

**ANALYSIS OF THE CONTRIBUTING FACTORS  
TO CONSTRUCTION SCHEDULE OVERRUN IN  
SELECTED PUBLIC SECTOR PROJECTS IN IMO  
STATE**

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**OCTOBER, 2023**

## CERTIFICATION


This is to certify that this thesis “**Analysis of the Contributing Factors to Construction Schedule Overrun in Selected Public Sector Projects in Imo State**” was carried out by **Opara, Godswill Ngozi**, with Registration Number: **20084653718** of the Department of Project Management Technology and is hereby presented for acceptance as a contribution to knowledge and learning.


  
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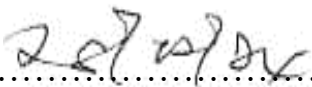
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## **DEDICATION**

This academic work is entirely dedicated to the Almighty God for His love, kindness, support and faithfulness throughout the course of my master's degree programme.

I also appreciate the selfless support in cash and in kind from my beloved parents Mr. Innocent Opara (late) and Mrs. Charity Opara in making this work a reality.

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**Opara, Godswill Ngozi**

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## ABSTRACT

This work seeks to analyze the Contributing Factors to Construction Schedule Overrun in Selected Public Sector Projects in Imo State. The objectives are to: determine and analyze the factors responsible for project schedule overrun in construction projects in Imo State; examine possible individual and collective significant effects of the factors on successful project delivery; examine the impact of schedule overrun on construction projects and; identify the causes of schedule overrun in construction projects and proffer workable solution to them. Questionnaire was developed using the 5-point Likert scale for the collection of primary data. Multiple regression analysis was adopted for the analysis of the collected data. The result obtained shows that government policies and project funding/finance, are significant factors that contribute to construction projects schedule overrun while project technology, force majeure and corruption are not significant. Funding/finance has the highest ranking, project technology ranks the least. Based on the above findings, it can be concluded that proper planning should be encouraged; government policies and programmes should be made in such a way that favours timely execution of projects. Adequate financial provisions should be made available to contractors by the government. The use of local raw materials should be encouraged in the execution of contracts. The selection of contractors and other major stakeholders should be based on competence and realistic tender quotations. All efforts should be made to reduce or eliminate the occurrence of design modifications during the project execution.

**Keywords:** Project schedule, Project Overrun, Construction Projects, Public sector, Funding.

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background Information

The word construction is defined by the Oxford Advanced Learner's Dictionary as the process or method of building or making something especially roads, buildings, bridges etc. Project on the other hand is defined by Rolstadas (1999) as one of a kind event with clear goals to be reached within a time and cost frame. More importantly, Akpan (1987), defined a project as “a series of jobs that individuals have to complete in order for the system (project) to be satisfactorily consummated”. Furthermore, the term “project” means any unique activity, situation, process, task, programme, scheme or any human endeavour in which human beings, time and resources are utilized to satisfy a definable and definite one-off (single or multiple) objective.

The planning and implementation of projects have taken a wider dimension since the 20<sup>th</sup> century. Project execution involves doing something which has not been before and which is therefore unique. Accurate construction planning is a key determinant in ensuring the delivery of a project on schedule and within budget. Construction time, although only a part of the life cycle duration of a project, has become an increasingly important concern within the construction industry. The

inability to complete projects on time and within budget continues to be a chronic problem worldwide and is worsening (Ahmed et al., 2002). Azhar and Farouqui (2008) observe that the trend of cost overrun is common worldwide and that it is more severe in developing countries. The debate in the construction industry on how to minimize or eliminate delays and cost overruns has been ongoing for some time among professionals, clients and/or end users, and the policy makers. According to Bramble (2017), the funding for construction industry activities is, in many countries, used to regulate the economy. As the construction industry continues to grow in size, so do planning and budgeting problems. This is because it is common for projects not to be completed on time and within the initial project budget. There are quite a number of examples at the national and internal scene. For instance, most of the construction projects in Nigeria have had problems with delay in completion time and this has caused a lot of concern. Because of construction delays and cost overruns, less and less work is performed despite the increase in construction budgets

The issue of construction project schedule overruns is a very common phenomenon in Nigeria. Completing construction projects on time has been a chronic problem for the various levels of government including the Federal, State and Local Governments. This problem has been found to be more prevalent in the public sector (Fubara, 2021). This statement is corroborated by the fact that abandoned projects

litter every corner of the country. Imo State obviously has its own fair share of the issue under study.

Schedule overrun has been a common problem in Nigeria. Numerous factors/reasons such as utility and weather damage delays can cause the cost of construction to exceed budget and extend project schedule.

Understanding the specific causes of schedule overruns due to design or changed conditions can help control time and extension on projects. They may be related to external or internal factors that may cause the construction of a project to delay. It can therefore be stated that a project that has passed pre-contract stage can experience schedule overrun by reason of contract modification or to source for more funds for its completion.

The cause of schedule overrun can be as a result of external or internal factors. As the names imply, the external factors emanate from sources outside the control and confines of the parties to the contract. These include utility companies, inconsistent government policies, subcontractors, suppliers, unfavourable weather conditions. It can also be as a result of the activities of militants and community disputes. The unfortunate problem of militancy has caused a lot of delays in timely project execution especially in the Niger Delta area of the country including Imo State, the focal point of this work (Fubara, 2021). The question is whether these are the only militating factors. Reactions from other experts indicate that weather conditions,

especially heavy rains that disrupt road construction projects; unavailability of resources, design delays (Akpan, 2008). However, some reasons have been adduced to construction schedule overrun including design errors, poor coordination, inadequate scope, weather damages resulting from heavy rains and other acts of force majeure (Bramble, 2017). Construction project schedule overruns can result in loss of time and money as well as inconveniences to the public.

In general, construction projects overrun occur as a result of project activities that have both external and internal cause and effect relationships. When one activity experiences a delay due to late start or late finish, the preceding activities will also experience a late start and cause the project extra time and money. An activity's delayed completion time may cause time overruns in other succeeding activities, which in turn can cause schedule overrun in the project completion (Schi, 2001). Relevant authors have made efforts to curtail this trend by making various suggestions, yet the schedule overrun still persists. It is against this background that this research work therefore aims at investigating into the critical factors of construction project schedule overrun in some selected projects in Imo State; their effects as well as proffer solutions through project management methods.

## **1.2 Problem Statement**

In recent times, the execution of projects in Nigeria has become wider in scope and concept. As a result of this, a lot of problems have besieged the efficient and timely

execution and completion of construction projects, especially the public sector projects. According to Fubara (2021), completing construction projects on time has been a chronic problem for the various levels of government including the Federal, State and Local Governments.

Most government contractors face a lot of problems associated with weather conditions; unavailability of resources, design delays, force majeure, lack of materials, poor funding, etc. which results in schedule overrun which attract cost overrun, disputes, litigation and finally total abandonment of the projects.

So much efforts have been made previously to eliminate or at least reduce construction project schedule overrun, all to no avail, hence the need for this in-depth research work.

### **1.3 Objectives of the Study**

The main objective of this study is to analyze the contributing factors to construction project schedule overrun in public sector projects in Imo State. The specific objectives, the research is therefore designed to achieve the following:

- a.** To ascertain whether inconsistent government policies and programmes is a significant factor responsible for schedule overrun in construction projects in Imo State.
- b.** To determine whether project technology is a significant factor responsible for schedule overrun in construction projects in Imo State.

- c. To ascertain whether funding/finance is a significant factor responsible for schedule overrun in construction projects.
- d. To know whether Force Majeure is a significant factor responsible for schedule overrun in construction projects in Imo State.
- e. To determine whether corruption is a significant factor responsible for schedule overrun in construction projects in Imo
  - a. State.
- f. To ascertain whether the factors have significant collective effects on public sector project delivery.

#### **1.4 Research Questions**

For the purpose of this work, the following research questions are hereby formulated.

- a. To what extent can inconsistent government policies and programmes significantly affect schedule overrun in construction projects in Imo State?
- b. To what extent can project technology significantly affect schedule overrun in construction projects in Imo State?
- c. How can funding/finance significantly affect schedule overrun in construction projects?
- d. How can Force Majeure significantly affect schedule overrun in construction projects in Imo State?

- e. To what extent corruption significantly affects schedule overrun in construction projects in Imo State?
- f. What is the level of collective effect that factors have on public sector project delivery?

### **1.5 Hypothesis Statements**

Based on the research objectives, the following hypotheses were formulated for testing:

**H01:** Inconsistent government policies and programmes are not a significant factor responsible for schedule overrun in construction projects in Imo State.

**H02:** Projects Technology is not a significant factor responsible for schedule overrun in construction projects in Imo State.

**H03:** Projects funding/finance is not a significant factor responsible for schedule overrun in construction projects.

**H04:** Force Majeure is not a significant factor responsible for schedule overrun in construction projects in the state.

**H05:** Corruption is not a significant factor responsible for schedule overrun in construction projects in the state.

**H06:** The factors of project schedule overrun collectively have no significant effect on public sector project delivery.

## **1.6 Justification of the Study**

The significance of this study cannot be overemphasized. It is a study that will go a long way in demystifying the factors that contribute to construction project overruns with particular reference to construction projects in Imo State.

This work will therefore have the following positive impacts with their attendant multiplier effects.

- i.** The study will enable the stakeholders in the construction industry to be well acquainted with the effects of the factors of construction projects overrun on the country economy.
- ii.** It will go a long way in reducing, if not completely eliminating the wastage of scarce resources (human, material and time) caused by schedule overrun.
- iii.** There will be prompt execution of projects, thereby enabling the stakeholders to achieve their goals and objectives on time.
- iv.** Construction firms may equally see the need for adoption of good time management techniques and may work towards provision of the same thereby leading to a more effective and efficient organizational performance.
- v.** This research will motivate other researchers to probe further into other aspects of project time management

- vi.** It will serve as a good reference material to contractors, clients, governments and project managers who can now fall back on it in correcting the errors committed in earlier projects.
- vii.** This study will also provide a reference point for consultants and students alike.

### **1.7 Scope of the Project**

This project work focuses on the analysis of factors affecting construction projects schedule overrun with particular attention on public sector projects in Imo State.

The following projects were sampled:

- i.** The dredging of Nworie River and construction of bridges and approach roads at Nekede, Assumpta Avenue and Egbeada.
- ii.** The construction of the Owerri/Port-Harcourt dual-carriage expressway.
- iii.** The construction of the Imo Ring Road with flyovers at Okigwe Road and Akwakuma.
- iv.** The construction of the New Imo State Government House at New Owerri.

However, limitations are natural phenomena in any research work. This very one is therefore not an exception. In the course of this work, the following limitations were encountered.

One of the limitations encountered in the course of this research was that of difficulties in data collection. This is especially so since this research was solely on government projects. Most of the respondents were reluctant to answer simple questions put to them. Some were also reluctant to fill the questionnaire. However, with persuasion and persistence, the researcher was able to overcome this difficulty.

Another limitation encountered was in the nature of the research topic. Most often, schedule overrun evaluation is directed towards projects that are abandoned or at the point of being abandoned or projects with significant implementation schedule overrun. Because of this, most of the key personnel that would have given the necessary information concerning the projects are hardly around to answer vital questions pertaining to the projects.

A significant level of financial constraints was also experienced in this work.

However, despite these limitations, the results of this study are highly reliable as these limitations were overcome by the determination and doggedness of the researcher.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Conceptual Review**

Project schedule overrun has been a recurring decimal in Nigeria in general and Imo State in particular. However, this has generated a lot of conflicts between clients and contractors and other stakeholders in project planning and implementation. Some problems encountered include: the difficulty in obtaining information from the major stakeholders especially government officials as most of them in their characteristic manner, were reluctant to give out official information/documents; most of the key personnel involved in the projects were hardly seen on site; financial constraints were equally encountered. However, all these constraints were surmounted to get accurate results. Among other objectives, this research aims to determine the possible individual and collective significant effects of the factors so identified; to determine the impact of schedule overrun in construction projects and proffer workable solutions to them. There are four types of construction project schedule overruns that can be encountered in construction projects (Bramble, 2017).

They include:

- a.** Excusable or Non-excusable
- b.** Concurrent or Non-concurrent
- c.** Compensable Non-compensable and

**d. Critical and Non-Critical schedule overruns.**

The types of schedule overruns above have internal or external impacts on the project's process. Internal causes of schedule overrun include causes that come from the owner, designers, contractors, and consultants. External causes of schedule overrun originate from outside of construction projects such as utility companies, government, subcontractors, suppliers, labour unions, force majeure (nature) etc.

Excusable delays are unforeseeable events beyond anyone's control. They are broken down further into compensable or non-compensable delays. If the delay is considered compensable, the contractor is entitled to additional financial compensation as well as extra project time. Under certain circumstances where compensated excusable delays occur, the contractor receives extra time but no extra money for the additional completed work (Bramble, 2017).

Excusable and non-excusable delays can occur concurrently or non-concurrently in a project. Concurrent delays occur at the same time or close to the same time. They can also contain critical and non-critical delays. Critical delays are delay claims that affect the progress, time and compensation. Non-critical delays do not affect the completion date of the project. They affect the succeeding activities that are not on the critical path of the schedule. This can set back activities if they do not have a float in the schedule (Bramble 2017).

### **2.1.1 Contributing Factors of Construction Project Schedule Overrun**

Project schedule overrun is a phenomenon that has permeated into the entire spectrum of the construction industry. It is a cankerworm that has eaten deep into the economy of the country. It therefore goes without saying that huge economic losses are the aftermath of this ugly trend.

In the course of this research work, it was discovered that a good number of projects in the country have experienced schedule overrun. These include among others, the Ajaokuta Steel Rolling Mill, the steel complex at Alaja, in Delta State. It goes without saying that countless housing, building and hospital projects are at various stages of overrun. According to Abbas (2006), late completion of works as compared to the planned schedule or contract schedule is what is known as delay. Delay occurs when the progress of a contract falls behind its scheduled program. It may be caused by any party to the contract and may be a direct result of one or more circumstances. A contract delay has adverse effects on both the owner and contractor (either in the form of lost revenues or extra expenses) and it often raises the contentious issue of delay responsibility, which may result in conflicts that frequently reach the courts. A cost overrun occurs when the final cost of the project exceeds the original estimates (Azhar & Farouqi, 2008). There is a relationship between schedule, the scope of work and project conditions. Changes to any one or more of these three can affect the compensation level and time of completion. It has

been argued that it is necessary to create awareness of causes of project schedule delays, their frequency, and the extent to which they adversely affect project delivery (Al-Khalil & Al-Gafly, 1999). Kaliba et al. (2009) concluded from their study that the major causes of delay in road construction projects in Zambia were delayed payments, financial deficiencies on the part of the client or contractor, contract modification, economic problems, material procurement, changes in design drawings, staffing problems, equipment unavailability, poor supervision, construction mistakes, poor coordination on site, changes in specifications, labour disputes, and strikes. Agaba (2009) attributes delays in construction projects to poor designs and specifications, and problems associated with management and supervision. In their study, El-Razek et al., (2008) found that delayed payments, coordination difficulty, and poor communication were important causes of delay in Egypt. Sambasivan and Soon (2007) established poor planning, poor site management, inadequate supervisory skills of the contractor, delayed payments, material shortage, labor supply, equipment availability and failure, poor communication and rework, were the most important causes of delays in the Malaysian Construction Industry. Kouskili and Kartan (2004) identified the main factors affecting cost and time overrun as inadequate/inefficient equipment, tools and plant, unreliable sources of materials on the local market, and site accidents. Le-Hoai et al., (2008) ranked the three top causes of cost overruns in Vietnam as

material cost increase due to inflation, inaccurate quantity take-off, and labour cost increase due to environmental restriction. Kaliba, et al (2009) conclude that cost escalation of construction projects in Zambia are caused by factors such as inclement weather, scope changes, environment protection and mitigation costs, schedule delay, strikes, technical challenges and inflation. Bubshait and Al-Juwait (2002) list the following as factors that cause cost overrun on construction projects in Saudi Arabia: effects of weather, number of projects going on at the same time, social and cultural impacts, project location, lack of productivity standards in Saudi Arabia, level of competitors, supplier manipulation, economic stability, inadequate production of raw materials by the country, absence of construction cost data. It can therefore be deduced that the most important factors vary from one region to another.

According to Anuolam Moses (1997), proper management of projects ensures that correct information and other activities concerning the project are obtained in order that the project is completed within the specified completion date or within the time schedule. He went further to say that this will highlight those activities that are on the critical path of the project network diagram.

In his own view, Rondinelli (1995) opined that since projects are the basic building blocks of development and that without successful project execution, development plans would be no more than mere wishes. He went further to state that the diverse

problems of project execution should be ameliorated by using viable techniques of management so as to improve administrative capacity and project implementation improvement.

From the foregoing and the aforementioned postulations, it has become obvious that construction projects are not only unique in nature, but involve works of a variable nature. Unlike in the past, the current principle of application of management in projects (including construction projects) has gone a long way in producing good and qualitative results. Before now, projects were executed in such a way that they lasted longer than scheduled, due to incompetent management skills and techniques. Jahren (1990) opined that past data shows that the size of a project influences project cost and time overruns. However, Rowland indicated that the project complexity increased cost and schedule overruns due to issuing many change orders (Rowland, 1981) Randolph (1990) found that change order rates were reduced on larger projects. However, Tyrrel (1983) indicated that project type influenced cost and schedule overruns.

Design errors and omissions were responsible for most construction projects schedule overruns. This is in line with the U.S. Federal Department of Transport (FDOT) report no 95-30. However, it is essential to control time overruns and avoid delay during the project pre-scheduling process.

The problem of delays in the construction industry is a global phenomenon. In Saudi Arabia, Assaf and Al-Hejji (2006) found that only 30% of construction projects were completed within the scheduled completion dates and that the average time overrun was between 10% and 30%. In Nigeria, Ajanlekoko (2009) observed that the performance of the construction industry in terms of time was poor. Odeyinka and Yusuf (1997) have shown that seven out of ten projects surveyed in Nigeria suffered delays in their execution. Ogunlana and Promkuntong (2014) conducted a study on construction delays in Thailand. Al-Momani (2000) carried out a quantitative analysis on construction delays in Jordan. Frimpong et al (2010) conducted a survey to identify and evaluate the relative importance of the significance factors contributing to delay and cost overruns in Ghana groundwater construction projects.

Manavizha and Adhikarib (2002) linked the material-related causes to the probable cost overruns in construction projects in Saudi Arabia.

Odey and Battaineh (2002) linked the construction projects to the probable disputes occurring in construction projects in Jordan. Chan and Kumaraswamy (2010) linked the consultant-related and client-related causes to the probable time overruns in construction projects in Hong Kong. Mansfield (1994) and Frimpong et al (2010) linked the client-related, consultant-related and material-related factors to the

probable cost and time overruns. They categorized the causes of schedule overrun into the following eight groups:

- a.** Client-related factors: finance and payments of completed works, owner's interference, slow decision making and unrealistic contract duration imposed by owners.
- b.** Contractor-related factors: delays caused by subcontractors, site management, improper construction methods, improper planning and errors during construction methods and inadequate contractor experience.
- c.** Consultant-related factors: contract management, preparations and approval of drawings, quality assurance and waiting time for approval of test and inspection.
- d.** Material-related factors: quality of material and shortage in material.
- e.** Labour and equipment –related factors: labour supply, labour productivity and equipment availability and failure.
- f.** Contract-related factors: change orders and mistakes or discrepancies in contract document.
- g.** Contract relationship –related factors: major disputes and negotiations, inappropriate overall organizational structures linking to the project and lack of communication between the parties.
- h.** External factors: weather condition, regulatory changes, problem with neighbors and unforeseen site condition.

## **2.1.2 Factors Responsible for Construction Project Schedule Overrun**

### **Inconsistent Government Policies and Programmes**

There is a high rate of inconsistency in government policies and programmes in Nigeria. Once there is a change in government in the country, the policies, programmes and projects of the past government are usually jettisoned.

To this end, Akinrinade (1988) stated that changes in government worry contractors who are always apprehensive that such changes may result in new rules and regulations that adversely affect their interest. As a result of this, even when the new government has not made any statement on contracts by the past government, the contractors usually down their tools waiting for the policy directives of the new government, thereby leading to schedule overrun.

### **Economic Factors**

#### **(i) The Problem of Finance:**

Finance is the backbone of proper and timely execution of any project, be it in the private or public or in the public sector. Many a time, adequate financial calculations or estimates are not made ab initio, during the course of a project. No project can see the light of the day without adequate financial provisions.

Boswell (2004) brought it to limelight that many clients do not consider the availability of funds before awarding contracts, which in turn delay the payment due

to the contractors. Many a time, the clients' hopes of generating revenue are dashed and the reliance on financial institutions usually fail. Once the contractor who is out to make profit is starved of funds, the project is bound to experience schedule overrun or even total abandonment.

**(ii) The Effect of Inflation:**

Projects are usually caught up with inflation. When this happens, the project's original cost shoots up drastically. This affects the completion time of the project, especially when there is the usual disagreement between the client and the contractor as a result of such inflation. This inflation is usually attributed to the client's inability to finance the project promptly, thereby forcing the contractor to down tools after waiting endlessly for funds.

Essena (1981) stated various types of contractors and how each has contributed in various degrees to project cost. Oduntan (1988) was of the view that delays in payment and bureaucracy brings about escalation of prices of government contracts.

## **Technical Factors**

### **(i) Involvement of Specialized Parts:**

Harris (1988) explained that a plant's schedule is a detailed summary of all plants and equipment used to carry out a project. There are some highly specialized and technically complex equipment and plants that require special handling and operation. If a project requires these machines when they are not available, it goes without saying that the project will experience overrun. Therefore, the procurement of materials and equipment are important factors that should be considered in any project execution.

### **(ii) Utility Lines**

Inaccurate records of underground utility lines can also lead to construction project delays. In addition, utility companies (such as communication companies, electricity companies, water supplies companies etc) not properly reviewing design plans or not paying the cost to move their utility lines may also result in construction project schedule overrun. This has been a problem in urban areas where utility lines have been installed many years ago.

## **Force Majeure**

This is also called the acts of nature. Any act of nature or natural disaster over which man has no control falls within this category. The high winds and storms at construction sites can damage materials and erode work and when this happens and

becomes persistent and devastating, it leads to schedule overrun. Extreme weather conditions such as tropical storms, erosions have adverse effects on project schedules. The delays emanating from the time to repay damaged equipment and materials invariably leads to schedule overrun.

### **Activities of Militants**

The activities of militants especially in the Niger Delta areas of Nigeria, including Imo State, is another factor that can cause schedule overrun. Their activities usually result in the disruption of construction work in these areas. This group of individuals often barricades the entrance of companies as well their construction sites, demanding one thing or the other. The precious time that would have been committed to the execution of the job is often spent trying to negotiate with these miscreants.

### **The Factor of Consultants**

In many occasions, consultancy services are very much needed in projects. These consultants usually take a longer time in giving out their services, thereby causing unnecessary delays of projects.

Others are strikes, technical challenges, materials procurement, changes in drawing, staffing problems, equipment unavailability, poor supervision, construction mistakes, poor coordination on sites, changes in specifications and labour disputes.

### **2.1.3 Key Factors in Reducing Construction Projects Schedule Overrun**

There are many schedule overrun contributing factors as enunciated in the last section. Some of them are beyond the owners and contractors control. Due to variations in every construction project, there are no simple solutions to overcome project schedule overruns. However, there are some that can be controlled by both owners and contractors.

- i.** Develop goals before planning starts
- ii.** Design plans should be reviewed carefully when there is increasing use of consultants.
- iii.** Review design related to problems from past projects
- iv.** Conduct additional preliminary research and investigation on site before bidding for the project.
- iv.** Minimize construction conflict with involved parties by creating better communication and coordination
- v.** Develop innovative contracting methods
- vi.** Improve quality of design plans.
- vii.** Make use of experienced project staff and consultants
- ix.** Employ constructability reviews that can examine whether projects can be built as designed.

- viii.** Prior to any project construction, the contractor should incorporate relevant authorities such as the town planning authorities, capital development authorities, utility companies and other stakeholders into its design plans to make sure that the utility lines have been identified or moved before construction starts. Everything has to be reviewed and approved between each party.
- ix.** Efforts should be made to locate underground utilities during site investigations by using the ion radar(GPR), the tracer tape, the vacuum excavation or any other underground utility detectors (Ellis et al 1996). Using any type of utility locator is costly to use but it would be even more costly and time consuming if a utility line is detected in the process of construction.

To minimize the schedule overrun caused by utilities, the following questions should be asked prior to construction.

- a.** Did a site inspection take place to locate any utilities within and around the construction site?
- b.** If a site inspection did not take place and a utility line was found, would it have a conflict with the construction operation?
- c.** Does the utility have a permit? (It needs to have a permit for relocation purposes).
- d.** Is the utility in the work schedule?

If a utility conflict is unanticipated, the problem should be studied with the utility company and contractor to come up with a best possible solution. The design should be revised and updated in order to expedite the construction project and minimize or eliminate schedule overrun. In addition, a review of the Utility Relocation Agreement and estimate of the effect that utility delays will have on contract duration should be done. Schedule overrun mostly occurs if the prime contractor cannot work as a result of utility conflicts (Bourgsen 2001). That is why it is important for the utility company and the contractor to establish good cooperation between them during the actual construction of the project (Ellis et al 1996).

#### **2.1.4 Key Determinants for Construction Schedule Performance**

According to Koga et al (2001) the five key determinants identified are:

- i.** Time devoted by the project manager to specific project
- ii.** Frequency of meetings between the project manager and other project personnel.
- iii.** Monetary incentives provided to the designer
- iv.** Implementation of constructability programme.
- v.** Project manager experience on projects with a similar scope.

### **2.1.5 Effects of Schedule Overrun On Construction Projects Objectives**

Project success is basically to gain the project objectives that are classically defined by the need to complete a project on time, within the budget and with appropriate quality. Hence disruption to the project will certainly contribute to project schedule overrun with its specified adverse effects on project objectives. Delays can give rise to disruption of work and less productivity, late completion of projects, increased time related costs and third-party claims and abandonment or termination of contract. It affects the feasibility of project owners and retards the development in the construction industry (Lim, 2004).

Aibinu and Jagboro (2002) studied the effects of construction schedule overrun on project delivery in Nigeria construction industry. The six effects of delay that were identified includes:

- i.** Time overrun
- ii.** Cost overrun
- iii.** Disputes
- iv.** Arbitration
- v.** Total abandonment
- vi.** Litigation

It is important to improve the estimated activity duration according to the actual skills levels, unexpected events, efficiency of work time, mistakes and misunderstanding (Lock, 1996). Schedule overrun influences negatively on the contractors' performance and contributes to adverse impacts in construction projects such as contract disputes, low productivity and increase in construction costs that will also influence on the predetermined construction project objectives.

For the comprehensive literature review, six major effects of delays in the construction projects were identified as follows:

### **1. Time Overrun**

Murali et al (2007) argued that contractor related factors and client related factors such as inadequate contractor experience and owner interference have an impact on time overrun. On the other hand, Aibinu and Jagboro (2002) studied the effects of construction delays on project delivery in Nigeria construction industry. They identified time overrun as one of the major effects of delay.

### **2. Cost Overrun**

Regarding cost overrun, Koushki et al (2005) identified three main causes that were contractor related problems, material related problems and owner's financial constraints, whereas Wiguna and Scott (2005) identified the most critical factors included: high inflation/increased material price, design change by client, defective

design, weather conditions, delayed payments on contracts and defective construction work.

### **3. Disputes**

Disputes are the effects of major causes of delays in construction projects such as causes of client related, contractor related, consultant related and external related issues that may be arising during the construction of projects among the project parties. Lack of communication may also lead to misunderstandings, conflicts and disputes. Hence, it necessitates the project managers to have effective communication skills which are one of the significant soft skills (people skills) with the project parties involved in construction projects. Based on Murali et al (2007), the factors such as lack of communication between the various parties, problem with neighbors, unforeseen site conditions, delay in payments for completed work, improper construction method, delay caused by the subcontractor and discrepancies in contract documents will give rise to dispute between the various parties. Furthermore, if the disputes cannot be solved amicably or easily it can lead to arbitration or litigation.

### **4. Arbitration**

According to Murali et al (2007), the delays which are caused by the client related factors and contractor related factors such as change in order, mistakes or discrepancies in contract documents and lack of communication between various

parties which may raise the disputes will be settled through an arbitration process. For these circumstances, it is necessary to have a complete third party that can settle the disputes amicably or easily without getting to court.

## **5. Litigation**

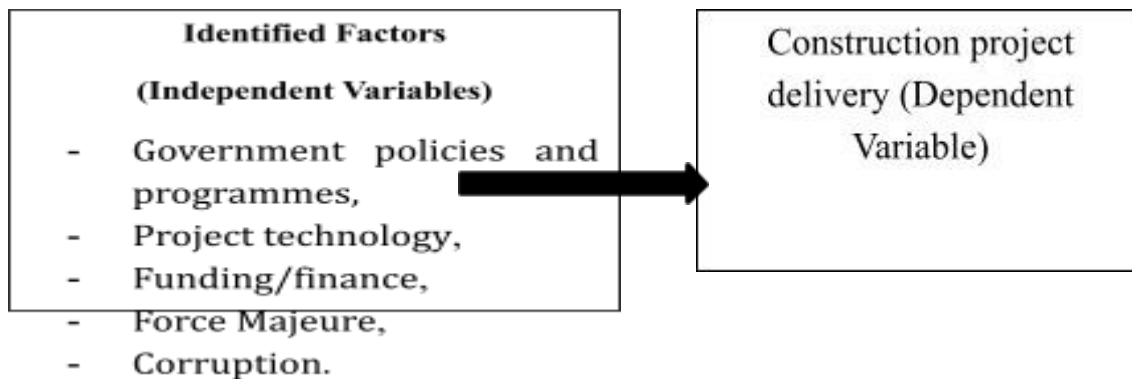
Based on Murali et al (2007) when delays caused by client related, contract related, labour related, external factor and contract relationship related factors such as delay in payment for completed works, problems with site conditions and less of labour supply where eventually rise the disputes to be settled by the litigation process. The parties involved in the construction projects use litigation as a last alternative to settle the disputes.

## **6. Total Abandonment**

The most critical adverse effect of delays in construction projects is abandonment that could be temporary or in worse condition for permanent duration. The major causes of client related, consultant related, contractor related and external related may lead to project abandonment that will lead to delays in construction projects. Aibunu and Jagboro studied the effects of construction delays on project delivery in the Nigerian construction industry. They identified total abandonment as one of the major effects of delay.

### 2.1.6 Conceptual Framework

In order to design the conceptual framework, the independent variables are the schedule overrun factors while the dependent variable is the delivery of construction projects which can be achieved if the identified schedule overrun are critically considered. This is because the context of the study is that proper project scheduling should attract successful project delivery in Nigeria. Hence, the independent factors are: government policies and programmes, project technology, funding/finance, Force Majeure, and corruption while the dependent variable is successful delivery of construction projects.



**Figure 2.1:** Conceptual Framework

## 2.2 Theoretical Review

This study has its footing on the study of systems as a holistic approach in solving real world problems with complex constraints. It was in the 1930's that Ludwig von Bertalanffy, a biologist, came up with his systems theory during a philosophy seminar at the University of Chicago. Bertalanffy began the systems theory study

in life sciences that resulted into the modern field of ecology which is the study of the systems of nature. He agreed that nothing could be comprehended by isolating only one part of what plays a critical role in a system (Bertalanffy, 1968).

His notion rests on the fact that if a system was going to be investigated, it had to be an open system. An open system is a system that possesses both inputs and outputs. However, Connors (2007) complained that Bertalanffy's idea on scientific reductionism could not accurately explain a whole system because that thought pattern disintegrates the system into parts rather than studying it as a whole. In order to properly understand and gain a better view of a system, the system and its holistic properties had to be examined to find the root of the problem.

Generally, Systems theory considers all possible roots of the problem and analyzes each individually and their roles in the system (Lazlo & Kripner, 1998). A system is best seen as a set of connected parts that forms a complex whole. This definition gives a basic understanding of the meaning of an overall system. However, Ackoff (1981), illustrates a system like this: Each element has an effect on the functioning of the whole. Each element is affected by at least one other element in the system. All possible subgroups of elements also have the first two properties. It can be seen that in Ackoff's definition, he presents the system in the same way as Bertalanffy was using it in his systems theory. Comprehending a system based on Bertalanffy's idea will help develop a better understanding of the purpose of this theory and why

it is so important in applied and social sciences. Consequently, the systems theory does not only apply to systems of natural sciences, but it can be applied to other systems like the family relationships, organizations and their employees, projects and its resources and can even assist in understanding the complicated system of governments.

Based on the attributes of systems theory, this study decides to adopt it since the study under consideration is examining construction project delivery as a whole from the angle of schedule overrun factors. This is because the study believes that proper project scheduling is the key factor that determines the success or failure of any project, particularly construction projects. According to Nwachukwu (2016), the choice of systems theory is based on the constraining factors to construction project management that has direct and indirect roles in the construction industry. System approach according to Onyeador (2016) is a useful method for gaining better understanding of complex processes. It is essentially a way of thinking about complex processes so that the relationships of its parts and their influence upon one another and the effectiveness of the total process can be better understood, analyzed and improved upon.

### **2.3 Empirical Review**

Chan and Kumaraswamy (2010) studied delays in the Hong Kong construction industry. They emphasized that timely delivery of projects within budget and to the

level of quality standard specified by the client is an index in successful project delivery. Failure to achieve targeted time, budgeted cost and specified quality result in various unexpected negative effects on the project. Normally, when the projects are delayed, they are either extended or accelerated and therefore incur additional cost. The normal practices usually allow a percentage of the project cost as a contingency allowance in the contract price and this allowance is usually based on judgment. Although the contract parties agreed upon the extra time and cost associated with delay, in many cases there were problems between the owner and contractor as to whether the contractor was entitled to claim the extra cost. Such situations usually involved questioning the facts, the causal factors and contract interpretation. Therefore, delays in construction projects give rise to dissatisfaction to all the parties involved and the main role of the project manager is to make sure that the projects are completed within the budgeted time and cost. According to MARBEX (2011), the construction sector in Malaysia, a fast-developing country in South-East Asia, has not escaped the problem of delays. In 2005, about 17.3% (of 417 government contract projects in Malaysia) were considered sick (more than 3 months of delay or abandoned).

The construction sector is one of the important sectors that contribute to Malaysia's economic growth. The sector accounted for nearly 3.3 % of GDP in the year 2005 and employed about 6,000,000 workers including 109,000 foreign workers

(MARBEX, 2011). The huge volume and complexity of projects in Malaysia's construction sector pose a great challenge and provide a wealth of opportunities to various companies in the construction industry. The construction sector in Malaysia can be divided into four broad categories: office, retail, residential and infrastructure. The sector suffered a temporary crisis between 1997 and 2000 (ASEAN crisis) and now it has started to improve. However, the delays in the projects continue to occur. The main purpose of this project is to analyze the critical factors on construction projects in the state.

According to Sambasivan, and Soon (2007), earlier studies considered the causes or the effects of project delays, separately. The causes of delays were categorized into client-related, contractor-related, consultant-related, material-related, labour-related, contract-related, contract relationship- related and external factors. Some identified major effects of delays are: time overrun, cost overrun, dispute, arbitration, litigation and total abandonment. Identification of causes of and effects alone does not help the project manager to take appropriate remedial or preventive steps. The project manager needs to understand, for example, what causes or factors result in time overrun or cost overrun. Once these factors become clear, the manager can take proactive steps to avoid such situations. For example, if it is known that time overrun is predominantly caused by client-related factors, the project manager can: make sure that payments for the completed work are made on time; reduce

owner interference; speed up decision making process; and avoid unrealistic contract duration and requirements.

Mansfield (1994) identified 16 major factors that caused schedule overrun and cost overrun in Nigeria. A questionnaire survey was carried out with contractors, consultants and client organizations in Nigeria. They presented that the causes of schedule overrun and cost overrun were attributed to finance and payment arrangements, poor contract management, shortages in materials, inaccurate estimations and overall price fluctuations.

Assaf et al (2006) identified 56 main causes of schedule overrun in Saudi large building construction projects and their relative importance. Based on the contractors surveyed, the most important delay factors were: preparation and approval of shop drawings, delays in contract's progress, payment by owners and design changes. From the view of the architects and engineers the cash problems during construction, the relationship between subcontractors and the slow decision-making process of the owner were the main causes of schedule overrun. However, the owners agreed that the design errors, labour shortages and inadequate labour skills were important delay factors.

Ogunlana and Promkumton (2014) conducted a study on construction delays in Thailand. They found that the problems faced by the construction industry in developing economies like Thailand could be: shortages or inadequacies in industry

infrastructure (mainly supply of resources); caused by clients and consultants; and caused by contractor's incompetence/inadequacies. They recommended that there should be a concerted effort by economy managers and construction industry associations to provide the necessary infrastructure for efficient project management.

Chan and Kumaraswamy (2010) conducted a survey to determine and evaluate the significant factors causing delays in Hong Kong construction projects. They analyzed and ranked main reasons for delays and classified them into two groups: the role of the parties in the local construction industry (i.e. whether client, consultants or contractors) and the type of projects, Results indicated that five major causes of schedule overrun were: poor site management and supervision, unforeseen ground conditions, low speed of decision making involving all project teams, client-initiated variations and necessary variations of works.

Odeyinka and Yusuf (1997) have addressed the causes of schedule overrun in building projects in Nigeria. They classified the causes of delay as project participants and extraneous factors. Client –related delays included variations in orders, slow decision-making and cash flow problems. Contractor-related delays identified were: financial difficulties, material management problems, planning and scheduling problems, inadequate site inspection, equipment management problems

and shortage of manpower. Extraneous causes of delay identified were: inclement weather, acts of nature and strikes.

Al-Momani (2000) carried out a quantitative analysis on construction delays in Jordan. The result of this study indicated that the main causes of delay in construction of public projects were related to designers, user changes, weather, site conditions, late deliveries, economic conditions and increase in quantity. Similarly, Odey and Battaineh (2002) also conducted a survey aimed at identifying the most important causes of delays in construction projects with traditional types of contracts from the viewpoint of construction contractors and consultants. Results of the survey indicated that contractors and consultants agreed that owner interference, inadequate contractor experience, financing and payments, labour productivity, slow decision making, improper planning, and subcontractors were among the top ten most important factors.

Frimpong et al (2010), conducted a survey to identify and evaluate the relative importance of significant factors contributing to delay and cost overruns in Ghana groundwater construction projects. A questionnaire with 26 factors was carefully designed from preliminary investigations conducted in groundwater drilling projects between 1970 and 1999 in Ghana. The questionnaire was directed towards three groups in both public and private organizations: owners of the groundwater projects, consulting offices, and contractors working in the groundwater works. The

questionnaire was distributed to a random sample of 55 owners, 40 contractors and 30 consultants. The result of the study revealed the main causes of delay and cost overruns in construction of groundwater projects: monthly payment difficulties from agencies; poor contract management; material procurement; poor technical performance; and escalation of material prices.

Assaf and Al-Hejji (2006) conducted a survey on time performance of large construction projects in Saudi Arabia. The survey had 73 different causes of delay. He studied the importance of various causes of delay from the viewpoint of contractors, consultants, and owners. The most common cause of delay identified by all the parties was “change order”. He also found that about 70% of the projects experienced time overruns.

Aibinu and Jagboro (2002) studied and evaluated the effects of construction delays on project delivery in Nigeria construction industry.

They found that the six effects of construction delay were: time overrun, cost overrun, dispute, arbitration and litigation and total abandonment. The questionnaires were sent to three groups of construction practitioners: quantity surveyors, architects and engineers and contractors.

Manavazhia and Adhikarib (2002) conducted a survey to investigate material and equipment procurement delays in highway projects in Nepal. Delay in the delivery

of materials and equipment to construction sites is often a contributory cause of cost overruns in construction projects in developing countries. An assessment of the causes of the delays and the magnitude of their impact on project costs were also made. The survey method was used in conducting this research involving 22 highway projects. The main causes of material and equipment procurement delays were found to be (in rank order) organizational weaknesses, supplier' s defaults, government regulation and transportation delays. However, the actual impact of these delays on project costs was found to be on average, only about 0.5% of the total budgeted cost of the projects. Among materials, delays in the supply of aggregates and equipment were found to occur most frequently.

Chan and Kumaraswamy (2010) explored strategies of compressing construction durations of various types of building projects on the basis of the lessons learned from Hong Kong based surveys and other research findings. The literature from different countries on the factors affecting construction durations, reasons for project delays and existing statistical models for duration forecasts were reviewed. A regression-based model developed from Hong Kong public housing construction project data was used for predicting the durations of the primary work packages in the building process and the overall completion period. And finally, a survey was conducted by the researchers to explore the construction time performance of projects in three building sub-sectors (public housing, public no-residential and

private sector). Based on the factors identified as significant, specific technological and managerial strategies for reducing construction periods in particular building sectors were formulated in order to improve the construction time performance of Hong Kong building projects.

Terry (2003) studied the standard methods currently available for assessing extension of time delays on major projects and issues around such assessment. He used a network causal mapping and system dynamics approach to study the impact of delays on a project.

## **2.4 Research Gap**

Although many past relevant authors have made several contributions regarding the research topic. Unfortunately, none of them have been able to explore the collective and individual effects of schedule overrun factors on successful delivery of construction projects in Nigeria.

This study is set to fill this gap by adopting the technique of multiple regression to ascertain the collective and individual effects of schedule overrun on construction project delivery.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Research Design**

Research design describes the process of data collection and analysis. It is a guide in collecting and analyzing relevant data for the study. Descriptive research design is adopted. However, based on the fact that the total number of stakeholders within the case study- engineers, architects, project managers, surveyors may not be completely accommodated, sample studies were conducted.

In this work, empirical study was conducted with a number of research questions in addition to statistical analysis, which represents a scientific method of analyzing a number of numerical data in a manner that all the essential relationships will be summarized.

In this research, simple arithmetic and scientific methods of analysis were adopted. It is therefore strongly believed by the researcher that the objective of this study will be met. In this study, it is intended to analyze the critical factors of construction projects schedule overrun on project delivery- a case study of some selected government projects in Imo State.

Based on the above, copies of the questionnaire were distributed to the engineers, surveyors, project managers and other stakeholders in construction projects.

The projects investigated include the following:

- i.** The dredging of Nworie River and construction of bridges and approach roads at Nekede, Assumpta Avenue and Egbeada.
- ii.** The construction of the Owerri/Port-Harcourt multi-lane expressway.
- iii.** The construction of the Imo Ring Road with flyovers at Okigwe Road and Akwakuma.
- iv.** The construction of the New Imo State Government House at  
New Owerri.

After the collection of the questionnaires, the data therein were analyzed in order to answer the questions raised by the problem under investigation.

Furthermore, in order to establish some governmental policies relating to project management planning, top government officials in the ministry of works and housing were interviewed. (See appendix II).

### **3.1.1 Population of the Study**

Population means the total number or aggregate concern which may lead to obtaining relevant information required for the study. The Imo State Ministry of Works was approached and information on their various projects was gathered. Out of the various construction projects in the ministry, five were selected, which form

the scope of the research. Thirty-two professionals were purposely sampled for the research. The characteristics of the population so considered include experience, and professionalism. This research work is limited to a number of selected construction projects in Imo State. These selected projects include road construction, bridge construction, dredging work and building projects. The questionnaire was distributed to professionals which include engineers, architects, surveyors and project managers.

**Table 3.1. Population Distribution in the Selected Projects**

Project	Professionals						Total
	Project Managers	Civil Engineers	Quantity Surveyors	Architects	Mechanical Engineers	Town Planners	
Dredging of Nworie River	1	1	1	1	1	0	5
Construction of Ow/PH. Expressway	1	1	1	1	1	1	6
Construction of Imo Ring Road	1	1	1	1	1	1	6
Construction of Imo State New Govt House	1	1	1	1	1	2	6
Construction Imo Modern Market at Egbu	1	1	1	1	2	1	7
Total	5	5	5	5	5	5	30

### 3.2 Sampling Procedure

Using the Yaro Yamen's formula, the sample size (n) can be determined as follows:

$$n = \frac{N}{1 + N(e)^2} \dots \dots \dots \text{equation (i)}$$

N

Where n = sample size

N = Population size (the universe)

e = Sample error (at .10, .05, .01 acceptable error). (In this case e = .05).

Substituting as follows: N = 30, e = .05)

This implies that;

$$n = \frac{32}{1 + 32(.05)^2} = \frac{32}{1 + 32(.0025)}$$
$$= \frac{32}{1 + .08} = \frac{32}{1.08} = 30$$

Hence, the study sampled thirty (30) respondents and their response was used for analysis made in this study.

### **3.3 Method of Data Collection**

For any research work, there are two sources of statistical data which include the primary data and the secondary data. Primary data are those data that come from the original sources of material which the researcher seeks out. That is, he collects data that have not been collected previously.

Questionnaire design was adopted mainly to collect primary data. Also, discussions with experts assisted in collecting on-the spot data regarding the performance of the selected projects.

On the other hand, secondary data sources may be used as the sole source of information for a research project as exemplified by the historical research method and retrospective research. Data from literature review, journals, and internet sources were used to collect secondary data.

In this research work, both primary and secondary data were used. Thirkettle (1998) opined that primary data are data collected for specific purposes.

#### **3.3.1 Questionnaire Design**

The questionnaire was designed using the five-point Likert scale. It was divided into five different clusters, with each cluster having five different questions relating to the particular factor under consideration. The expected responses were further subdivided into five ranging from strongly agree (5-points), agree (4-point), neutral

(3-points), disagree (2-points) to strongly disagree (1-point). All this constitutes the independent variable. This research is designed in a way and manner that makes it easy to understand and execute. A questionnaire was developed to assess the perceptions of different professionals who are well knowledgeable in the construction industry. These professionals include engineers, architects, project managers, surveyors and others. A total of thirty (30) questionnaires were distributed to these individuals. The questionnaire was divided into five different clusters. Each cluster contains five different questions, thus making it a total of twenty-five questions. Each cluster was made to reflect a particular factor under consideration.

The clusters, each of which reflect a particular factor of construction schedule overrun, include the following:

- a.** Government policies
- b.** Project technology
- c.** Project funding/finance
- d.** Force Majeure
- e.** Corruption

The questionnaire was administered, collected and analyzed.

### 3.4 Method of Data Analysis

The analysis of the data so collected was made using the Statistical Package for Social Sciences(SPSS) software. The software utilized the Multiple Regression Analysis to determine the collective effects of the factors under consideration on successful project delivery with **F-test** utilized in the determination of the level of significance. The student's **t-test** was used in testing the level of significance for each individual factor.

Granted that the Multiple Regression Analysis was electronically done using software, the following formula for the manual calculation of regression must be discussed.

Multiple Regression is given by:

$$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + \dots + b_kX_k + e_i \text{ ----Eqn 1.}$$

Where  $Y$  = dependent variable

$X$  = independent variable  $e_i$  = independent and normally distributed random error term with mean 0 and constant variance.  $b_0$  and  $b_i$  = parameters to be estimated.

Specifically,

$Y$  = Successful delivery of projects (Dependent variable)

$X_1$  = Government policies and programmes (independent variable)

$X_2$  = Project technology (independent variable)

$X_3$  = Finance (independent variable)

$X_4$  = Force Majeure (independent variable)

$X_5$  = Corruption (independent variable)

### 3.4.1 Test for Significance (F-test)

In testing for the level of significance of all the independent variables, the **F-test** was used. This therefore implies that the F-test investigates or determines the collective effect of all the independent variables put together. This test establishes whether or not a significant relationship exists between the dependent variable (Y) and independent variables ( $X_1$ ,  $X_2$ ,  $X_3$ ,  $X_4$  and  $X_5$ ). The null hypothesis ( $H_0$ ) is accepted at a level of significance, if  $F^* < F_{1 - \alpha} (n-k-1)$ , otherwise reject  $H_0$  and accept the alternative hypothesis  $H_A$ .

However,

$$\frac{(RSS_1 - RSS_2)/(p_2 - p_1)}{RSS_2/(n - p_2)} \text{ -----Eqn 2.}$$

$$F = \frac{(RSS_2)/(n - p_2)}{RSS_2/(n - p_2)}$$

Where

RSS<sub>1</sub> = Residual sum of squares of model 1

RSS<sub>2</sub> = Residual sum of squares of model 2

(p<sub>2</sub> - p<sub>1</sub> , n - p<sub>2</sub> ) = degree of freedom.

$$R^2 = \frac{b_1 \sum x_1 y + b_2 \sum x_2 y \dots}{\sum y^2} \dots \dots \dots \text{Eqn 4}$$

Where SSR = Sum of squares of Regression

SSE = Sum of Squares of Error

SST = Sum of Squares of Total variance (y) n =  
number of observations

### 3.4.2 The Students Test (t-test)

In the event of rejecting the null hypothesis, the t-test is used in ascertaining the degree to which each of the independent variables contributed to the significance and as such should be included in the regression model. Ho is accepted at the 5% significance level if  $|t| < t$

0.05 (n- 2).

However,  $t = \frac{X - \mu_0}{S / \sqrt{n}} \dots \dots \dots \text{Eqn 3.}$

where  $S$  = sample standard deviation

$n$  = sample size

### **3.5 Decision Rule**

In this study, the researcher adopted the age long tradition of accepting the null hypothesis ( $H_0$ ) if the critical tabulated value is greater than the calculated value, otherwise reject. When the null hypothesis is rejected, it means that the alternative hypothesis ( $H_A$ ) is automatically accepted.

### **3.6 Description of Data**

In the analysis of the hypothesis testing, the Multiple Regression Analysis was used. The primary data was structured in such a way as to examine the effects of the contributions of identified factors of construction schedule overrun in the selected projects.

The factors of construction projects schedule overrun under analysis were compressed together and summarized into the following:

- 1.** Inconsistent government policies and programmes
- 2.** Poor/Inadequate project technology on the part of the construction firms.
- 3.** Lack /Inadequate project funding /finance
- 4.** Force Majeure (unexpected eventualities/acts of nature)

## 5. Corruption

For the purpose of testing the hypothesis using Multiple Regression Analysis, five variables were used. These were designed as follows:

Government Policies -----(X<sub>1</sub>)

Project Technology -----(X<sub>2</sub>)

Finance -----(X<sub>3</sub>)

Force Majeure----- (X<sub>4</sub>)

Corruption -----(X<sub>5</sub>)

## CHAPTER FOUR

### RESULTS AND DISCUSSIONS

#### 4.1 Statistics of Questionnaire Distribution and Collection

A total number 32 copies of the questionnaire were distributed to 32 respondents and all the administered instruments were collected representing 100% response rate. This form the basis of the analysis made in this study

**Table 4.1: Responses by Various Professions in the Questionnaire**

S/N	PROFESSION	NO OF RESPONSES
1.	Project Managers	5
2.	Civil Engineers	5
3.	Surveyors	5
4.	Architects	5
5.	Mechanical Engineers	5
6.	Town Planners	5
<b>TOTAL</b>		<b>30</b>

With respect to the primary data collected in this study, the effects of government policies, project technology, finance, force majeure and corruption were tabulated.

The result of the data is shown in appendix iv.

## 4.2 Testing of the Individual Effects of the Identified Factors on Construction Schedule Overrun

The data collected from the respondents were analyzed using multiple regressions as shown in tables below.

**Table 4.2 Multiple Regression Coefficients (A)**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error			
1(Constant)	21.065	7.115		2.960	.007
X <sub>1</sub>	.423	.242	.318	1.748	.093
X <sub>2</sub>	-.511	.249	-.360	-2.056	.051
X <sub>3</sub>	.475	.244	.351	1.947	.063
X <sub>4</sub>	.201	.126	.126	.634	.532
X <sub>5</sub>	.288	.208	.208	.992	.331

**a. Dependent Variable: Y**

### 4.2.1 Testing of Hypothesis 1

This hypothesis states that:

**H01:** Inconsistent government policies and programmes are not a significant factor responsible for schedule overrun in construction projects in Imo State.

In order to test this hypothesis, the significance of the coefficient of ‘government policies ( $X_1$ )’ is tested using the t-test as shown in Table 4.2.

Level of significance ( $\alpha$ ) = 0.05 = 5%.

Confident Level = 95%.

Computed/Calculated ( $t_c$ ) = 1.748

From statistical table: T-tabulated ( $t_t$ ) at 24 degree of freedom = 1.711

#### **Decision Rule:**

Since the calculated t-ratio (1.748) > t-tabulated (1.711) at 5% level of significance, we therefore reject the null hypothesis

#### **Conclusion:**

There is a significant relationship between government policies and construction project schedule overruns.

### 4.2.2 Testing of Hypothesis 2

**H02:** Projects Technology is not a significant factor responsible for schedule overrun in construction projects in Imo State.

In order to test this hypothesis, the significance of the coefficient of 'project technology ( $X_2$ )' is tested using the t-test as shown in Table 4.2.

Level of significance ( $\alpha$ ) = 0.05 = 5%.

Confident Level = 95%.

Computed/Calculated ( $t_c$ ) = 1.748 **Decision Rule:**

Since the calculated t-ratio (-2.056) < t-tabulated (1.711) at 5% level of significance, we therefore accept the null hypothesis.

#### **Conclusion:**

There is no significant relationship between project technology and construction project schedule overrun.

### 4.2.3 Testing of Hypothesis 3

**H03:** Projects funding/finance is not a significant factor responsible for schedule overrun in construction projects.

In order to test this hypothesis, the significance of the coefficient of 'project funding/finance ( $X_3$ )' is tested using the t-test as shown in Table 4.2.

Level of significance ( $\alpha$ ) = 0.05 = 5%.

Confident Level = 95%. Computed/Calculated ( $t_c$ ) = 1.947

**Decision Rule:**

Since the calculated t-ratio (1.947) > t-tabulated (1.711) at 5% level of significance, we therefore reject the null hypothesis.

**Conclusion:**

There is a significant relationship between project funding/finance and construction project schedule overrun.

**4.2.4 Testing of Hypothesis 4**

**H04:** Force Majeure is not a significant factor responsible for schedule overrun in construction projects in the state.

In order to test this hypothesis, the significance of the coefficient of ‘force majeure ( $X_4$ )’ is tested using the t-test as shown in table 4.1.

Level of significance ( $\alpha$ ) = 0.05 = 5%.

Confident Level = 95%.

Computed/Calculated ( $t_c$ ) = 0.634

**Decision Rule:**

Since the calculated t-ratio (0.634) < t-tabulated (1.711) at 5% level of significance, we therefore accept the null hypothesis.

**Conclusion:**

There is no significant relationship between force majeure and construction project schedule overrun.

**4.2.5 Testing of Hypothesis 5**

**H05:** Corruption is not a significant factor responsible for schedule overrun in construction projects in the state.

In order to test this hypothesis, the significance of the coefficient of corruption ( $X_5$ )' is tested using the t-test as shown in Table 4.2.

Level of significance ( $\alpha$ ) = 0.05 = 5%.

Confident Level = 95%.

Computed/Calculated ( $t_c$ ) = 0.992

**Decision Rule:**

Since the calculated t-ratio (0.992) < t-tabulated (1.711) at 5% level of significance, we therefore accept the null hypothesis.

**Conclusion:**

There is no significant relationship between corruption and construction project schedule overrun.

**4.2.6 Testing of Hypothesis 6**

**H06:** The factors of project schedule overrun collectively have no significant effect on public sector project delivery.

This test was done using analysis of variance (ANOVA) as shown in Table 4.3.

<b>Model</b>		<b>Sum of Squares</b>	<b>df</b>	<b>Mean Square</b>	<b>F</b>	<b>Sig.</b>
1	Regression Total	103.680	5	20.736	3.383	0.019 <sup>a</sup>
		147.120	24	6.130		
		250.800	29			

a. Predictors: (Constants) X<sub>5</sub>, X<sub>1</sub>, X<sub>2</sub>, X<sub>3</sub>, X<sub>4</sub>.

b. Dependent Variable: Y

**Table 4.3. Analysis of Variance (ANOVA)**

From Table 4.3, we read the ANOVA table and compare the F-ratio calculated with the F-ratio tabulated.

### **Decision Rule:**

From table,  $F_{0.95(5,24)} = 2.62$

Where **5** = numerator degree of freedom

**24** = denominator degree of freedom

F- Calculated = 3.383, F-tabulated = 2.62

Since F-calculated > F-tabulated i.e.  $F_c > F_t$

**i.e.**  $F^* = 3.383 > 2.62 = F_{0.95(5,24)}$

Since the F-calculated (3.383) > F-tabulated (2.62) at 5% level of significance, we therefore reject the null hypothesis (**H<sub>0</sub>**) and accept the alternative hypothesis (**H<sub>A</sub>**)

### **Conclusion:**

There is a significant collective effect of the factors analyzed on construction projects scheduled overrun in the state. Put differently, government policies, project technology, finance, force majeure and corruption collectively have a significant effect on project schedule overrun. That is to say that these factors collectively lead to schedule overruns in construction projects.

We therefore reject the null hypothesis, accept the alternative hypothesis, with the conclusion that the factors of project schedule overrun collectively have significant effect on public sector project delivery. This implies that the five (5) factors

combined have led to significant increase in construction projects completion time and that the relationship is significant and can be used for making meaningful analysis.

### 4.3 Ranking the Factors Affecting Construction Projects Schedule Overrun

The absolute values of the beta coefficient of each of the contributions made to successful project delivery is used in ranking the effect of each of the factors on the projects studied.

**Table 4.3. Ranking of the Impact of Contributions**

<b>S/N</b>	<b>CONTRIBUTOR</b>	<b>RANKING</b>
<b>1.</b>	Inconsistent government policies and programmes	<b>2nd</b>
<b>2.</b>	Project technology	<b>5th</b>
<b>3.</b>	Project funding/finance	<b>1st</b>
<b>4.</b>	Force majeure	<b>4th</b>
<b>5.</b>	Corruption	<b>3rd</b>

Table 4.3 above indicates that project funding/finance has the highest effect on construction project schedule overrun. This is followed by inconsistent government policies and programmes. Corruption ranked third, while force majeure took the

fourth position. Project technology has the least effect (5<sup>th</sup>) in causing schedule overrun in construction projects.

The result of the study shows that there exists a significant relationship between inconsistent government policies and construction projects schedule overrun. This can be attributed to the fact that once the government policies change, government contractors are usually apprehensive. They usually down their tools and equipment trying to decipher the new policy direction of the government. Again, when there is change in government, the contractors usually wait in order to understand the policies of the new government. This is not unconnected with the fact that the governments of Nigeria are in the habit of suspending the policies and programmes of their predecessors. No wonder inconsistent government policies and programmes rank second in the factors identified.

The test hypothesis based on this research question revealed that no significant relationship exists between project technology and schedule overrun. No wonder project technology has the least ranking among the factors under consideration.

The study further revealed that project funding/finance has a significant effect on construction project schedule overrun. This is further strengthened by the fact project funding/finance has the highest ranking based on the regression model. This is very obvious because the primary goal/objective of any businessman is financial

gains. To this effect, if a project is poorly funded by the owner, the contractor will usually apply delay tactics pending the release of more funds by the client. This is true irrespective of the contingency fund that is usually captured in the bill of quantity.

Also, the research showed that there is no significant relationship between force majeure and construction projects schedule overrun. This hypothesis is strongly supported in the ranking, as force majeure ranks fourth among the factors identified and studied in this research. This may not be unconnected with application of risk management in project execution. When the principles of risk management are properly applied in project execution, the effects of force majeure can be drastically reduced if not completely eliminated.

The study showed that corruption has no significant effect on construction projects schedule overrun. Hence it ranks third from the regression model so developed.

### **4.3 Discussion of Findings**

For a project to be described as being successfully executed it must be completed at a specified time; it must be completed at a specified cost and must meet a specified quality. The research questions pointed out in section 1.5 will be a guide in this and discussion of results.

The table of model summary<sup>b</sup> reveals that there exist a relationship between timely and successful delivery of construction projects and the five (5) explanatory/predictor variables (**X<sub>1</sub>, X<sub>2</sub>, X<sub>3</sub>, X<sub>4</sub>, X<sub>5</sub>**)

1. The value of R-square ( $R^2$ ) is 0.413. This indicates that 41.3% correlation exist between the dependent (Y) successful project delivery and the five identified factors (independent variables i.e. X<sub>1</sub> to X<sub>5</sub>) of construction projects schedule overrun.
2. The adjusted R-square value is 0.291. This indicates that 26.3% of variation in a project's schedule overrun can be explained by the cumulative effect of the factors (independent variable) when all possible errors in the estimation are considered.
3. The standard error of the estimated value is 2.476. Using the five predictor variables in relation to the projects studied, this value does not appear to be significant.

From the above result of the regression analysis, we obtain a fitted model for successful construction projects delivery in Imo State.

Thus:

$$Y=21.065 + 0.433X_1 - 0.511X_2 + 0.475X_3 + 0.201X_4 + 0.288X_5 - \text{Eqn 5}$$

Where:

**X<sub>1</sub>** = Inconsistent government policies and programmes (independent variable)

**X2** = Project Technology (independent variable)

**X3** = Project Funding/finance (independent variable)

**X4** = Force Majeure (independent variable)

**X5** = Corruption (independent variable)

Analysis of the factors of construction projects scheduled overrun in selected public projects in Imo State formed the topic of this study. The research covered five projects while a total of thirty respondents reacted to the questions that addressed the topic under research.

The factors were compressed into five, namely:

- i.** Government policies and programmes
- ii.** Project technology
- iii.** Project funding/finance
- iv.** Force Majeure
- v.** Corruption

Based on the Multiple Regression Analysis of the primary data, the following findings are summed up as follows:

- a.** In this study, there exists a collective significant effect of the five (5) independent variables on construction projects scheduled overrun in the projects studied. About 41.3% of causes of construction projects schedule overrun can be attributed to the five (5) independent variables ( $X_1$ ,  $X_2$ ,  $X_3$ ,  $X_4$ ,  $X_5$ ) studied in this research.
- b.** (b)Government policies and programmes have a significant effect on construction schedule overruns. It ranked second, indicating its significance.
- c.** (c.) Project technology has no significant effect on construction schedule overrun. Hence it ranked the least, 5<sup>th</sup> in the ranking order.
- d.** Project funding/finance has a significant effect on the construction project schedule. From the study, it has the highest significance in the five factors analyzed. It has the highest ranking of 1st in the ranking order.
- e.** Force majeure has no significant effect on construction projects schedule overrun. This is further buttressed by its ranking of 4<sup>th</sup> in the ranking order.
- f.** Corruption has no significant effect on construction projects schedule overrun. It has a ranking of 3<sup>rd</sup>.

## CHAPTER FIVE

### CONCLUSION AND RECOMMENDATIONS

#### 5.1 CONCLUSION

As a result of the above findings, the following conclusions are therefore made:

- a. The variation in the dependent variable (Y) for the projects considered is accounted for by the model shown in appendix I.
- b. Inconsistent government policies and programmes is a significant factor in construction projects schedule overrun. This is due to the fact that each successive government hardly continues with the programmes and policies of its predecessors with its attendant effects on contracts.
- c. Project technology is not significant in causing construction projects schedule overrun. The study indicates that project technology has the least effect on construction projects schedule overrun.
- d. Project funding/finance is significant in construction projects schedule overrun. From the ranking, funding/finance has the most significant effect. This is obvious because of the indispensable role that money plays in every human activity. It there implies that delay in the release of funds affects timely contract execution. Most government contractors out of past ugly experience have learnt not to make use of the contingency fund usually captured in the bill of quantity. This is

because they cannot be too sure of the next move of the government in terms of policy directives. Hence, they execute the contracts in accordance with the funds made available by the government.

- e. Force majeure is not significant. This is probably so because the effective application of risk management principles can go a long way in reducing the ugly effects of unforeseen contingencies.
- f. Corruption is not significant.

## **5.2 Recommendations**

The world over, projects are sine-qua-non for the development of nations. Nigeria, and indeed Imo State are not left out in this regard. The need for projects in the life of nations, individuals and groups cannot be over emphasized.

Every year, governments, individuals, and groups embark on various construction projects. When these projects experience schedule overrun, a lot of economic losses become the order of the day. Therefore, care and every effort should be made by all the stakeholders in construction projects to avoid schedule overrun.

In the course of project planning and execution, well thought-out procedures should be set out and followed. Project stakeholders should adhere to their roles timely in order to avoid overrun. Project participants should be proactive in the execution of

projects. The identified factors that cause schedule overrun should therefore be minimized if not completely eliminated to avoid schedule overrun.

Therefore, based on the findings in this research, the following recommendations are made:

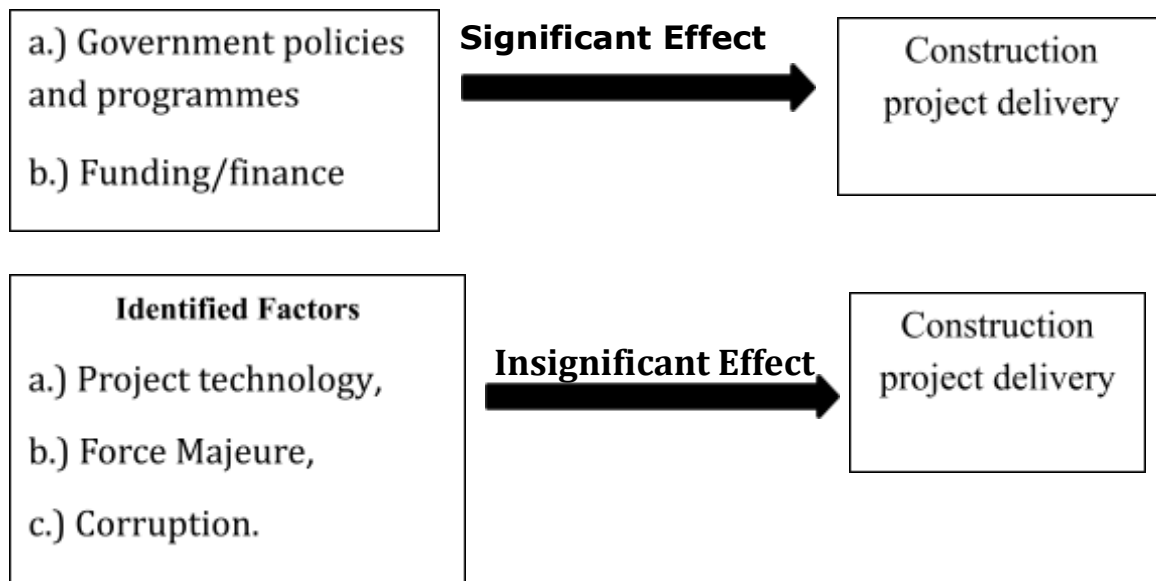
- a.** Proper project planning should be encouraged from project initiation to conclusion. Inadequate project planning usually occurs when projects are hurriedly initiated.
- b.** Project scope should be determined entirely during the project planning stage. When this is done, it will not only reduce, but possibly wipe out the need for design modification during the project execution phase. This is because changes in design modification have been found to be among the force majeure factors.
- c.** Government policies and programmes should be made in a way that favours timely execution of projects.
- d.** Reference Class Forecasting should be inculcated in allocation of durations to tasks as determined by the work breakdown structure.
- e.** In order to reduce or prevent the factor of lack of funds for project execution, the government should make money available to contractors. This will reduce; if not completely eliminate the problem of finance in projects.

- f.** Selection of project stakeholders should be based on realistic tender quotations and not on least price or shortest project execution time quoted by a developer, contractor or any other stakeholder projects execution.
- g.** Managers and officials responsible for project awards, planning and execution must embrace managerial integrity as well as remove all vices that lead to fraud.
- h.** Appropriate relevant laws should be put in place in order to avoid project overrun that are intentional.
- i.** Project stakeholders involved in corruption in any form should be made to suffer the full weight of the law.
- j.** The government and other stakeholders in projects execution should adopt the use of local raw materials and manpower especially when they compete favourably with the imported ones.
- k.** The services of project coordinators/managers should be employed in the execution of projects. In this way, they monitor the activities of all contract stakeholders, thereby detecting and offering corrective measures even before overruns occur.

### 5.3 Contributions to Knowledge

The study was able to make the following contributions to the existing body of knowledge;

- a. This study has made effort to empirically apply an advanced multivariate technique of multiple regression analysis in analyzing the effect of construction schedule factors on successful delivery of construction projects which resulted in the modification of the conceptual framework in line with the findings from the hypotheses tested. The outcome is a model that describes the influences on successful delivery of construction projects in Imo State, Nigeria;



**Fig 5.1: Model of the Effect of Schedule Overrun on Successful Delivery of Construction projects. Source: Field Study, 2014**

- b. The predictive model for predicting successful delivery of construction projects in the face of the individual and collective effect of identified factors contributing to schedule overrun.
- c. Contrary to the findings of past related studies, this study was able to establish that inconsistent Government policies & programmes and Project funding/finance are the only variables that significantly affect project schedule leading to overrun witnessed in the selected projects.

#### **5.4 Areas for Further Research**

Some discoveries were made in the course of this work. These would definitely be of interest for further research work.

1. The use of computer simulations in project execution.
2. Comparative analysis of schedule overrun and cost overrun in projects.
3. Proper application of project management techniques to reduce/eliminate project schedule overrun.
4. The effects of inflation on project cost is an area that needs to be researched further.
5. The role of experience and expertise on successful project delivery.

## REFERENCES

- Abbas, M.I. (2006) *Causes and Effects of Delays in Aceh Construction Industry*, Master's Thesis, Universiti Teknologi, Malaysia.
- Ackoff, R.L. (1981). *Creating the corporate future*. New York: John Wiley & Sons.
- Agaba, E. (2009) Poor Planning Delaying Government Projects (Business News Pullout), *The New Vision*, Thursday 16 2 2009, Vol. 24, pp 6.
- Ahmed S, Azher S, and Castillo M, Kappagantula P. (2002) *Construction delays in Florida; an empirical study*, Florida.
- Aibinu A. A., and Jagboro G.O. (2002) The effects of construction delays on project delivery in Nigeria construction industry. *International Journal of Project Management* 2002; 20: pp 593-599.
- Aibinu, A.A. and Jagboro, G.O. (2009); The Effect of Construction Delays on Projects Delivery in the Nigerian Construction Industry. *International Journal of Project Management*, Elsevier, pp 20, 593599.
- Ajanlekoko J.O. (2009) Controlling cost in the construction industry. Lagos *Quantity Surveyors' Digest*, Lagos; (1): pp 8-12.
- Akinsola A.O. (2010) Neutral network model for predicting building projects' contingency.
- Akpan E.O.P. and Ezenna F.C. (2002): *Project Theory and Practice*. Fylann Ltd. Owerri.

- Alinaitwe, H. M. (2008). *Improvement of labor performance and productivity in Uganda's building Industry*. PhD Thesis, Lund University, Sweden.
- Alkass S, Mazerolle M, and Harris F. (2010) Construction delay analysis technique. *Construction Management Economics* 1996; Vol 14, Issue 5; pp375-94.
- Al-Khalil and Al- Ghafly, M.A. (1999). Important causes of delay in public utility projects in Saudi Arabia, *International Journal of Project Management* Vol 17, Issue 2, pp 647-655.
- Al-Momani A. (2000) Construction delay: a quantitative analysis. *International Journal of Project Management.*; Vol 2, Issue 20; pp 51.
- Amin, M. E. (2005). *Social Science Research: Conception, Methodology and Analysis*, Makerere University Printers, Kampala, pp 256-257.
- Anuolam M. (1997) Project Financing in Nigeria: *Journal of Project Management*, High Education Publishers Owerri, pp 11-14.
- Assaf S.A., Alkhalil M, and Al-Hazim M. (1995) Causes of delay in large building construction projects. *Journal of Management Engineering*, ASCE 1995; Vol 11, Issue 2;45-50.
- Assaf S.A., and Al-Hejji S. (2006) Causes of delay in large construction projects. *International Journal of Project Management*; Vol 24 Issue 4 pp349-57.
- Azhar, N. and Farouqi, R. U. (2008). Cost Overrun Factors in the Construction Industry of Pakistan, In the 1st International Conference on Construction in

Developing Countries: *Advancing & Integrating Construction Education, Research and Practice*. Karachi, Pakistan.

Barwell (2004); *Modern Construction Management*, Illinois Publishing Ltd. London.

Bent J.A. (2005); “The Project Management, Accountability, Planning”  
Bertalanffy, L. (1968). *General system theory: Essays on its foundation and development*, rev. ed. New York: George Braziller.

Bramble, B. B. and Callahan M. T. (2017): *Construction Delay Claims*, Wiley Law Publications, 2<sup>nd</sup> Edition U.S.A.

Chan D.W.M., and Kumaraswamy M.M. (2010) Compressive construction durations: lessons learned from Hong Kong building projects. *International Journal of Project Management*. Vol Issue 20; pp23.

Chan D.W.M., Kumaraswamy M.M. (1997). A comparative study of causes of time overruns in Hong Kong construction projects. *International Journal of Project Management*.; 15 (1); 55-63.

Cleanland D.F. and Kerzar, H.A. (2003); *A Project Management Dictionary of Term* van Nostrand, Reinhold Co. New York pp 4,8,16,40.

Connor, T.F. (2007) The shape of the systems movement. *Journal of Applied Systems Analysis*. 6(3), pp.129-135.

Contract Costs. *ASCE Journal of Construction Engineering and Management*, vol. 116, no 3, pp 548-552.

Cost and Time Overruns in Highway Construction. 4<sup>th</sup> Transportation Specialty Conference of the Canadian Society for Civil Engineering, Montreal, Quebec, Canada 5-8 June 2002. pp 1-10.

Effects of Construction Delay on Construction Projects Objectives, The Proceedings of the First Iranian Students Scientific Conference in Malaysia 9-10 April, 2011, pp.1-7.

El-Razek, M.E.A. Bassoioni, H.A & Mobarak, A.M. (2008). Causes of Delay in building Construction Projects in Egypt, *Journal of Construction Engineering and Management*, Vol 134, Issue 11, p 831.

Florida Department of Transportation in Controlling Cost Overrun when Building Roads & Bridges. Report No. 97-22, Florida Department of Transportation, December 1997. [www.dot.state.fl.us](http://www.dot.state.fl.us).

Frimpong Y, Oluwoye J. Crawford L. (2010) Causes of delay and cost overruns in construction of groundwater projects in developing countries, Ghana as a case study. *International Journal of Project Management*. Vol. 21; pp321-6.

Fubara, A.D. (2021) Delay Factors for Construction Projects in the SubSaharan Africa, *Journal of Applied Scientific Studies*, 3(12), pp. 67.

- Jahren, C. T. & Ashe, A. M/ (1990); Predictors of Cost-Overrun Rates, *Journal of Construction Engineering and Management*, vol 116, no 3, pp. 547-552.
- Kaliba, C, Muya, M & Mumba, K. (2009). Cost Escalation and Schedule Delay in Road Construction Projects in Zambia, *International Journal of Project Management*, Vol27, Issue 5, pp 522-531.
- Kerzner H. (2000) Project Management; A system Approach to Planning, Scheduling and Control, North Press, New York.
- Koushki et al (2005); Delays and Construction Increase in the Construction of Private Residential Projects in Kuwait; *Journal of Construction Management and Economics* pp 285-294.
- Koushki P.A and Kartam N. (2002); Impact of Construction Materials on Project Time and Cost in Kuwait. *Engineering Construction and Management Economics Journal* pp. 11,12, 126 132.
- Koushki, P. A., & Kartan, N. (2004). Impact of construction materials on project time and cost in Kuwait. *Journal of Construction and Architectural management*, Vol. 11, Issue 2, pp 126 -132.
- Lazlo, A. & Kripner, S. (1998) *Systems Theories and A Priori Aspects of Perception*. Amsterdam: Elsevier Science, pp. 47-74.
- Le-Hoai, L., Lee, Y.D. & Lee, J.Y. (2008), Delay and Cost Overrun in Vietnam Large Construction Projects: A comparison with other selected Countries,

- KSCE *Journal of Civil Engineering*, Vol 12, Issue 6, pp 36 Lock, D. (1996);  
Project Management. 6<sup>th</sup> Ed., Gower, Aldershot.
- Manavazhia M.R, & Adhikarib D.K. (2002) Material and equipment procurement delays in highway projects in Nepal. *International Journal of Project Management.*; vol.20; pp 627-32.
- Mansfield N.R. (1994) Causes of delay and cost overruns in Nigerian construction projects. *International Journal of Project Management*; 12(4);254-60.
- Nwachukwu C.C. (2016). *Dimensions of Real Estate Project Management*. Gabtony Prints Ltd, Owerri.
- Odey A.M. & Battaineh H.T. (2002) Causes on construction delay; traditional contracts. *International Journal of Project Management*, 20; 67-73.
- Odeyinka H.A. & Yusuf, A. (1997) The causes and effects of construction delays on completion cost of housing projects in Nigeria. *Journal of Financial Management Property Construction*; 2(3)31 -44.
- Ogunlanna S.O. & Prokuntong K. (2014) Construction delays in a fast economy: comparing Thailand with other economies. *International Journal of Project Management* Vol. 20, Issue 4, pp 407-406.
- Onyeado, S.O. (2016). The Major Challenges to Housing Development and Delivery in Anambra State. *Civil and Environmental Research*, 3(4), June.

Randolph D.A., Rajaandra, K. & Campfield, J.J. (2010); Using Risk Management Technology to Control Construction.

Sambasivan, M. & Soon, Y.W. (2007), Causes and Effects of Delays in Malaysian Construction Industry, *International Journal of Project management*, Vol. 25, Issue 5, pp 517-526.

Terry W. (2003). Assessing extension of time delays on major projects. *International Journal of Project Management*. 2003;21; 19-26.

## **APPENDIX I**

### **QUESTIONNAIRE DESIGN**

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School of Postgraduate Studies  
Federal University of Technology  
P.M.B 1526 Owerri.

**TO WHOM IT MAY CONCERN**

**QUESTIONNAIRE**

**ANALYSIS OF THE CRITICAL FACTORS AFFECTING  
CONSTRUCTION PROJECTS SCHEDULE OVERRUN: A STUDY OF  
SELECTED PUBLIC PROJECTS IN IMO STATE**

I am a postgraduate project student of Project Management Technology, Federal University of Technology, Owerri, carrying out a master's degree thesis on the above topic.

Please, I would be very much appreciative if you could kindly answer the questions below. This is to enable me to continue in my research work.

Your responses would be treated with strict confidentiality and will remain anonymous.

Thank you for your cooperation in anticipation.

**OPARA, GODSWILL N**  
(08034813021)

**SECTION A:**

**DATA ABOUT THE FIRM AND PROJECT**

- i. Date:.....
- ii. Name of Company:.....
- iii. Address of Company:.....
- iv. Profession:.....
- v. Which project are you involved in?.....
- vi. When did you start work on the project?.....
- vii. How long is the project expected to last ?.....

**SECTION B: DATA ON DELAY IN ACTIVITY COMPLETION**

1. Have you experienced any schedule overrun in the project so far?

Yes :----- NO: -----

2. If yes, for how long ?

.....

1-3 months      3-6 months      7-12 months      above 12 months

3. Which of the following reasons was responsible for the schedule overrun?

- i. Inconsistent government policies
- ii. Project technology
- iii. Project funding/finance
- iv. Force majeure
- v. Corruption

**SECTION C:**

**DATA ON INDIVIDUAL EFFECT OF THE CRITICAL FACTORS ON  
CONSTRUCTION PROJECT SCHEDULE OVERRUN**

**INSTRUCTION:**

For each of the following statements, indicate the extent to which you agree or disagree that it describes the critical factors of construction projects schedule overrun.

In the five-point Likert scale provided, mark “x” at the point that represents your feeling using the code shown below.

<b>CODE</b>	<b>MEANING</b>
SD	Strongly Disagree
D	Disagree
N	Neutral (Neither Agree nor Disagree)
A	Agree
SA	Strongly Agree

S/N	FACTORS	SD	D	N	A	SA
	<p><b>CRITICAL FACTOR</b></p> <p><b>1: INCONSISTENT GOVERNMENT POLICIES AND PROGRAMMES</b></p>					
1.	Inconsistent government policies and programmes can impede the timely execution of construction projects.					
2.	The low level of infrastructure provided by the government contributes to high costs of projects thereby leading to schedule overrun.					
3.	Changes in government worry contractors, who are always apprehensive that changes in government may result in new rules, policies and regulations that might adversely affect their interest, therefore, they intentionally delay the job.					
4.	Government policies and regulatory activities do not promote the development of appropriate work breakdown structure that would ensure timely execution of projects.					
5.	The tax structure of federal, state and local governments have a negative influence on project planning and implementation.					

	<b>CRITICAL FACTOR 2: PROJECT TECHNOLOGY</b>	<b>SD</b>	<b>D</b>	<b>N</b>	<b>A</b>	<b>SA</b>
<b>1.</b>	It takes a longer time than planned to receive project machinery and equipment from local and overseas suppliers especially when specialized plants are involved.					
<b>2.</b>	Equipment and machinery used by some contractors in the state are fragile and suffer from frequent breakdowns, leading to schedule overrun.					
<b>3.</b>	The technical and managerial training given to operating staff in most construction companies are inadequate. This leads to errors and omissions in plans with its attendant delays.					
<b>4.</b>	The low level of indigenous technology, process and skills in the economy limits timely execution and completion of projects.					
<b>5.</b>	Utility lines such as those of <b>NITEL, MTN, GLO, AIRTEL</b> , water, etc may take time to redesign and relocate from the construction line. This causes project delay.					

	<b>CRITICAL FACTOR 3: PROJECT FUNDING/FINANCE</b>	<b>SD</b>	<b>D</b>	<b>N</b>	<b>A</b>	<b>SA</b>
<b>1.</b>	It is usually very difficult for construction companies to obtain the required credit from financial institutions to execute their projects.					
<b>2.</b>	When these companies succeed in getting these loans under strict conditions, the problem of inflation usually comes to constitute a clog on their will of progress.					
<b>3.</b>	The conditions for the repayment of these loans for operating these projects results in project failures and overrun.					
<b>4.</b>	Most of the contracts are underpriced. This causes a hitch and financial crisis for the contractor leading to overrun.					
<b>5.</b>	Sometimes the contracts are quoted in local currencies, but the materials needed are purchased in hard currencies, whose values are not stable.					

	<b>CRITICAL FACTOR 4: FORCE MAJEURE</b>	<b>SD</b>	<b>D</b>	<b>N</b>	<b>A</b>	<b>SA</b>
1.	Extreme weather conditions such as prolonged high rainfall, winds etc can delay work or even damage materials and equipment of these companies					
2.	Some parts of the country such as the Niger Delta and the North-Boko Haram- are so volatile, thereby disrupting the activities of these companies.					
3.	Disputes between the stakeholders (e.g. government, community, contractor, clients etc) involved in construction activities lead to delays that consequently prolong contract duration.					
4.	Changes in material quantities, construction blue-prints and specifications needed for the job after plans were completed can contribute to the elongation of the project duration.					
5.	Outbreaks of wars and other threats to lives and property can cause schedule overrun of construction projects.					

	<b>CRITICAL FACTOR 5: CORRUPTION</b>	<b>SD</b>	<b>D</b>	<b>N</b>	<b>A</b>	<b>SA</b>
1.	Corruption is among the factors that militate against the timely execution of contracts in Nigeria.					
2.	Sometimes contractors intentionally decide to delay the execution of contracts with the aim of asking for an increase in the contract sum.					
3.	Many a time those in charge of awarding the contracts award them to their friends, family members, party members etc who are					
	usually incompetent. They end up doing shabby jobs that experience overrun.					
4.	Because in many occasions, the contractors bribe their ways to get the contracts, the officials involved in contract supervision and monitoring lack the moral strength to enforce the contract terms and agreement, including time of contract delivery					
5.	Time overrun in construction projects can be caused by the nefarious activities of kidnappers towards company executives and expatriates					

**APPENDIX II**  
**SUMMARY OF RESPONSES BY RESPONDENTS TO THE**  
**QUESTIONNAIRES**

<b>RESPONDENTS</b>	<b>INDEPENDENT VARIABLES</b>					<b>DEPENDENT VARIABLE (Y)</b>
	<b>X<sub>1</sub></b>	<b>X<sub>2</sub></b>	<b>X<sub>3</sub></b>	<b>X<sub>4</sub></b>	<b>X<sub>5</sub></b>	
<b>1.</b>	23	19	19	19	21	<b>40</b>
<b>2.</b>	24	23	17	22	20	<b>38</b>
<b>3.</b>	23	21	19	21	22	<b>39</b>
<b>4.</b>	22	22	23	21	23	<b>41</b>
<b>5.</b>	20	22	22	21	23	<b>43</b>
<b>6.</b>	21	21	21	21	20	<b>40</b>
<b>7.</b>	20	19	23	21	19	<b>39</b>
<b>8.</b>	19	21	23	22	21	<b>38</b>
<b>9.</b>	21	22	23	22	23	<b>36</b>
<b>10.</b>	23	21	23	23	23	<b>39</b>
<b>11.</b>	23	21	21	21	22	<b>40</b>
<b>12.</b>	23	24	22	23	24	<b>38</b>
<b>13.</b>	22	25	21	23	21	<b>38</b>

<b>14.</b>	22	22	17	22	22	<b>39</b>
<b>15.</b>	22	21	22	22	22	<b>45</b>
<b>16.</b>	20	22	22	23	22	<b>37</b>
<b>17.</b>	21	21	19	24	22	<b>42</b>
<b>18.</b>	21	20	20	22	20	<b>40</b>
<b>19.</b>	20	19	19	20	22	<b>37</b>
<b>20.</b>	19	20	22	21	21	<b>46</b>
<b>21.</b>	14	18	20	18	19	<b>36</b>
<b>22.</b>	20	16	20	21	22	<b>40</b>
<b>23.</b>	19	19	24	23	20	<b>42</b>
<b>24.</b>	23	20	25	23	23	<b>46</b>
<b>25.</b>	23	21	19	16	17	<b>38</b>
<b>26.</b>	20	18	18	20	17	<b>37</b>
<b>27.</b>	18	18	17	20	18	<b>36</b>
<b>28.</b>	25	18	20	25	25	<b>45</b>
<b>29.</b>	20	18	18	20	17	<b>37</b>
<b>30.</b>	24	17	21	24	18	<b>42</b>

**N/B: The 5-Point Likert Scale was used in the Questionnaire.**

**TABLE 1.****COEFFICIENTS <sup>a</sup>**

<b>Model</b>	<b>Unstandardized Coefficients</b>		<b>Standardized Coefficients</b>	<b>t</b>	<b>Sig.</b>
	<b>B</b>	<b>Std. Error</b>			
1 (Constant)	21.065	7.115		2.960	.007
X <sub>1</sub>	.423	.242	.318	1.748	.093
X <sub>2</sub>	-.511	.249	-.360	-2.056	.051
X <sub>3</sub>	.475	.244	.351	1.947	.063
X <sub>4</sub>	.201	.126	.126	.634	.532
X <sub>5</sub>	.288	.208	.208	.992	.331

b. Dependent Variable: Y

**TABLE 2.****ANOVA (b)**

<b>Model</b>		<b>Sum of Squares</b>	<b>df</b>	<b>Mean Square</b>	<b>F</b>	<b>Sig.</b>
1 Regression		103.680	5	20.736	3.383	0.019 <sup>a</sup>
Residual		147.120	24	6.130		
<b>Total</b>		<b>250.80</b>	<b>29</b>			
		<b>0</b>				

c. Predictors: (Constants)  $X_5$ ,  $X_1$ ,  $X_2$ ,  $X_3$ ,  $X_4$ .

d. Dependent Variable : Y

**TABLE 3. DESCRIPTIVE STATISTICS**

	<b>MEAN (X)</b>	<b>STANDARD DEVIATION (S.D)</b>	<b>N</b>
<b>Y</b>	39.80	2.941	30
<b>X<sub>1</sub></b>	21.17	2.214	30
<b>X<sub>2</sub></b>	20.30	2.070	30
<b>X<sub>3</sub></b>	20.67	2.171	30
<b>X<sub>4</sub></b>	21.47	1.852	30
<b>X<sub>5</sub></b>	20.97	2.125	30

**TABLE 4. CORRELATIONS**

		<b>Y</b>	<b>X<sub>1</sub></b>	<b>X<sub>2</sub></b>	<b>X<sub>3</sub></b>	<b>X<sub>4</sub></b>	<b>X<sub>5</sub></b>
	<b>Y</b>	<b>1.000</b>	<b>.328</b>	<b>-.086</b>	<b>.411</b>	<b>.418</b>	<b>.391</b>
<b>X1</b>		<b>.328</b>	<b>1.000</b>	<b>.305</b>	<b>-.010</b>	<b>.392</b>	<b>.353</b>
<b>X2</b>		<b>-.086</b>	<b>.305</b>	<b>1.000</b>	<b>.192</b>	<b>.205</b>	<b>.402</b>
<b>X3</b>		<b>.411</b>	<b>-.010</b>	<b>.192</b>	<b>1.000</b>	<b>.357</b>	<b>.416</b>
<b>X4</b>		<b>.417</b>	<b>.392</b>	<b>.205</b>	<b>.357</b>	<b>1.000</b>	<b>.547</b>
<b>X5</b>		<b>.391</b>	<b>.353</b>	<b>.402</b>	<b>.416</b>	<b>.547</b>	<b>1.000</b>

The following conclusion can be drawn from the correlation table above:

- i. The correlation between a factor and itself is unity.
- ii. There is a negative correlation between X<sub>2</sub> and Y as well as between X<sub>1</sub> and X<sub>3</sub>.

**TABLE 5. MODEL SUMMARY (b)**

<b>Model</b>	<b>R</b>	<b>R-Square</b>	<b>Adjusted R-Square</b>	<b>Std. error of the estimate</b>	<b>Durbin Watson</b>
1	.643a	.413	.291	2.476	1.950

a. Predictors: (constants) X<sub>5</sub>, X<sub>1</sub>, X<sub>2</sub>, X<sub>3</sub>, X<sub>4</sub>.

Dependent Variable: Y.

In order to conduct tests of significance in multiple regression, we use analysis of variance tables as shown below.

**TABLE 6.****COEFFICIENTS**

<b>Model</b>	<b>Unstandardized Coefficients</b>		<b>Standardized Coefficients</b>	<b>t</b>	<b>Sig.</b>
	<b>B</b>	<b>Std. Error</b>			
1(Constant)	21.065	7.115		2.960	.007
X <sub>1</sub>	.423	.242	.318	1.748	.093
X <sub>2</sub>	-.511	.249	-.360	-2.056	.051
X <sub>3</sub>	.475	.244	.351	1.947	.063
X <sub>4</sub>	.201	.126	.126	.634	.532
X <sub>5</sub>	.288	.208	.208	.992	.331

c. Dependent Variable: