on causes of delays based on position in organisation**

|                                |                       | <b>Sum of Squares</b> | <b>df</b> | <b>Mean Square</b> | <b>F</b> | <b>Sig.</b> |
|--------------------------------|-----------------------|-----------------------|-----------|--------------------|----------|-------------|
| <b>Clients' related issues</b> | <b>Between Groups</b> | 0.146                 | 1         | 0.146              | 0.257    | 0.614       |
|                                | <b>Within Groups</b>  | 43.721                | 77        | 0.568              |          |             |
|                                | <b>Total</b>          | 43.867                | 78        |                    |          |             |
| <b>Contractors'</b>            | <b>Between Groups</b> | 0.478                 | 1         | 0.478              | 0.755    | 0.388       |

|                                                  |                       |        |    |       |       |       |
|--------------------------------------------------|-----------------------|--------|----|-------|-------|-------|
| <b>related issues</b>                            | <b>Within Groups</b>  | 48.118 | 76 | 0.633 |       |       |
|                                                  | <b>Total</b>          | 48.595 | 77 |       |       |       |
| <b>Labour and equipments' related issues</b>     | <b>Between Groups</b> | 1.661  | 1  | 1.661 | 2.302 | 0.133 |
|                                                  | <b>Within Groups</b>  | 55.554 | 77 | 0.721 |       |       |
|                                                  | <b>Total</b>          | 57.215 | 78 |       |       |       |
| <b>Materials' related issues</b>                 | <b>Between Groups</b> | 1.138  | 1  | 1.138 | 1.337 | 0.251 |
|                                                  | <b>Within Groups</b>  | 64.686 | 76 | 0.851 |       |       |
|                                                  | <b>Total</b>          | 65.824 | 77 |       |       |       |
| <b>Consultants' related issues</b>               | <b>Between Groups</b> | 0.097  | 1  | 0.097 | 0.173 | 0.678 |
|                                                  | <b>Within Groups</b>  | 42.426 | 76 | 0.558 |       |       |
|                                                  | <b>Total</b>          | 42.523 | 77 |       |       |       |
| <b>community's related issues</b>                | <b>Between Groups</b> | 0.179  | 1  | 0.179 | 0.36  | 0.55  |
|                                                  | <b>Within Groups</b>  | 37.264 | 75 | 0.497 |       |       |
|                                                  | <b>Total</b>          | 37.443 | 76 |       |       |       |
| <b>Contractual relationship's related issues</b> | <b>Between Groups</b> | 0.577  | 1  | 0.577 | 0.828 | 0.366 |
|                                                  | <b>Within Groups</b>  | 53.639 | 77 | 0.697 |       |       |
|                                                  | <b>Total</b>          | 54.217 | 78 |       |       |       |
| <b>External factors</b>                          | <b>Between Groups</b> | 0.588  | 1  | 0.588 | 0.79  | 0.377 |
|                                                  | <b>Within Groups</b>  | 56.56  | 76 | 0.744 |       |       |
|                                                  | <b>Total</b>          | 57.148 | 77 |       |       |       |

**Table J7: Summary of ANOVA on causes of delays based on respondents' positions in organization**

| <b>Factors</b>              | <b>Categories of respondents</b> | <b>N</b>  | <b>Mean</b>    | <b>Std. Deviation</b> | <b>P-value</b> |
|-----------------------------|----------------------------------|-----------|----------------|-----------------------|----------------|
| Clients' related issues     | Management staff                 | 35        | 3.35357        | 0.599851              | 0.614          |
|                             | Field/Project staff              | 44        | 3.26705        | 0.855722              |                |
|                             | <b>Total</b>                     | <b>79</b> | <b>3.30538</b> | <b>0.749932</b>       |                |
| Contractors' related issues | Management staff                 | 35        | 3.26122        | 0.753133              | 0.388          |
|                             | Field/Project staff              | 43        | 3.41860        | 0.828545              |                |

|                                          |                     |           |                |                 |       |
|------------------------------------------|---------------------|-----------|----------------|-----------------|-------|
|                                          | <b>Total</b>        | <b>78</b> | <b>3.34799</b> | <b>0.794425</b> |       |
| Labour and equipment's related issues    | Management staff    | 36        | 3.25926        | 0.773001        | 0.133 |
|                                          | Field/Project staff | 43        | 3.55039        | 0.908175        |       |
|                                          | <b>Total</b>        | <b>79</b> | <b>3.41772</b> | <b>0.856463</b> |       |
| Materials' related issues                | Management staff    | 35        | 3.25714        | 0.816840        | 0.251 |
|                                          | Field/Project staff | 43        | 3.50000        | 1.000000        |       |
|                                          | <b>Total</b>        | <b>78</b> | <b>3.39103</b> | <b>0.924583</b> |       |
| Consultants' related issues              | Management staff    | 35        | 3.27143        | 0.753964        | 0.678 |
|                                          | Field/Project staff | 43        | 3.20058        | 0.741590        |       |
|                                          | <b>Total</b>        | <b>78</b> | <b>3.23237</b> | <b>0.743130</b> |       |
| community' s related issues              | Management staff    | 35        | 3.80000        | 0.784657        | 0.550 |
|                                          | Field/Project staff | 42        | 3.89683        | 0.631118        |       |
|                                          | <b>Total</b>        | <b>77</b> | <b>3.85281</b> | <b>0.701905</b> |       |
| Contractual relationships related issues | Management staff    | 36        | 3.23148        | 0.779986        | 0.366 |
|                                          | Field/Project staff | 43        | 3.40310        | 0.877581        |       |
|                                          | <b>Total</b>        | <b>79</b> | <b>3.32489</b> | <b>0.833717</b> |       |
| External factors                         | Management staff    | 35        | 3.09286        | 0.929670        | 0.377 |
|                                          | Field/Project staff | 43        | 3.26744        | 0.804369        |       |
|                                          | <b>Total</b>        | <b>78</b> | <b>3.18910</b> | <b>0.861502</b> |       |

**Table J8: ANOVA on causes of delays-types of project management organization**

|                         |                                                       | N  | Mean    | Std. Deviation | Std. Error | 95% Confidence Interval for Mean |             | Minimum | Maximum |
|-------------------------|-------------------------------------------------------|----|---------|----------------|------------|----------------------------------|-------------|---------|---------|
|                         |                                                       |    |         |                |            | Lower Bound                      | Upper Bound |         |         |
| Clients' related issues | <b>Projectised</b>                                    | 14 | 3.03571 | 0.717951       | 0.19188    | 2.62118                          | 3.45025     | 1.875   | 4.25    |
|                         | <b>Functional</b>                                     | 22 | 3.46023 | 0.740401       | 0.157854   | 3.13195                          | 3.7885      | 2       | 5       |
|                         | <b>Matrix (Combined functional &amp; Projectised)</b> | 40 | 3.2625  | 0.740214       | 0.117038   | 3.02577                          | 3.49923     | 1.625   | 5       |
|                         | <b>Total</b>                                          | 76 | 3.27796 | 0.740664       | 0.08496    | 3.10871                          | 3.44721     | 1.625   | 5       |

|                                              |                                                       |    |             |              |              |             |             |       |       |
|----------------------------------------------|-------------------------------------------------------|----|-------------|--------------|--------------|-------------|-------------|-------|-------|
| <b>Contractors' related issues</b>           | <b>Projectised</b>                                    | 14 | 2.8367<br>3 | 0.66972<br>5 | 0.17899<br>1 | 2.4500<br>5 | 3.2234<br>2 | 1.714 | 3.857 |
|                                              | <b>Functional</b>                                     | 22 | 3.5844<br>2 | 0.85704      | 0.18272<br>1 | 3.2044<br>3 | 3.9644<br>1 | 2     | 5     |
|                                              | <b>Matrix (Combined functional &amp; Projectised)</b> | 39 | 3.3553<br>1 | 0.71644<br>2 | 0.11472<br>2 | 3.1230<br>7 | 3.5875<br>5 | 1.571 | 5     |
|                                              | <b>Total</b>                                          | 75 | 3.3257<br>1 | 0.78512<br>1 | 0.09065<br>8 | 3.1450<br>7 | 3.5063<br>5 | 1.571 | 5     |
| <b>Labour and equipment's related issues</b> | <b>Projectised</b>                                    | 14 | 3.0238<br>1 | 0.81086<br>9 | 0.21671<br>4 | 2.5556<br>3 | 3.4919<br>9 | 1.667 | 4.667 |
|                                              | <b>Functional</b>                                     | 23 | 3.3188<br>4 | 0.89599<br>7 | 0.18682<br>8 | 2.9313<br>8 | 3.7063      | 1.667 | 5     |
|                                              | <b>Matrix (Combined functional &amp; Projectised)</b> | 39 | 3.5641      | 0.81704<br>7 | 0.13083<br>2 | 3.2992<br>5 | 3.8289<br>6 | 2.333 | 5     |
|                                              | <b>Total</b>                                          | 76 | 3.3903<br>5 | 0.85442<br>3 | 0.09800<br>9 | 3.1951<br>1 | 3.5855<br>9 | 1.667 | 5     |
| <b>Materials' related issues</b>             | <b>Projectised</b>                                    | 14 | 3.25        | 0.99518<br>1 | 0.26597<br>3 | 2.6754      | 3.8246      | 1.5   | 5     |
|                                              | <b>Functional</b>                                     | 22 | 3.5         | 1.06904<br>5 | 0.22792<br>1 | 3.0260<br>1 | 3.9739<br>9 | 1.5   | 5     |
|                                              | <b>Matrix (Combined functional &amp; Projectised)</b> | 39 | 3.3846<br>2 | 0.85425<br>8 | 0.13679<br>1 | 3.1077      | 3.6615<br>3 | 1.5   | 5     |
|                                              | <b>Total</b>                                          | 75 | 3.3933<br>3 | 0.93827<br>5 | 0.10834<br>3 | 3.1774<br>6 | 3.6092<br>1 | 1.5   | 5     |
| <b>Consultants' related issues</b>           | <b>Projectised</b>                                    | 14 | 3.0982<br>1 | 0.81774      | 0.21855      | 2.6260<br>7 | 3.5703<br>6 | 2     | 4.625 |
|                                              | <b>Functional</b>                                     | 22 | 3.4602<br>3 | 0.74341      | 0.15849<br>6 | 3.1306<br>2 | 3.7898<br>4 | 2.375 | 5     |
|                                              | <b>Matrix (Combined functional &amp; Projectised)</b> | 39 | 3.1217<br>9 | 0.70797<br>1 | 0.11336<br>6 | 2.8923      | 3.3512<br>9 | 1.625 | 4.5   |
|                                              | <b>Total</b>                                          | 75 | 3.2166<br>7 | 0.74614<br>2 | 0.08615<br>7 | 3.0449<br>9 | 3.3883<br>4 | 1.625 | 5     |
| <b>community's related issues</b>            | <b>Projectised</b>                                    | 14 | 3.8809<br>5 | 0.56397<br>8 | 0.15072<br>9 | 3.5553<br>2 | 4.2065<br>8 | 3     | 5     |
|                                              | <b>Functional</b>                                     | 22 | 4.0606<br>1 | 0.80761<br>2 | 0.17218<br>3 | 3.7025<br>3 | 4.4186<br>8 | 2     | 5     |

|                                                               |                                                                       |    |             |              |              |             |             |       |       |
|---------------------------------------------------------------|-----------------------------------------------------------------------|----|-------------|--------------|--------------|-------------|-------------|-------|-------|
|                                                               | <b>Matrix<br/>(Combined<br/>functional<br/>&amp;<br/>Projectised)</b> | 38 | 3.7017<br>5 | 0.68790<br>3 | 0.11159<br>3 | 3.4756<br>5 | 3.9278<br>6 | 2.333 | 5     |
|                                                               | <b>Total</b>                                                          | 74 | 3.8423<br>4 | 0.71347<br>8 | 0.08294      | 3.6770<br>4 | 4.0076<br>4 | 2     | 5     |
| <b>Contractual<br/>relationship'<br/>s related<br/>issues</b> | <b>Projectised</b>                                                    | 14 | 3.3333<br>3 | 0.84731<br>9 | 0.22645<br>5 | 2.8441<br>1 | 3.8225<br>6 | 2     | 4.667 |
|                                                               | <b>Functional</b>                                                     | 24 | 3.5416<br>7 | 0.90523<br>2 | 0.18478      | 3.1594<br>2 | 3.9239<br>1 | 1.667 | 5     |
|                                                               | <b>Matrix<br/>(Combined<br/>functional<br/>&amp;<br/>Projectised)</b> | 38 | 3.1666<br>7 | 0.79317<br>7 | 0.12867      | 2.9059<br>6 | 3.4273<br>8 | 1.667 | 5     |
|                                                               | <b>Total</b>                                                          | 76 | 3.3157<br>9 | 0.84484<br>4 | 0.09691      | 3.1227<br>3 | 3.5088<br>4 | 1.667 | 5     |
| <b>External<br/>factors</b>                                   | <b>Projectised</b>                                                    | 14 | 3.3571<br>4 | 0.79490<br>1 | 0.21244<br>6 | 2.8981<br>8 | 3.8161<br>1 | 1.75  | 4.5   |
|                                                               | <b>Functional</b>                                                     | 23 | 3.0978<br>3 | 1.00492<br>9 | 0.20954<br>2 | 2.6632<br>6 | 3.5323<br>9 | 1     | 5     |
|                                                               | <b>Matrix<br/>(Combined<br/>functional<br/>&amp;<br/>Projectised)</b> | 38 | 3.1776<br>3 | 0.80098<br>7 | 0.12993<br>7 | 2.9143<br>5 | 3.4409<br>1 | 1.5   | 4.75  |
|                                                               | <b>Total</b>                                                          | 75 | 3.1866<br>7 | 0.86024<br>6 | 0.09933<br>3 | 2.9887<br>4 | 3.3845<br>9 | 1     | 5     |

**Table J9: Results of ANOVA on causes of delays based on types of project management organization**

|                                        |                       | <b>Sum of<br/>Squares</b> | <b>df</b> | <b>Mean<br/>Square</b> | <b>F</b> | <b>Sig.</b> |
|----------------------------------------|-----------------------|---------------------------|-----------|------------------------|----------|-------------|
| <b>Clients'<br/>related issues</b>     | <b>Between Groups</b> | 1.562                     | 2         | 0.781                  | 1.44     | 0.243       |
|                                        | <b>Within Groups</b>  | 39.582                    | 73        | 0.542                  |          |             |
|                                        | <b>Total</b>          | 41.144                    | 75        |                        |          |             |
| <b>Contractors'<br/>related issues</b> | <b>Between Groups</b> | 4.854                     | 2         | 2.427                  | 4.287    | 0.017       |
|                                        | <b>Within Groups</b>  | 40.761                    | 72        | 0.566                  |          |             |
|                                        | <b>Total</b>          | 45.615                    | 74        |                        |          |             |
| <b>Labour and</b>                      | <b>Between Groups</b> | 3.176                     | 2         | 1.588                  | 2.248    | 0.113       |

|                                                  |                       |        |    |       |       |       |
|--------------------------------------------------|-----------------------|--------|----|-------|-------|-------|
| <b>equipment's related issues</b>                | <b>Within Groups</b>  | 51.577 | 73 | 0.707 |       |       |
|                                                  | <b>Total</b>          | 54.753 | 75 |       |       |       |
| <b>Materials' related issues</b>                 | <b>Between Groups</b> | 0.541  | 2  | 0.27  | 0.301 | 0.741 |
|                                                  | <b>Within Groups</b>  | 64.606 | 72 | 0.897 |       |       |
|                                                  | <b>Total</b>          | 65.147 | 74 |       |       |       |
| <b>Consultants' related issues</b>               | <b>Between Groups</b> | 1.853  | 2  | 0.926 | 1.695 | 0.191 |
|                                                  | <b>Within Groups</b>  | 39.345 | 72 | 0.546 |       |       |
|                                                  | <b>Total</b>          | 41.198 | 74 |       |       |       |
| <b>community' s related issues</b>               | <b>Between Groups</b> | 1.82   | 2  | 0.91  | 1.828 | 0.168 |
|                                                  | <b>Within Groups</b>  | 35.341 | 71 | 0.498 |       |       |
|                                                  | <b>Total</b>          | 37.161 | 73 |       |       |       |
| <b>Contractual relationship's related issues</b> | <b>Between Groups</b> | 2.074  | 2  | 1.037 | 1.471 | 0.236 |
|                                                  | <b>Within Groups</b>  | 51.458 | 73 | 0.705 |       |       |
|                                                  | <b>Total</b>          | 53.532 | 75 |       |       |       |
| <b>External factors</b>                          | <b>Between Groups</b> | 0.592  | 2  | 0.296 | 0.393 | 0.676 |
|                                                  | <b>Within Groups</b>  | 54.17  | 72 | 0.752 |       |       |
|                                                  | <b>Total</b>          | 54.762 | 74 |       |       |       |

**Table J10: Summary of ANOVA on causes of delays based on types of project management organization**

| <b>Factors</b>              | <b>Categories of respondents</b>           | <b>N</b>  | <b>Mean</b>    | <b>Std. Deviation</b> | <b>P-value</b> |
|-----------------------------|--------------------------------------------|-----------|----------------|-----------------------|----------------|
| Clients' related issues     | Projectised                                | 14        | 3.03571        | 0.717951              | 0.243          |
|                             | Functional                                 | 22        | 3.46023        | 0.740401              |                |
|                             | Matrix (Combined functional & Projectised) | 40        | 3.26250        | 0.740214              |                |
|                             | <b>Total</b>                               | <b>76</b> | <b>3.27796</b> | <b>0.740664</b>       |                |
| Contractors' related issues | Projectised                                | 14        | 2.83673        | 0.669725              | 0.017          |
|                             | Functional                                 | 22        | 3.58442        | 0.857040              |                |

|                                           |                                            |           |                |                 |       |
|-------------------------------------------|--------------------------------------------|-----------|----------------|-----------------|-------|
|                                           | Matrix (Combined functional & Projectised) | 39        | 3.35531        | 0.716442        |       |
|                                           | <b>Total</b>                               | <b>75</b> | <b>3.32571</b> | <b>0.785121</b> |       |
| Labour and equipment's related issues     | Projectised                                | 14        | 3.02381        | 0.810869        | 0.113 |
|                                           | Functional                                 | 23        | 3.31884        | 0.895997        |       |
|                                           | Matrix (Combined functional & Projectised) | 39        | 3.56410        | 0.817047        |       |
|                                           | <b>Total</b>                               | <b>76</b> | <b>3.39035</b> | <b>0.854423</b> |       |
| Materials' related issues                 | Projectised                                | 14        | 3.25000        | 0.995181        | 0.741 |
|                                           | Functional                                 | 22        | 3.50000        | 1.069045        |       |
|                                           | Matrix (Combined functional & Projectised) | 39        | 3.38462        | 0.854258        |       |
|                                           | <b>Total</b>                               | <b>75</b> | <b>3.39333</b> | <b>0.938275</b> |       |
| Consultants' related issues               | Projectised                                | 14        | 3.09821        | 0.817740        | 0.191 |
|                                           | Functional                                 | 22        | 3.46023        | 0.743410        |       |
|                                           | Matrix (Combined functional & Projectised) | 39        | 3.12179        | 0.707971        |       |
|                                           | <b>Total</b>                               | <b>75</b> | <b>3.21667</b> | <b>0.746142</b> |       |
| community' s related issues               | Projectised                                | 14        | 3.88095        | 0.563978        | 0.168 |
|                                           | Functional                                 | 22        | 4.06061        | 0.807612        |       |
|                                           | Matrix (Combined functional & Projectised) | 38        | 3.70175        | 0.687903        |       |
|                                           | <b>Total</b>                               | <b>74</b> | <b>3.84234</b> | <b>0.713478</b> |       |
| Contractual relationship's related issues | Projectised                                | 14        | 3.33333        | 0.847319        | 0.236 |
|                                           | Functional                                 | 24        | 3.54167        | 0.905232        |       |
|                                           | Matrix (Combined functional & Projectised) | 38        | 3.16667        | 0.793177        |       |

|                  |                                            |           |                |                 |       |
|------------------|--------------------------------------------|-----------|----------------|-----------------|-------|
|                  | <b>Total</b>                               | <b>76</b> | <b>3.31579</b> | <b>0.844844</b> |       |
| External factors | Projectised                                | 14        | 3.35714        | 0.794901        | 0.676 |
|                  | Functional                                 | 23        | 3.09783        | 1.004929        |       |
|                  | Matrix (Combined functional & Projectised) | 38        | 3.17763        | 0.800987        |       |
|                  | <b>Total</b>                               | <b>75</b> | <b>3.18667</b> | <b>0.860246</b> |       |

## APPENDIX K: ANOVA ON EFFECTS OF DELAYS

**Table K1: ANOVA on effects of delays based on respondents' types of business organisation**

|                                       |                       | N  | Mean | Std. Deviation | Std. Error | 95% Confidence Interval for Mean |             | Minimum | Maximum |
|---------------------------------------|-----------------------|----|------|----------------|------------|----------------------------------|-------------|---------|---------|
|                                       |                       |    |      |                |            | Lower Bound                      | Upper Bound |         |         |
| <b>Time overrun</b>                   | <b>Public service</b> | 33 | 4.27 | 0.674          | 0.117      | 4.03                             | 4.51        | 3       | 5       |
|                                       | <b>Multinational</b>  | 18 | 4    | 1.138          | 0.268      | 3.43                             | 4.57        | 1       | 5       |
|                                       | <b>Private</b>        | 26 | 3.73 | 1.185          | 0.232      | 3.25                             | 4.21        | 1       | 5       |
|                                       | <b>Total</b>          | 77 | 4.03 | 1              | 0.114      | 3.8                              | 4.25        | 1       | 5       |
| <b>Budget overrun</b>                 | <b>Public service</b> | 33 | 4.12 | 0.857          | 0.149      | 3.82                             | 4.43        | 2       | 5       |
|                                       | <b>Multinational</b>  | 18 | 4.06 | 1.056          | 0.249      | 3.53                             | 4.58        | 2       | 5       |
|                                       | <b>Private</b>        | 26 | 3.5  | 1.208          | 0.237      | 3.01                             | 3.99        | 1       | 5       |
|                                       | <b>Total</b>          | 77 | 3.9  | 1.059          | 0.121      | 3.66                             | 4.14        | 1       | 5       |
| <b>Bad public relations</b>           | <b>Public service</b> | 34 | 3.74 | 0.931          | 0.16       | 3.41                             | 4.06        | 2       | 5       |
|                                       | <b>Multinational</b>  | 18 | 3.22 | 0.943          | 0.222      | 2.75                             | 3.69        | 2       | 5       |
|                                       | <b>Private</b>        | 26 | 2.88 | 0.993          | 0.195      | 2.48                             | 3.29        | 1       | 5       |
|                                       | <b>Total</b>          | 78 | 3.33 | 1.015          | 0.115      | 3.1                              | 3.56        | 1       | 5       |
| <b>Poor quality completed project</b> | <b>Public service</b> | 34 | 3.26 | 1.189          | 0.204      | 2.85                             | 3.68        | 1       | 5       |
|                                       | <b>Multinational</b>  | 18 | 3.28 | 1.32           | 0.311      | 2.62                             | 3.93        | 1       | 5       |
|                                       | <b>Private</b>        | 27 | 3.04 | 1.055          | 0.203      | 2.62                             | 3.45        | 1       | 5       |
|                                       | <b>Total</b>          | 79 | 3.19 | 1.167          | 0.131      | 2.93                             | 3.45        | 1       | 5       |
| <b>Litigation</b>                     | <b>Public service</b> | 34 | 2.79 | 0.978          | 0.168      | 2.45                             | 3.14        | 1       | 5       |

|                              |                       |    |      |       |       |      |      |   |   |
|------------------------------|-----------------------|----|------|-------|-------|------|------|---|---|
|                              | <b>Multinational</b>  | 18 | 3.5  | 1.2   | 0.283 | 2.9  | 4.1  | 1 | 5 |
|                              | <b>Private</b>        | 27 | 2.74 | 1.13  | 0.217 | 2.29 | 3.19 | 1 | 5 |
|                              | <b>Total</b>          | 79 | 2.94 | 1.113 | 0.125 | 2.69 | 3.19 | 1 | 5 |
| <b>Total abandonment</b>     | <b>Public service</b> | 33 | 3.42 | 1.062 | 0.185 | 3.05 | 3.8  | 1 | 5 |
|                              | <b>Multinational</b>  | 18 | 3.06 | 1.349 | 0.318 | 2.38 | 3.73 | 1 | 5 |
|                              | <b>Private</b>        | 27 | 3.33 | 1.144 | 0.22  | 2.88 | 3.79 | 1 | 5 |
|                              | <b>Total</b>          | 78 | 3.31 | 1.154 | 0.131 | 3.05 | 3.57 | 1 | 5 |
| <b>Disputes &amp; claims</b> | <b>Public service</b> | 34 | 3.62 | 1.015 | 0.174 | 3.26 | 3.97 | 2 | 5 |
|                              | <b>Multinational</b>  | 18 | 3.72 | 1.018 | 0.24  | 3.22 | 4.23 | 2 | 5 |
|                              | <b>Private</b>        | 27 | 3.3  | 0.993 | 0.191 | 2.9  | 3.69 | 1 | 5 |
|                              | <b>Total</b>          | 79 | 3.53 | 1.011 | 0.114 | 3.31 | 3.76 | 1 | 5 |
| <b>Arbitration</b>           | <b>Public service</b> | 34 | 2.76 | 1.304 | 0.224 | 2.31 | 3.22 | 1 | 5 |
|                              | <b>Multinational</b>  | 18 | 3.33 | 1.085 | 0.256 | 2.79 | 3.87 | 1 | 5 |
|                              | <b>Private</b>        | 27 | 2.7  | 0.775 | 0.149 | 2.4  | 3.01 | 1 | 4 |
|                              | <b>Total</b>          | 79 | 2.87 | 1.114 | 0.125 | 2.62 | 3.12 | 1 | 5 |

**Table K2: Results of ANOVA on effects of delays based on types of business organisation**

|                                       |                       | <b>Sum of Squares</b> | <b>df</b> | <b>Mean Square</b> | <b>F</b> | <b>Sig.</b> |
|---------------------------------------|-----------------------|-----------------------|-----------|--------------------|----------|-------------|
| <b>Time overrun</b>                   | <b>Between Groups</b> | 4.287                 | 2         | 2.144              | 2.214    | 0.116       |
|                                       | <b>Within Groups</b>  | 71.661                | 74        | 0.968              |          |             |
|                                       | <b>Total</b>          | 75.948                | 76        |                    |          |             |
| <b>Budget overrun</b>                 | <b>Between Groups</b> | 6.209                 | 2         | 3.105              | 2.91     | 0.061       |
|                                       | <b>Within Groups</b>  | 78.96                 | 74        | 1.067              |          |             |
|                                       | <b>Total</b>          | 85.169                | 76        |                    |          |             |
| <b>Bad public relations</b>           | <b>Between Groups</b> | 10.951                | 2         | 5.475              | 6.005    | 0.004       |
|                                       | <b>Within Groups</b>  | 68.383                | 75        | 0.912              |          |             |
|                                       | <b>Total</b>          | 79.333                | 77        |                    |          |             |
| <b>Poor quality completed project</b> | <b>Between Groups</b> | 0.96                  | 2         | 0.48               | 0.347    | 0.708       |
|                                       | <b>Within Groups</b>  | 105.192               | 76        | 1.384              |          |             |

|                              |                       |         |    |       |       |       |
|------------------------------|-----------------------|---------|----|-------|-------|-------|
|                              | <b>Total</b>          | 106.152 | 78 |       |       |       |
| <b>Litigation</b>            | <b>Between Groups</b> | 7.44    | 2  | 3.72  | 3.168 | 0.048 |
|                              | <b>Within Groups</b>  | 89.244  | 76 | 1.174 |       |       |
|                              | <b>Total</b>          | 96.684  | 78 |       |       |       |
| <b>Total abandonment</b>     | <b>Between Groups</b> | 1.61    | 2  | 0.805 | 0.598 | 0.553 |
|                              | <b>Within Groups</b>  | 101.005 | 75 | 1.347 |       |       |
|                              | <b>Total</b>          | 102.615 | 77 |       |       |       |
| <b>Disputes &amp; claims</b> | <b>Between Groups</b> | 2.401   | 2  | 1.2   | 1.181 | 0.313 |
|                              | <b>Within Groups</b>  | 77.27   | 76 | 1.017 |       |       |
|                              | <b>Total</b>          | 79.671  | 78 |       |       |       |
| <b>Arbitration</b>           | <b>Between Groups</b> | 4.987   | 2  | 2.493 | 2.065 | 0.134 |
|                              | <b>Within Groups</b>  | 91.747  | 76 | 1.207 |       |       |
|                              | <b>Total</b>          | 96.734  | 78 |       |       |       |

**Table K3: Summary of ANOVA on effects of delays based on types of business organisation**

| <b>Factors</b> | <b>Categories of respondents</b> | <b>N</b>  | <b>Mean</b> | <b>Std. Deviation</b> | <b>P-value</b> |
|----------------|----------------------------------|-----------|-------------|-----------------------|----------------|
| Time overrun   | Sponsor/Client                   | 42        | 4.14        | 0.843                 | 0.092          |
|                | Consultant                       | 14        | 3.50        | 1.345                 |                |
|                | Contractor                       | 21        | 4.14        | 0.964                 |                |
|                | <b>Total</b>                     | <b>77</b> | <b>4.03</b> | <b>1.000</b>          |                |
| Budget overrun | Sponsor/Client                   | 42        | 4.10        | 0.878                 | 0.075          |
|                | Consultant                       | 14        | 3.36        | 1.336                 |                |
|                | Contractor                       | 21        | 3.86        | 1.108                 |                |
|                | <b>Total</b>                     | <b>77</b> | <b>3.90</b> | <b>1.059</b>          |                |
| Bad public     | Sponsor/Client                   | 43        | 3.49        | 0.960                 | 0.331          |

|                                |                |           |             |              |       |
|--------------------------------|----------------|-----------|-------------|--------------|-------|
| relations                      | Consultant     | 15        | 3.13        | 0.990        |       |
|                                | Contractor     | 20        | 3.15        | 1.137        |       |
|                                | <b>Total</b>   | <b>78</b> | <b>3.33</b> | <b>1.015</b> |       |
| Poor quality completed project | Sponsor/Client | 43        | 3.44        | 1.098        | 0.081 |
|                                | Consultant     | 15        | 3.07        | 1.163        |       |
|                                | Contractor     | 21        | 2.76        | 1.221        |       |
|                                | <b>Total</b>   | <b>79</b> | <b>3.19</b> | <b>1.167</b> |       |
| Litigation                     | Sponsor/Client | 43        | 2.98        | 1.080        | 0.938 |
|                                | Consultant     | 15        | 2.87        | 1.060        |       |
|                                | Contractor     | 21        | 2.90        | 1.261        |       |
|                                | <b>Total</b>   | <b>79</b> | <b>2.94</b> | <b>1.113</b> |       |
| Total abandonment              | Sponsor/Client | 42        | 3.26        | 1.083        | 0.857 |
|                                | Consultant     | 15        | 3.27        | 1.280        |       |
|                                | Contractor     | 21        | 3.43        | 1.248        |       |
|                                | <b>Total</b>   | <b>78</b> | <b>3.31</b> | <b>1.154</b> |       |
| Disputes & claims              | Sponsor/Client | 43        | 3.63        | 1.001        | 0.603 |
|                                | Consultant     | 15        | 3.33        | 1.047        |       |
|                                | Contractor     | 21        | 3.48        | 1.030        |       |
|                                | <b>Total</b>   | <b>79</b> | <b>3.53</b> | <b>1.011</b> |       |
| Arbitration                    | Sponsor/Client | 43        | 2.98        | 1.244        | 0.534 |
|                                | Consultant     | 15        | 2.60        | 0.910        |       |
|                                | Contractor     | 21        | 2.86        | 0.964        |       |
|                                | <b>Total</b>   | <b>79</b> | <b>2.87</b> | <b>1.114</b> |       |

**Table K4: ANOVA on effects of delays based on respondents involvement in project**

execution

|                                |                | N  | Mean | Std. Deviation | Std. Error | 95% Confidence Interval for Mean |             | Minimum | Maximum |
|--------------------------------|----------------|----|------|----------------|------------|----------------------------------|-------------|---------|---------|
|                                |                |    |      |                |            | Lower Bound                      | Upper Bound |         |         |
| Time overrun                   | Sponsor/Client | 42 | 4.14 | 0.843          | 0.13       | 3.88                             | 4.41        | 1       | 5       |
|                                | Consultant     | 14 | 3.5  | 1.345          | 0.359      | 2.72                             | 4.28        | 1       | 5       |
|                                | Contractor     | 21 | 4.14 | 0.964          | 0.21       | 3.7                              | 4.58        | 2       | 5       |
|                                | Total          | 77 | 4.03 | 1              | 0.114      | 3.8                              | 4.25        | 1       | 5       |
| Budget overrun                 | Sponsor/Client | 42 | 4.1  | 0.878          | 0.136      | 3.82                             | 4.37        | 2       | 5       |
|                                | Consultant     | 14 | 3.36 | 1.336          | 0.357      | 2.59                             | 4.13        | 1       | 5       |
|                                | Contractor     | 21 | 3.86 | 1.108          | 0.242      | 3.35                             | 4.36        | 2       | 5       |
|                                | Total          | 77 | 3.9  | 1.059          | 0.121      | 3.66                             | 4.14        | 1       | 5       |
| Bad public relations           | Sponsor/Client | 43 | 3.49 | 0.96           | 0.146      | 3.19                             | 3.78        | 2       | 5       |
|                                | Consultant     | 15 | 3.13 | 0.99           | 0.256      | 2.58                             | 3.68        | 2       | 5       |
|                                | Contractor     | 20 | 3.15 | 1.137          | 0.254      | 2.62                             | 3.68        | 1       | 5       |
|                                | Total          | 78 | 3.33 | 1.015          | 0.115      | 3.1                              | 3.56        | 1       | 5       |
| Poor quality completed project | Sponsor/Client | 43 | 3.44 | 1.098          | 0.167      | 3.1                              | 3.78        | 1       | 5       |
|                                | Consultant     | 15 | 3.07 | 1.163          | 0.3        | 2.42                             | 3.71        | 1       | 5       |
|                                | Contractor     | 21 | 2.76 | 1.221          | 0.266      | 2.21                             | 3.32        | 1       | 5       |
|                                | Total          | 79 | 3.19 | 1.167          | 0.131      | 2.93                             | 3.45        | 1       | 5       |
| Litigation                     | Sponsor/Client | 43 | 2.98 | 1.08           | 0.165      | 2.64                             | 3.31        | 1       | 5       |
|                                | Consultant     | 15 | 2.87 | 1.06           | 0.274      | 2.28                             | 3.45        | 1       | 5       |
|                                | Contractor     | 21 | 2.9  | 1.261          | 0.275      | 2.33                             | 3.48        | 1       | 5       |
|                                | Total          | 79 | 2.94 | 1.113          | 0.125      | 2.69                             | 3.19        | 1       | 5       |

|                              |                       |    |      |       |       |      |      |   |   |
|------------------------------|-----------------------|----|------|-------|-------|------|------|---|---|
| <b>Total abandonment</b>     | <b>Sponsor/Client</b> | 42 | 3.26 | 1.083 | 0.167 | 2.92 | 3.6  | 1 | 5 |
|                              | <b>Consultant</b>     | 15 | 3.27 | 1.28  | 0.33  | 2.56 | 3.98 | 1 | 5 |
|                              | <b>Contractor</b>     | 21 | 3.43 | 1.248 | 0.272 | 2.86 | 4    | 1 | 5 |
|                              | <b>Total</b>          | 78 | 3.31 | 1.154 | 0.131 | 3.05 | 3.57 | 1 | 5 |
| <b>Disputes &amp; claims</b> | <b>Sponsor/Client</b> | 43 | 3.63 | 1.001 | 0.153 | 3.32 | 3.94 | 2 | 5 |
|                              | <b>Consultant</b>     | 15 | 3.33 | 1.047 | 0.27  | 2.75 | 3.91 | 1 | 5 |
|                              | <b>Contractor</b>     | 21 | 3.48 | 1.03  | 0.225 | 3.01 | 3.95 | 2 | 5 |
|                              | <b>Total</b>          | 79 | 3.53 | 1.011 | 0.114 | 3.31 | 3.76 | 1 | 5 |
| <b>Arbitration</b>           | <b>Sponsor/Client</b> | 43 | 2.98 | 1.244 | 0.19  | 2.59 | 3.36 | 1 | 5 |
|                              | <b>Consultant</b>     | 15 | 2.6  | 0.91  | 0.235 | 2.1  | 3.1  | 1 | 4 |
|                              | <b>Contractor</b>     | 21 | 2.86 | 0.964 | 0.21  | 2.42 | 3.3  | 1 | 5 |
|                              | <b>Total</b>          | 79 | 2.87 | 1.114 | 0.125 | 2.62 | 3.12 | 1 | 5 |

**Table K5: Results of ANOVA on effects of delays based on respondents' involvement in project execution**

|                               |                       | <b>Sum of Squares</b> | <b>df</b> | <b>Mean Square</b> | <b>F</b> | <b>Sig.</b> |
|-------------------------------|-----------------------|-----------------------|-----------|--------------------|----------|-------------|
| <b>Time overrun</b>           | <b>Between Groups</b> | 4.734                 | 2         | 2.367              | 2.459    | 0.092       |
|                               | <b>Within Groups</b>  | 71.214                | 74        | 0.962              |          |             |
|                               | <b>Total</b>          | 75.948                | 76        |                    |          |             |
| <b>Budget overrun</b>         | <b>Between Groups</b> | 5.764                 | 2         | 2.882              | 2.686    | 0.075       |
|                               | <b>Within Groups</b>  | 79.405                | 74        | 1.073              |          |             |
|                               | <b>Total</b>          | 85.169                | 76        |                    |          |             |
| <b>Bad public relations</b>   | <b>Between Groups</b> | 2.306                 | 2         | 1.153              | 1.123    | 0.331       |
|                               | <b>Within Groups</b>  | 77.028                | 75        | 1.027              |          |             |
|                               | <b>Total</b>          | 79.333                | 77        |                    |          |             |
| <b>Poor quality completed</b> | <b>Between Groups</b> | 6.804                 | 2         | 3.402              | 2.603    | 0.081       |

|                              |                       |         |    |       |       |       |
|------------------------------|-----------------------|---------|----|-------|-------|-------|
| <b>project</b>               | <b>Within Groups</b>  | 99.348  | 76 | 1.307 |       |       |
|                              | <b>Total</b>          | 106.152 | 78 |       |       |       |
| <b>Litigation</b>            | <b>Between Groups</b> | 0.164   | 2  | 0.082 | 0.065 | 0.938 |
|                              | <b>Within Groups</b>  | 96.52   | 76 | 1.27  |       |       |
|                              | <b>Total</b>          | 96.684  | 78 |       |       |       |
| <b>Total abandonment</b>     | <b>Between Groups</b> | 0.42    | 2  | 0.21  | 0.154 | 0.857 |
|                              | <b>Within Groups</b>  | 102.195 | 75 | 1.363 |       |       |
|                              | <b>Total</b>          | 102.615 | 77 |       |       |       |
| <b>Disputes &amp; claims</b> | <b>Between Groups</b> | 1.053   | 2  | 0.526 | 0.509 | 0.603 |
|                              | <b>Within Groups</b>  | 78.618  | 76 | 1.034 |       |       |
|                              | <b>Total</b>          | 79.671  | 78 |       |       |       |
| <b>Arbitration</b>           | <b>Between Groups</b> | 1.586   | 2  | 0.793 | 0.633 | 0.534 |
|                              | <b>Within Groups</b>  | 95.148  | 76 | 1.252 |       |       |
|                              | <b>Total</b>          | 96.734  | 78 |       |       |       |

**Table K6: Summary of ANOVA on effects of delays based on respondents' involvement in project execution**

| <b>Factors</b>       | <b>Categories of respondents</b> | <b>N</b>  | <b>Mean</b> | <b>Std. Deviation</b> | <b>P-value</b> |
|----------------------|----------------------------------|-----------|-------------|-----------------------|----------------|
| Time overrun         | Management staff                 | 36        | 4.06        | 1.013                 | 0.810          |
|                      | Field/Project staff              | 41        | 4.00        | 1.000                 |                |
|                      | <b>Total</b>                     | <b>77</b> | <b>4.03</b> | <b>1.000</b>          |                |
| Budget overrun       | Management staff                 | 36        | 3.89        | 1.090                 | 0.956          |
|                      | Field/Project staff              | 41        | 3.90        | 1.044                 |                |
|                      | <b>Total</b>                     | <b>77</b> | <b>3.90</b> | <b>1.059</b>          |                |
| Bad public relations | Management staff                 | 36        | 3.31        | 1.009                 | 0.825          |

|                                |                     |           |             |              |       |
|--------------------------------|---------------------|-----------|-------------|--------------|-------|
|                                | Field/Project staff | 42        | 3.36        | 1.032        |       |
|                                | <b>Total</b>        | <b>78</b> | <b>3.33</b> | <b>1.015</b> |       |
| Poor quality completed project | Management staff    | 36        | 3.11        | 1.141        | 0.586 |
|                                | Field/Project staff | 43        | 3.26        | 1.197        |       |
|                                | <b>Total</b>        | <b>79</b> | <b>3.19</b> | <b>1.167</b> |       |
| Litigation                     | Management staff    | 36        | 2.83        | 1.082        | 0.454 |
|                                | Field/Project staff | 43        | 3.02        | 1.144        |       |
|                                | <b>Total</b>        | <b>79</b> | <b>2.94</b> | <b>1.113</b> |       |
| Total abandonment              | Management staff    | 36        | 3.22        | 1.072        | 0.548 |
|                                | Field/Project staff | 42        | 3.38        | 1.229        |       |
|                                | <b>Total</b>        | <b>78</b> | <b>3.31</b> | <b>1.154</b> |       |
| Disputes & claims              | Management staff    | 36        | 3.42        | 0.996        | 0.358 |
|                                | Field/Project staff | 43        | 3.63        | 1.024        |       |
|                                | <b>Total</b>        | <b>79</b> | <b>3.53</b> | <b>1.011</b> |       |
| Arbitration                    | Management staff    | 36        | 2.64        | 0.899        | 0.087 |
|                                | Field/Project staff | 43        | 3.07        | 1.242        |       |
|                                | <b>Total</b>        | <b>79</b> | <b>2.87</b> | <b>1.114</b> |       |

**Table K7: ANOVA on effects of delays based on project management organization**

|                                       |                            | N  | Mean | Std. Deviation | Std. Error | 95% Confidence Interval for Mean |             | Minimum | Maximum |
|---------------------------------------|----------------------------|----|------|----------------|------------|----------------------------------|-------------|---------|---------|
|                                       |                            |    |      |                |            | Lower Bound                      | Upper Bound |         |         |
| <b>Time overrun</b>                   | <b>Management staff</b>    | 36 | 4.06 | 1.013          | 0.169      | 3.71                             | 4.4         | 1       | 5       |
|                                       | <b>Field/Project staff</b> | 41 | 4    | 1              | 0.156      | 3.68                             | 4.32        | 1       | 5       |
|                                       | <b>Total</b>               | 77 | 4.03 | 1              | 0.114      | 3.8                              | 4.25        | 1       | 5       |
| <b>Budget overrun</b>                 | <b>Management staff</b>    | 36 | 3.89 | 1.09           | 0.182      | 3.52                             | 4.26        | 2       | 5       |
|                                       | <b>Field/Project staff</b> | 41 | 3.9  | 1.044          | 0.163      | 3.57                             | 4.23        | 1       | 5       |
|                                       | <b>Total</b>               | 77 | 3.9  | 1.059          | 0.121      | 3.66                             | 4.14        | 1       | 5       |
| <b>Bad public relations</b>           | <b>Management staff</b>    | 36 | 3.31 | 1.009          | 0.168      | 2.96                             | 3.65        | 1       | 5       |
|                                       | <b>Field/Project staff</b> | 42 | 3.36 | 1.032          | 0.159      | 3.04                             | 3.68        | 2       | 5       |
|                                       | <b>Total</b>               | 78 | 3.33 | 1.015          | 0.115      | 3.1                              | 3.56        | 1       | 5       |
| <b>Poor quality completed project</b> | <b>Management staff</b>    | 36 | 3.11 | 1.141          | 0.19       | 2.73                             | 3.5         | 1       | 5       |
|                                       | <b>Field/Project staff</b> | 43 | 3.26 | 1.197          | 0.183      | 2.89                             | 3.62        | 1       | 5       |
|                                       | <b>Total</b>               | 79 | 3.19 | 1.167          | 0.131      | 2.93                             | 3.45        | 1       | 5       |
| <b>Litigation</b>                     | <b>Management staff</b>    | 36 | 2.83 | 1.082          | 0.18       | 2.47                             | 3.2         | 1       | 5       |
|                                       | <b>Field/Project staff</b> | 43 | 3.02 | 1.144          | 0.174      | 2.67                             | 3.38        | 1       | 5       |
|                                       | <b>Total</b>               | 79 | 2.94 | 1.113          | 0.125      | 2.69                             | 3.19        | 1       | 5       |
| <b>Total abandonment</b>              | <b>Management staff</b>    | 36 | 3.22 | 1.072          | 0.179      | 2.86                             | 3.58        | 1       | 5       |
|                                       | <b>Field/Project staff</b> | 42 | 3.38 | 1.229          | 0.19       | 3                                | 3.76        | 1       | 5       |
|                                       | <b>Total</b>               | 78 | 3.31 | 1.154          | 0.131      | 3.05                             | 3.57        | 1       | 5       |
| <b>Disputes &amp; claims</b>          | <b>Management staff</b>    | 36 | 3.42 | 0.996          | 0.166      | 3.08                             | 3.75        | 2       | 5       |
|                                       | <b>Field/Project staff</b> | 43 | 3.63 | 1.024          | 0.156      | 3.31                             | 3.94        | 1       | 5       |
|                                       | <b>Total</b>               | 79 | 3.53 | 1.011          | 0.114      | 3.31                             | 3.76        | 1       | 5       |
| <b>Arbitration</b>                    | <b>Management staff</b>    | 36 | 2.64 | 0.899          | 0.15       | 2.33                             | 2.94        | 1       | 5       |

|  |                     |    |      |       |       |      |      |   |   |
|--|---------------------|----|------|-------|-------|------|------|---|---|
|  | Field/Project staff | 43 | 3.07 | 1.242 | 0.189 | 2.69 | 3.45 | 1 | 5 |
|  | Total               | 79 | 2.87 | 1.114 | 0.125 | 2.62 | 3.12 | 1 | 5 |

**Table K8: Results of ANOVA on effects of delays based on project management organization**

|                                       |                       | Sum of Squares | df | Mean Square | F     | Sig.  |
|---------------------------------------|-----------------------|----------------|----|-------------|-------|-------|
| <b>Time overrun</b>                   | <b>Between Groups</b> | 0.059          | 1  | 0.059       | 0.058 | 0.81  |
|                                       | <b>Within Groups</b>  | 75.889         | 75 | 1.012       |       |       |
|                                       | <b>Total</b>          | 75.948         | 76 |             |       |       |
| <b>Budget overrun</b>                 | <b>Between Groups</b> | 0.004          | 1  | 0.004       | 0.003 | 0.956 |
|                                       | <b>Within Groups</b>  | 85.165         | 75 | 1.136       |       |       |
|                                       | <b>Total</b>          | 85.169         | 76 |             |       |       |
| <b>Bad public relations</b>           | <b>Between Groups</b> | 0.052          | 1  | 0.052       | 0.049 | 0.825 |
|                                       | <b>Within Groups</b>  | 79.282         | 76 | 1.043       |       |       |
|                                       | <b>Total</b>          | 79.333         | 77 |             |       |       |
| <b>Poor quality completed project</b> | <b>Between Groups</b> | 0.41           | 1  | 0.41        | 0.299 | 0.586 |
|                                       | <b>Within Groups</b>  | 105.742        | 77 | 1.373       |       |       |
|                                       | <b>Total</b>          | 106.152        | 78 |             |       |       |
| <b>Litigation</b>                     | <b>Between Groups</b> | 0.707          | 1  | 0.707       | 0.567 | 0.454 |
|                                       | <b>Within Groups</b>  | 95.977         | 77 | 1.246       |       |       |
|                                       | <b>Total</b>          | 96.684         | 78 |             |       |       |
| <b>Total abandonment</b>              | <b>Between Groups</b> | 0.488          | 1  | 0.488       | 0.363 | 0.548 |
|                                       | <b>Within Groups</b>  | 102.127        | 76 | 1.344       |       |       |
|                                       | <b>Total</b>          | 102.615        | 77 |             |       |       |
| <b>Disputes &amp; claims</b>          | <b>Between Groups</b> | 0.874          | 1  | 0.874       | 0.854 | 0.358 |
|                                       | <b>Within Groups</b>  | 78.797         | 77 | 1.023       |       |       |
|                                       | <b>Total</b>          | 79.671         | 78 |             |       |       |

|                    |                       |        |    |       |       |       |
|--------------------|-----------------------|--------|----|-------|-------|-------|
| <b>Arbitration</b> | <b>Between Groups</b> | 3.638  | 1  | 3.638 | 3.009 | 0.087 |
|                    | <b>Within Groups</b>  | 93.096 | 77 | 1.209 |       |       |
|                    | <b>Total</b>          | 96.734 | 78 |       |       |       |

**Table K9: Summary of ANOVA on effects of delays based on project management organization**

| <b>Factors</b>                 | <b>Categories of respondents</b>           | <b>N</b>  | <b>Mean</b> | <b>Std. Deviation</b> | <b>P-value</b> |
|--------------------------------|--------------------------------------------|-----------|-------------|-----------------------|----------------|
| Time overrun                   | Projectised                                | 14        | 3.64        | 1.008                 | 0.059          |
|                                | Functional                                 | 23        | 4.39        | 0.988                 |                |
|                                | Matrix (Combined functional & Projectised) | 37        | 3.95        | 0.911                 |                |
|                                | <b>Total</b>                               | <b>74</b> | <b>4.03</b> | <b>0.979</b>          |                |
| Budget overrun                 | Projectised                                | 14        | 3.50        | 1.16                  | 0.247          |
|                                | Functional                                 | 23        | 4.09        | 1.041                 |                |
|                                | Matrix (Combined functional & Projectised) | 37        | 3.92        | 0.983                 |                |
|                                | <b>Total</b>                               | <b>74</b> | <b>3.89</b> | <b>1.041</b>          |                |
| Bad public relations           | Projectised                                | 13        | 2.69        | 0.855                 | 0.012          |
|                                | Functional                                 | 23        | 3.70        | 1.063                 |                |
|                                | Matrix (Combined functional & Projectised) | 39        | 3.26        | 0.91                  |                |
|                                | <b>Total</b>                               | <b>75</b> | <b>3.29</b> | <b>0.997</b>          |                |
| Poor quality completed project | Projectised                                | 14        | 3.21        | 1.311                 | 0.907          |
|                                | Functional                                 | 23        | 3.26        | 1.214                 |                |

|                   |                                            |           |             |              |       |
|-------------------|--------------------------------------------|-----------|-------------|--------------|-------|
|                   | Matrix (Combined functional & Projectised) | 39        | 3.13        | 1.105        |       |
|                   | <b>Total</b>                               | <b>76</b> | <b>3.18</b> | <b>1.163</b> |       |
| Litigation        | Projectised                                | 14        | 2.71        | 1.267        | 0.087 |
|                   | Functional                                 | 23        | 2.57        | 1.08         |       |
|                   | Matrix (Combined functional & Projectised) | 39        | 3.18        | 1.048        |       |
|                   | <b>Total</b>                               | <b>76</b> | <b>2.91</b> | <b>1.122</b> |       |
| Total abandonment | Projectised                                | 14        | 3.00        | 1.038        | 0.622 |
|                   | Functional                                 | 22        | 3.36        | 1.293        |       |
|                   | Matrix (Combined functional & Projectised) | 39        | 3.31        | 1.104        |       |
|                   | <b>Total</b>                               | <b>75</b> | <b>3.27</b> | <b>1.143</b> |       |
| Disputes & claims | Projectised                                | 14        | 3.29        | 0.914        | 0.487 |
|                   | Functional                                 | 23        | 3.43        | 1.199        |       |
|                   | Matrix (Combined functional & Projectised) | 39        | 3.64        | 0.932        |       |
|                   | <b>Total</b>                               | <b>76</b> | <b>3.51</b> | <b>1.013</b> |       |
| Arbitration       | Projectised                                | 14        | 2.79        | 0.893        | 0.909 |
|                   | Functional                                 | 23        | 2.78        | 1.204        |       |
|                   | Matrix (Combined functional & Projectised) | 39        | 2.90        | 1.165        |       |
|                   | <b>Total</b>                               | <b>76</b> | <b>2.84</b> | <b>1.12</b>  |       |

# APPENDIX L: ANOVA ON EXTENTS OF DELAYS

**Table L1: ANOVA on extents of delays based on respondents' types of business organisation**

|                                 |                       | N  | Mean | Std. Deviation | Std. Error | 95% Confidence Interval for Mean |             | Minimum | Maximum |
|---------------------------------|-----------------------|----|------|----------------|------------|----------------------------------|-------------|---------|---------|
|                                 |                       |    |      |                |            | Lower Bound                      | Upper Bound |         |         |
| <b>Delay in Buildings</b>       | <b>Public service</b> | 31 | 3.55 | 1.234          | 0.222      | 3.1                              | 4           | 1       | 5       |
|                                 | <b>Multinational</b>  | 14 | 3.36 | 1.082          | 0.289      | 2.73                             | 3.98        | 2       | 5       |
|                                 | <b>Private</b>        | 15 | 3.2  | 0.941          | 0.243      | 2.68                             | 3.72        | 2       | 5       |
|                                 | <b>Total</b>          | 60 | 3.42 | 1.124          | 0.145      | 3.13                             | 3.71        | 1       | 5       |
| <b>Delay in Electrification</b> | <b>Public service</b> | 30 | 3.2  | 1.126          | 0.206      | 2.78                             | 3.62        | 1       | 5       |
|                                 | <b>Multinational</b>  | 12 | 3.33 | 1.073          | 0.31       | 2.65                             | 4.02        | 2       | 5       |
|                                 | <b>Private</b>        | 13 | 3.46 | 0.776          | 0.215      | 2.99                             | 3.93        | 3       | 5       |
|                                 | <b>Total</b>          | 55 | 3.29 | 1.031          | 0.139      | 3.01                             | 3.57        | 1       | 5       |
| <b>Delay in Jetty</b>           | <b>Public service</b> | 28 | 2.96 | 1.17           | 0.221      | 2.51                             | 3.42        | 1       | 5       |
|                                 | <b>Multinational</b>  | 9  | 3.22 | 0.972          | 0.324      | 2.48                             | 3.97        | 2       | 4       |
|                                 | <b>Private</b>        | 12 | 3.33 | 0.985          | 0.284      | 2.71                             | 3.96        | 1       | 5       |
|                                 | <b>Total</b>          | 49 | 3.1  | 1.085          | 0.155      | 2.79                             | 3.41        | 1       | 5       |
| <b>Delay in Roads/Bridges</b>   | <b>Public service</b> | 32 | 4    | 1.107          | 0.196      | 3.6                              | 4.4         | 1       | 5       |
|                                 | <b>Multinational</b>  | 10 | 3.5  | 1.08           | 0.342      | 2.73                             | 4.27        | 2       | 5       |
|                                 | <b>Private</b>        | 17 | 3.88 | 0.928          | 0.225      | 3.41                             | 4.36        | 3       | 5       |
|                                 | <b>Total</b>          | 59 | 3.88 | 1.052          | 0.137      | 3.61                             | 4.16        | 1       | 5       |
| <b>Delay in Shore</b>           | <b>Public</b>         | 29 | 4.1  | 1.012          | 0.18       | 3.72                             | 4.49        | 1       | 5       |

|                                  |                       |    |      |       |       |       |       |   |   |
|----------------------------------|-----------------------|----|------|-------|-------|-------|-------|---|---|
| <b>Protection/Channelization</b> | <b>service</b>        |    |      |       | 8     |       |       |   |   |
|                                  | <b>Multinational</b>  | 10 | 3.2  | 1.135 | 0.359 | 2.39  | 4.01  | 1 | 5 |
|                                  | <b>Private</b>        | 12 | 3.83 | 1.267 | 0.366 | 3.03  | 4.64  | 1 | 5 |
|                                  | <b>Total</b>          | 51 | 3.86 | 1.132 | 0.158 | 3.54  | 4.18  | 1 | 5 |
| <b>Delay in Water</b>            | <b>Public service</b> | 29 | 3.14 | 1.156 | 0.215 | 2.7   | 3.58  | 1 | 5 |
|                                  | <b>Multinational</b>  | 9  | 3    | 0.707 | 0.236 | 2.46  | 3.54  | 2 | 4 |
|                                  | <b>Private</b>        | 12 | 3.25 | 1.215 | 0.351 | 2.48  | 4.02  | 1 | 5 |
|                                  | <b>Total</b>          | 50 | 3.14 | 1.088 | 0.154 | 2.83  | 3.45  | 1 | 5 |
| <b>Delay in other projects</b>   | <b>Public service</b> | 2  | 3.5  | 0.707 | 0.5   | -2.85 | 9.85  | 3 | 4 |
|                                  | <b>Multinational</b>  | 2  | 4    | 1.414 | 1     | -8.71 | 16.71 | 3 | 5 |
|                                  | <b>Private</b>        | 3  | 3    | 1     | 0.577 | 0.52  | 5.48  | 2 | 4 |
|                                  | <b>Total</b>          | 7  | 3.43 | 0.976 | 0.369 | 2.53  | 4.33  | 2 | 5 |

**Table L2: Results of ANOVA on extents of delays based on respondents' types of business organisation**

|                                 |                       | <b>Sum of Squares</b> | <b>df</b> | <b>Mean Square</b> | <b>F</b> | <b>Sig.</b> |
|---------------------------------|-----------------------|-----------------------|-----------|--------------------|----------|-------------|
| <b>Delay in Buildings</b>       | <b>Between Groups</b> | 1.292                 | 2         | 0.646              | 0.502    | 0.608       |
|                                 | <b>Within Groups</b>  | 73.292                | 57        | 1.286              |          |             |
|                                 | <b>Total</b>          | 74.583                | 59        |                    |          |             |
| <b>Delay in Electrification</b> | <b>Between Groups</b> | 0.648                 | 2         | 0.324              | 0.297    | 0.744       |
|                                 | <b>Within Groups</b>  | 56.697                | 52        | 1.09               |          |             |
|                                 | <b>Total</b>          | 57.345                | 54        |                    |          |             |
| <b>Delay in Jetty</b>           | <b>Between Groups</b> | 1.303                 | 2         | 0.652              | 0.543    | 0.585       |

|                                                 |                       |            |    |       |           |       |
|-------------------------------------------------|-----------------------|------------|----|-------|-----------|-------|
|                                                 | <b>Within Groups</b>  | 55.18<br>7 | 46 | 1.2   |           |       |
|                                                 | <b>Total</b>          | 56.49      | 48 |       |           |       |
| <b>Delay in Roads/Bridges</b>                   | <b>Between Groups</b> | 1.905      | 2  | 0.952 | 0.85<br>7 | 0.43  |
|                                                 | <b>Within Groups</b>  | 62.26<br>5 | 56 | 1.112 |           |       |
|                                                 | <b>Total</b>          | 64.16<br>9 | 58 |       |           |       |
| <b>Delay in Shore Protection/Channelization</b> | <b>Between Groups</b> | 6.083      | 2  | 3.041 | 2.51<br>9 | 0.091 |
|                                                 | <b>Within Groups</b>  | 57.95<br>6 | 48 | 1.207 |           |       |
|                                                 | <b>Total</b>          | 64.03<br>9 | 50 |       |           |       |
| <b>Delay in Water</b>                           | <b>Between Groups</b> | 0.322      | 2  | 0.161 | 0.13<br>1 | 0.878 |
|                                                 | <b>Within Groups</b>  | 57.69<br>8 | 47 | 1.228 |           |       |
|                                                 | <b>Total</b>          | 58.02      | 49 |       |           |       |
| <b>Delay in other projects</b>                  | <b>Between Groups</b> | 1.214      | 2  | 0.607 | 0.54      | 0.62  |
|                                                 | <b>Within Groups</b>  | 4.5        | 4  | 1.125 |           |       |
|                                                 | <b>Total</b>          | 5.714      | 6  |       |           |       |

**Table L3: Summary of ANOVA on extents of delays based on respondents' types of business organisation**

| <b>Factors</b>           | <b>Categories of respondents</b> | <b>N</b>  | <b>Mean</b> | <b>Std. Deviation</b> | <b>P-value</b> |
|--------------------------|----------------------------------|-----------|-------------|-----------------------|----------------|
| Delay in Buildings       | Sponsors/Clients                 | 37        | 3.59        | 1.117                 | 0.303          |
|                          | Consultants                      | 8         | 3.13        | 0.641                 |                |
|                          | Contractors                      | 15        | 3.13        | 1.302                 |                |
|                          | <b>Total</b>                     | <b>60</b> | <b>3.42</b> | <b>1.124</b>          |                |
| Delay in Electrification | Sponsor/Client                   | 34        | 3.29        | 1.06                  | 0.347          |
|                          | Consultant                       | 9         | 3.67        | 0.866                 |                |
|                          | Contractor                       | 12        | 3.00        | 1.044                 |                |

Project delays in the Niger Delta region, Nigeria

|                                          |                  |           |             |              |       |
|------------------------------------------|------------------|-----------|-------------|--------------|-------|
|                                          | <b>Total</b>     | <b>55</b> | <b>3.29</b> | <b>1.031</b> |       |
| Delay in Jetty                           | Sponsor/Client   | 32        | 3.13        | 1.157        | 0.500 |
|                                          | Consultant       | 7         | 3.43        | 0.535        |       |
|                                          | Contractor       | 10        | 2.80        | 1.135        |       |
|                                          | <b>Total</b>     | <b>49</b> | <b>3.10</b> | <b>1.085</b> |       |
| Delay in Roads/Bridges                   | Sponsor/Client   | 37        | 3.86        | 1.084        | 0.913 |
|                                          | Consultant       | 11        | 3.82        | 0.874        |       |
|                                          | Contractor       | 11        | 4.00        | 1.183        |       |
|                                          | <b>Total</b>     | <b>59</b> | <b>3.88</b> | <b>1.052</b> |       |
| Delay in Shore Protection/Channelization | Sponsor/Client   | 33        | 4.00        | 1.09         | 0.218 |
|                                          | Consultant       | 8         | 4.00        | 0.926        |       |
|                                          | Contractor       | 10        | 3.30        | 1.337        |       |
|                                          | <b>Total</b>     | <b>51</b> | <b>3.86</b> | <b>1.132</b> |       |
| Delay in Water                           | Sponsor/Client   | 33        | 3.21        | 1.083        | 0.552 |
|                                          | Consultant       | 8         | 3.25        | 1.035        |       |
|                                          | Contractor       | 9         | 2.78        | 1.202        |       |
|                                          | <b>Total</b>     | <b>50</b> | <b>3.14</b> | <b>1.088</b> |       |
| Delay in other projects                  | Sponsors/Clients | 4         | 3.50        | 1.291        | 0.926 |
|                                          | Consultants      | 1         | 3.00        | 0            |       |
|                                          | Contractors      | 2         | 3.50        | 0.707        |       |
|                                          | <b>Total</b>     | <b>7</b>  | <b>3.43</b> | <b>0.976</b> |       |

Table L4: ANOVA on extents of delays based on respondents' involvement in project execution

|                                          |                | N  | Mean | Std. Deviation | Std. Error | 95% Confidence Interval for Mean |             | Minimum | Maximum |
|------------------------------------------|----------------|----|------|----------------|------------|----------------------------------|-------------|---------|---------|
|                                          |                |    |      |                |            | Lower Bound                      | Upper Bound |         |         |
| Delay in Buildings                       | Sponsor/Client | 37 | 3.59 | 1.117          | 0.184      | 3.22                             | 3.97        | 1       | 5       |
|                                          | Consultant     | 8  | 3.13 | 0.641          | 0.227      | 2.59                             | 3.66        | 2       | 4       |
|                                          | Contractor     | 15 | 3.13 | 1.302          | 0.336      | 2.41                             | 3.85        | 2       | 5       |
|                                          | Total          | 60 | 3.42 | 1.124          | 0.145      | 3.13                             | 3.71        | 1       | 5       |
| Delay in Electrification                 | Sponsor/Client | 34 | 3.29 | 1.06           | 0.182      | 2.92                             | 3.66        | 1       | 5       |
|                                          | Consultant     | 9  | 3.67 | 0.866          | 0.289      | 3                                | 4.33        | 3       | 5       |
|                                          | Contractor     | 12 | 3    | 1.044          | 0.302      | 2.34                             | 3.66        | 2       | 5       |
|                                          | Total          | 55 | 3.29 | 1.031          | 0.139      | 3.01                             | 3.57        | 1       | 5       |
| Delay in Jetty                           | Sponsor/Client | 32 | 3.13 | 1.157          | 0.205      | 2.71                             | 3.54        | 1       | 5       |
|                                          | Consultant     | 7  | 3.43 | 0.535          | 0.202      | 2.93                             | 3.92        | 3       | 4       |
|                                          | Contractor     | 10 | 2.8  | 1.135          | 0.359      | 1.99                             | 3.61        | 1       | 5       |
|                                          | Total          | 49 | 3.1  | 1.085          | 0.155      | 2.79                             | 3.41        | 1       | 5       |
| Delay in Roads/Bridges                   | Sponsor/Client | 37 | 3.86 | 1.084          | 0.178      | 3.5                              | 4.23        | 1       | 5       |
|                                          | Consultant     | 11 | 3.82 | 0.874          | 0.263      | 3.23                             | 4.41        | 3       | 5       |
|                                          | Contractor     | 11 | 4    | 1.183          | 0.357      | 3.21                             | 4.79        | 2       | 5       |
|                                          | Total          | 59 | 3.88 | 1.052          | 0.137      | 3.61                             | 4.16        | 1       | 5       |
| Delay in Shore Protection/Channelization | Sponsor/Client | 33 | 4    | 1.09           | 0.19       | 3.61                             | 4.39        | 1       | 5       |
|                                          | Consultant     | 8  | 4    | 0.926          | 0.327      | 3.23                             | 4.77        | 3       | 5       |
|                                          | Contractor     | 10 | 3.3  | 1.337          | 0.423      | 2.34                             | 4.26        | 1       | 5       |
|                                          | Total          | 51 | 3.86 | 1.132          | 0.158      | 3.54                             | 4.18        | 1       | 5       |
| Delay in Water                           | Sponsor/Client | 33 | 3.21 | 1.083          | 0.188      | 2.83                             | 3.6         | 1       | 5       |
|                                          | Consultant     | 8  | 3.25 | 1.035          | 0.366      | 2.38                             | 4.12        | 2       | 5       |
|                                          | Contractor     | 9  | 2.78 | 1.202          | 0.401      | 1.85                             | 3.7         | 1       | 5       |
|                                          | Total          | 50 | 3.14 | 1.088          | 0.154      | 2.83                             | 3.45        | 1       | 5       |
| Delay in other projects                  | Sponsor/Client | 4  | 3.5  | 1.291          | 0.645      | 1.45                             | 5.55        | 2       | 5       |
|                                          | Consultant     | 1  | 3    | .              | .          | .                                | .           | 3       | 3       |
|                                          | Contractor     | 2  | 3.5  | 0.707          | 0.5        | -2.85                            | 9.85        | 3       | 4       |
|                                          | Total          | 7  | 3.43 | 0.976          | 0.369      | 2.53                             | 4.33        | 2       | 5       |

**Table L5: Results of ANOVA on extents of delays based on respondents' position organization**

|                                                 |                       | Sum of Squares | df | Mean Square | F     | Sig.  |
|-------------------------------------------------|-----------------------|----------------|----|-------------|-------|-------|
| <b>Delay in Buildings</b>                       | <b>Between Groups</b> | 3.056          | 2  | 1.528       | 1.218 | 0.303 |
|                                                 | <b>Within Groups</b>  | 71.527         | 57 | 1.255       |       |       |
|                                                 | <b>Total</b>          | 74.583         | 59 |             |       |       |
| <b>Delay in Electrification</b>                 | <b>Between Groups</b> | 2.287          | 2  | 1.143       | 1.08  | 0.347 |
|                                                 | <b>Within Groups</b>  | 55.059         | 52 | 1.059       |       |       |
|                                                 | <b>Total</b>          | 57.345         | 54 |             |       |       |
| <b>Delay in Jetty</b>                           | <b>Between Groups</b> | 1.676          | 2  | 0.838       | 0.703 | 0.5   |
|                                                 | <b>Within Groups</b>  | 54.814         | 46 | 1.192       |       |       |
|                                                 | <b>Total</b>          | 56.49          | 48 |             |       |       |
| <b>Delay in Roads/Bridges</b>                   | <b>Between Groups</b> | 0.209          | 2  | 0.104       | 0.091 | 0.913 |
|                                                 | <b>Within Groups</b>  | 63.961         | 56 | 1.142       |       |       |
|                                                 | <b>Total</b>          | 64.169         | 58 |             |       |       |
| <b>Delay in Shore Protection/Channelization</b> | <b>Between Groups</b> | 3.939          | 2  | 1.97        | 1.573 | 0.218 |
|                                                 | <b>Within Groups</b>  | 60.1           | 48 | 1.252       |       |       |
|                                                 | <b>Total</b>          | 64.039         | 50 |             |       |       |
| <b>Delay in Water</b>                           | <b>Between Groups</b> | 1.449          | 2  | 0.725       | 0.602 | 0.552 |
|                                                 | <b>Within Groups</b>  | 56.571         | 47 | 1.204       |       |       |
|                                                 | <b>Total</b>          | 58.02          | 49 |             |       |       |
| <b>Delay in other projects</b>                  | <b>Between Groups</b> | 0.214          | 2  | 0.107       | 0.078 | 0.926 |
|                                                 | <b>Within Groups</b>  | 5.5            | 4  | 1.375       |       |       |
|                                                 | <b>Total</b>          | 5.714          | 6  |             |       |       |

**Table L6: Summary of ANOVA on extents of delays based on respondents' project management organization**

**Table L7: ANOVA on extents of delays based on respondents' project management organization**

| Factors                                  | Categories of respondents | N         | Mean        | Std. Deviation | P-value |
|------------------------------------------|---------------------------|-----------|-------------|----------------|---------|
| Delay in Buildings                       | Management staff          | 29        | 3.62        | 1.015          | 0.176   |
|                                          | Field/Project staff       | 31        | 3.23        | 1.203          |         |
|                                          | <b>Total</b>              | <b>60</b> | <b>3.42</b> | <b>1.124</b>   |         |
| Delay in Electrification                 | Management staff          | 24        | 3.50        | 0.885          | 0.188   |
|                                          | Field/Project staff       | 31        | 3.13        | 1.118          |         |
|                                          | <b>Total</b>              | <b>55</b> | <b>3.29</b> | <b>1.031</b>   |         |
| Delay in Jetty                           | Management staff          | 23        | 3.00        | 1.128          | 0.541   |
|                                          | Field/Project staff       | 26        | 3.19        | 1.059          |         |
|                                          | <b>Total</b>              | <b>49</b> | <b>3.10</b> | <b>1.085</b>   |         |
| Delay in Roads/Bridges                   | Management staff          | 26        | 4.08        | 0.977          | 0.208   |
|                                          | Field/Project staff       | 33        | 3.73        | 1.098          |         |
|                                          | <b>Total</b>              | <b>59</b> | <b>3.88</b> | <b>1.052</b>   |         |
| Delay in Shore Protection/Channelization | Management staff          | 24        | 3.88        | 1.227          | 0.943   |
|                                          | Field/Project staff       | 27        | 3.85        | 1.064          |         |
|                                          | <b>Total</b>              | <b>51</b> | <b>3.86</b> | <b>1.132</b>   |         |
| Delay in Water                           | Management staff          | 24        | 3.17        | 1.129          | 0.870   |
|                                          | Field/Project staff       | 26        | 3.12        | 1.071          |         |
|                                          | <b>Total</b>              | <b>50</b> | <b>3.14</b> | <b>1.088</b>   |         |
| Delay in other projects                  | Management staff          | 5         | 3.40        | 1.14           | 0.915   |
|                                          | Field/Project staff       | 2         | 3.50        | 0.707          |         |
|                                          | <b>Total</b>              | <b>7</b>  | <b>3.43</b> | <b>0.976</b>   |         |

## Project delays in the Niger Delta region, Nigeria

|                                          |                                            | N  | Mean | Std. Deviation | Std. Error | 95% Confidence Interval for Mean |             | Minimum | Maximum |
|------------------------------------------|--------------------------------------------|----|------|----------------|------------|----------------------------------|-------------|---------|---------|
|                                          |                                            |    |      |                |            | Lower Bound                      | Upper Bound |         |         |
| Delay in Buildings                       | Projectized                                | 9  | 2.89 | 1.364          | 0.455      | 1.84                             | 3.94        | 1       | 5       |
|                                          | Functional                                 | 19 | 3.63 | 1.116          | 0.256      | 3.09                             | 4.17        | 2       | 5       |
|                                          | Matrix (Combined functional & projectized) | 29 | 3.34 | 1.01           | 0.188      | 2.96                             | 3.73        | 2       | 5       |
|                                          | Total                                      | 57 | 3.37 | 1.112          | 0.147      | 3.07                             | 3.66        | 1       | 5       |
| Delay in Electrification                 | Projectized                                | 8  | 3    | 1.414          | 0.5        | 1.82                             | 4.18        | 1       | 5       |
|                                          | Functional                                 | 17 | 3.59 | 0.939          | 0.228      | 3.11                             | 4.07        | 2       | 5       |
|                                          | Matrix (Combined functional & projectized) | 28 | 3.07 | 0.858          | 0.162      | 2.74                             | 3.4         | 2       | 5       |
|                                          | Total                                      | 53 | 3.23 | 0.993          | 0.136      | 2.95                             | 3.5         | 1       | 5       |
| Delay in Jetty                           | Projectized                                | 8  | 3.5  | 1.309          | 0.463      | 2.41                             | 4.59        | 1       | 5       |
|                                          | Functional                                 | 17 | 3    | 1.118          | 0.271      | 2.43                             | 3.57        | 1       | 5       |
|                                          | Matrix (Combined functional & projectized) | 23 | 3.04 | 1.022          | 0.213      | 2.6                              | 3.49        | 1       | 5       |
|                                          | Total                                      | 48 | 3.1  | 1.096          | 0.158      | 2.79                             | 3.42        | 1       | 5       |
| Delay in Roads/Bridges                   | Projectized                                | 10 | 3.1  | 1.101          | 0.348      | 2.31                             | 3.89        | 1       | 5       |
|                                          | Functional                                 | 19 | 4.37 | 0.831          | 0.191      | 3.97                             | 4.77        | 3       | 5       |
|                                          | Matrix (Combined functional & projectized) | 28 | 3.75 | 1.005          | 0.19       | 3.36                             | 4.14        | 2       | 5       |
|                                          | Total                                      | 57 | 3.84 | 1.049          | 0.139      | 3.56                             | 4.12        | 1       | 5       |
| Delay in Shore Protection/Channelization | Projectized                                | 8  | 4    | 1.414          | 0.5        | 2.82                             | 5.18        | 1       | 5       |
|                                          | Functional                                 | 17 | 4    | 1.173          | 0.284      | 3.4                              | 4.6         | 1       | 5       |
|                                          | Matrix (Combined functional & projectized) | 24 | 3.71 | 1.042          | 0.213      | 3.27                             | 4.15        | 1       | 5       |
|                                          | Total                                      | 49 | 3.86 | 1.137          | 0.162      | 3.53                             | 4.18        | 1       | 5       |
| Delay in Water                           | Projectized                                | 10 | 3.3  | 1.252          | 0.396      | 2.4                              | 4.2         | 1       | 5       |
|                                          | Functional                                 | 16 | 3.31 | 1.302          | 0.326      | 2.62                             | 4.01        | 1       | 5       |
|                                          | Matrix (Combined functional & projectized) | 22 | 2.91 | 0.75           | 0.16       | 2.58                             | 3.24        | 2       | 5       |
|                                          | Total                                      | 48 | 3.13 | 1.064          | 0.154      | 2.82                             | 3.43        | 1       | 5       |
| Delay in other projects                  | Projectized                                | 0  | .    | .              | .          | .                                | .           | .       | .       |
|                                          | Functional                                 | 4  | 3.25 | 0.957          | 0.479      | 1.73                             | 4.77        | 2       | 4       |

|  |                                                     |   |      |       |       |      |      |   |   |
|--|-----------------------------------------------------|---|------|-------|-------|------|------|---|---|
|  | Matrix<br>(Combined<br>functional &<br>projectized) |   |      |       |       |      |      |   |   |
|  |                                                     | 3 | 3.67 | 1.155 | 0.667 | 0.8  | 6.54 | 3 | 5 |
|  | <b>Total</b>                                        | 7 | 3.43 | 0.976 | 0.369 | 2.53 | 4.33 | 2 | 5 |

**Table L8: Results of ANOVA on extents of delays based on respondents' project management organization**

|                                                     |                           | Sum of<br>Squares | df | Mean<br>Square | F     | Sig.  |
|-----------------------------------------------------|---------------------------|-------------------|----|----------------|-------|-------|
| <b>Delay in Buildings</b>                           | <b>Between<br/>Groups</b> | 2.336             | 1  | 2.336          | 1.876 | 0.176 |
|                                                     | <b>Within<br/>Groups</b>  | 72.247            | 58 | 1.246          |       |       |
|                                                     | <b>Total</b>              | 74.583            | 59 |                |       |       |
| <b>Delay in Electrification</b>                     | <b>Between<br/>Groups</b> | 1.862             | 1  | 1.862          | 1.778 | 0.188 |
|                                                     | <b>Within<br/>Groups</b>  | 55.484            | 53 | 1.047          |       |       |
|                                                     | <b>Total</b>              | 57.345            | 54 |                |       |       |
| <b>Delay in Jetty</b>                               | <b>Between<br/>Groups</b> | 0.451             | 1  | 0.451          | 0.379 | 0.541 |
|                                                     | <b>Within<br/>Groups</b>  | 56.038            | 47 | 1.192          |       |       |
|                                                     | <b>Total</b>              | 56.49             | 48 |                |       |       |
| <b>Delay in Roads/Bridges</b>                       | <b>Between<br/>Groups</b> | 1.778             | 1  | 1.778          | 1.624 | 0.208 |
|                                                     | <b>Within<br/>Groups</b>  | 62.392            | 57 | 1.095          |       |       |
|                                                     | <b>Total</b>              | 64.169            | 58 |                |       |       |
| <b>Delay in Shore<br/>Protection/Channelization</b> | <b>Between<br/>Groups</b> | 0.007             | 1  | 0.007          | 0.005 | 0.943 |
|                                                     | <b>Within<br/>Groups</b>  | 64.032            | 49 | 1.307          |       |       |
|                                                     | <b>Total</b>              | 64.039            | 50 |                |       |       |
| <b>Delay in Water</b>                               | <b>Between<br/>Groups</b> | 0.033             | 1  | 0.033          | 0.027 | 0.87  |
|                                                     | <b>Within<br/>Groups</b>  | 57.987            | 48 | 1.208          |       |       |
|                                                     | <b>Total</b>              | 58.02             | 49 |                |       |       |
| <b>Delay in other projects</b>                      | <b>Between<br/>Groups</b> | 0.014             | 1  | 0.014          | 0.013 | 0.915 |
|                                                     | <b>Within<br/>Groups</b>  | 5.7               | 5  | 1.14           |       |       |
|                                                     | <b>Total</b>              | 5.714             | 6  |                |       |       |

**Table L9: Summary of ANOVA on extents of delays based on respondents' project management organization**

| Factors                  | Categories of respondents                  | N         | Mean        | Std. Deviation | P-value |
|--------------------------|--------------------------------------------|-----------|-------------|----------------|---------|
| Delay in Buildings       | Projectised                                | 9         | 2.89        | 1.364          | 0.257   |
|                          | Functional                                 | 19        | 3.63        | 1.116          |         |
|                          | Matrix (Combined functional & Projectised) | 29        | 3.34        | 1.01           |         |
|                          | <b>Total</b>                               | <b>57</b> | <b>3.37</b> | <b>1.112</b>   |         |
| Delay in Electrification | Projectised                                | 8         | 3.00        | 1.414          | 0.189   |
|                          | Functional                                 | 17        | 3.59        | 0.939          |         |
|                          | Matrix (Combined functional & Projectised) | 28        | 3.07        | 0.858          |         |
|                          | <b>Total</b>                               | <b>53</b> | <b>3.23</b> | <b>0.993</b>   |         |
| Delay in Jetty           | Projectised                                | 8         | 3.50        | 1.309          | 0.541   |
|                          | Functional                                 | 17        | 3.00        | 1.118          |         |
|                          | Matrix (Combined functional & Projectised) | 23        | 3.04        | 1.022          |         |
|                          | <b>Total</b>                               | <b>48</b> | <b>3.10</b> | <b>1.096</b>   |         |
| Delay in Roads/Bridges   | Projectised                                | 10        | 3.10        | 1.101          | 0.005   |
|                          | Functional                                 | 19        | 4.37        | 0.831          |         |
|                          | Matrix (Combined functional & Projectised) | 28        | 3.75        | 1.005          |         |

|                                          |                                            |           |             |              |       |
|------------------------------------------|--------------------------------------------|-----------|-------------|--------------|-------|
|                                          | <b>Total</b>                               | <b>57</b> | <b>3.84</b> | <b>1.049</b> |       |
| Delay in Shore Protection/Channelization | Projectised                                | 8         | 4.00        | 1.414        | 0.677 |
|                                          | Functional                                 | 17        | 4.00        | 1.173        |       |
|                                          | Matrix (Combined functional & Projectised) | 24        | 3.71        | 1.042        |       |
|                                          | <b>Total</b>                               | <b>49</b> | <b>3.86</b> | <b>1.137</b> |       |
| Delay in Water                           | Projectised                                | 10        | 3.30        | 1.252        | 0.443 |
|                                          | Functional                                 | 16        | 3.31        | 1.302        |       |
|                                          | Matrix (Combined functional & Projectised) | 22        | 2.91        | 0.75         |       |
|                                          | <b>Total</b>                               | <b>48</b> | <b>3.13</b> | <b>1.064</b> |       |
| Delay in other projects                  | Projectised                                | 0         | 0           | 0            | 0.623 |
|                                          | Functional                                 | 4         | 3.25        | 0.957        |       |
|                                          | Matrix (Combined functional & Projectised) | 3         | 3.67        | 1.155        |       |
|                                          | <b>Total</b>                               | <b>7</b>  | <b>3.43</b> | <b>0.976</b> |       |