AN ASSESSMENT OF THE POTENTIAL OF LIFE CYCLE MANAGEMENT SYSTEM ON PROJECT PERFORMANCE IN THE BUILDING INDUSTRY IN ABUJA, NIGERIA

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N85F/24682/2011

A Thesis Submitted in Fulfillment for the Degree of Doctor of Philosophy in Environmental Planning and Management (Construction Project Management) in the School of Environmental Studies of Kenyatta University

July 2015
DECLARATION

This thesis is my original work and has not been presented for a degree in any other University or for any other award. No part of this work should be reproduced without prior permission of the author and/or Kenyatta University.

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DEDICATION

To the glory and honor of God and to my late father (Sgt. Daniel Usman), and my late daughter (Faith Napoleon Daniel).
AKNOWLEDGEMENTS

My sincere gratitude goes to Dr Peter K. Kamau and Prof. Caleb Mireri for their guidance and supervision throughout my study. My sincere thanks go to Prof. James B, Kungu, Prof. Paul Okemo, Prof. E. N. Kimani, Dr Letema C., Dr Christine Majale and Dr Inuwa I. I. for their assistance and encouragement. I also appreciate the staff of Environmental Planning and Management for their encouragement and the friendly rapport accorded me.

I wish to express my appreciation to the management and staff of the Federal Polytechnic, Bauchi for their support and the opportunity to study abroad. I also thank my friends, siblings and family members for support and encouragement.

Special appreciation goes to Nuhu Yabase, you are a friend indeed. Thank you for the love and financial support. I also appreciate Tula Christian Youth Association, Kahawa Sukari Baptist Church, Nairobi, Kenya; ECWA Gospel Church Kagadama, YMCA and Child Evangelism Fellowship for standing with me in prayers.

Finally, I thank all that have contributed in one way or the other whose names are not mentioned. May the Lord reward you abundantly.
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OPERATIONALIZATION OF TERMS AND CONCEPTS

In this study, the following terms assume the meanings as used in the study based on the authors perception assigned below:

**Builder:** is the project manager in charge of building projects' supervision, monitoring and control from inception to completion.

**Charter:** is a working document outlining the activities of stakeholders in project delivery.

**Contractor:** is the one who agrees to provide materials or a service to another for an agreed and set fee.

**Delivery:** is the act of completing a building project based on quality standards.

**Efficiency:** is the use of minimal resources to produce a desired volume of output.

**Engineer:** is a person responsible for the design of services and structural elements in building.

**Gates:** are activities in the phases of project life cycle.

**Performance:** The organization’s ability to attain its goals (time, cost and quality) by using resources in an efficient and effective manner.
Project: is a series of building activities that are consuming resources; a project must also begin and come to an end according to a specified time-line.

Project Life Cycle: is a series of activities in the life of a project from initiation to completion.

Project Management: is the process of planning and executing building construction from inception to completion for the purpose of achieving the predetermined objective based on time, cost and quality standards.

Resources: refer to capital, human and material resources used for the accomplishment of building projects.

Team: is a unit of two or more people who interact and coordinate their work to accomplish a specific goal in building project delivery.

Quality: is the provision of excellent services and product on time and within budget as well as meeting the requirements of client.
## ABBREVIATIONS AND ACRONYMS

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<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tr>
<td>ANOVA</td>
<td>Analysis of Variance</td>
</tr>
<tr>
<td>ARCH</td>
<td>Architect’s</td>
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<td>BI</td>
<td>Builders Industry</td>
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<td>BLDR</td>
<td>Builder Freedom</td>
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<td>CPP</td>
<td>Completion Phase Principle</td>
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<td>DF</td>
<td>Degree of Freedom</td>
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<td>EIA</td>
<td>Environmental Impact Assessment</td>
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<td>ENGR</td>
<td>Engineer</td>
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<tr>
<td>FCDA</td>
<td>Federal Capital Development Authority</td>
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<td>FCT</td>
<td>Federal Capital Territory</td>
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<td>FGN</td>
<td>Federal Republic of Nigeria</td>
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<td>H0</td>
<td>Null Hypothesis</td>
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<td>IBC</td>
<td>International Building Code</td>
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<td>IMPPP</td>
<td>Implementation Phase Principle</td>
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<td>IPP</td>
<td>Initial Phase Principle</td>
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<td>LCM</td>
<td>Life Cycle Management</td>
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<td>NATE</td>
<td>National Association of Technology Engineers</td>
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<td>NBC</td>
<td>National Building Code</td>
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<td>NBI</td>
<td>Nigerian Building Industry</td>
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<td>NIA</td>
<td>Nigerian Institute of Architects</td>
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<td>NIOB</td>
<td>Nigerian Institute of Building</td>
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<td>NIQS</td>
<td>Nigerian Institute of Quantity Surveyors</td>
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<td>NISET</td>
<td>Nigerian Institute of Science and Engineering Technicians</td>
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<td>NSE</td>
<td>Nigerian Society of Engineers</td>
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<td>NIURP</td>
<td>Nigerian Institute of Urban and Regional Planners</td>
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<tr>
<td>PPP</td>
<td>Planning Phase Principle</td>
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<tr>
<td>QS</td>
<td>Quantity Surveyor</td>
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<tr>
<td>TMS</td>
<td>Traditional Management System</td>
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<tr>
<td>URP</td>
<td>Urban and Regional Planners</td>
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<tr>
<td>PMI</td>
<td>Project Management Institute</td>
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<tr>
<td>PMBOK</td>
<td>Project Management Body of Knowledge</td>
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<td>P- Value</td>
<td>Probability Value</td>
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<td>SBC</td>
<td>Standard Building Code</td>
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<tr>
<td>Sig</td>
<td>Significant</td>
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<tr>
<td>UBC</td>
<td>Uniform Building Code</td>
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<td>United State Dollars</td>
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ABSTRACT

The building industry (BI) has continued to be a major player in the socio-economic development of many countries globally. Apart from creating employment, it provides shelter to millions as well as operational infrastructure such as offices, schools and hospitals. The Federal Capital Territory (FCT) Abuja continues to expand as a result of shift of the Federal Administration from Lagos to Abuja. This has attracted increased private and public investments in the BI to cater for the increasing population. Despite this expansion, issues of quality, costs, reliability, and human and environmental safety have posed a challenge to the growth of the BI. These issues are linked to the processes in building production. Studies express concerns over issues of poor quality and the high cost of buildings as well as longer duration before project completion which prevents the BI from successful project delivery. Hence, this study focused on the assessment of the potentials of Life Cycle Management on project performance in the building industry in Abuja, Nigeria. The objectives of the study were to: examine policies/procedural framework within the BI; investigate how adoption of initial phase principles may affect project performance within the BI; examine how planning phase principles influence project performance within the BI; determine how implementation phase principles may influence project performance within the BI; and ascertain whether completion phase principles can improve project performance within the industry in Abuja, Nigeria. Data for this study was collected from a population of 2310 (350 architects, 352 builders, 354 engineers, 354 Quantity Surveyors, 350 Urban and Regional Planners, and 350 contractors) and a sample of 341 representing 20% from a population of 2310. Proportional Stratified Random Sampling was used to select 341 samples and purposive sampling was used to select six projects from project files for qualitative data analysis. Data was collected by use of questionnaires and interviews. The responses to the questionnaires were coded and analyzed using Statistical Package for Social Sciences (SPSS) version 17. Descriptive statistics and frequency tables were used to present the data. Chi-square statistics and Analysis of Variance (ANOVA) were conducted to test hypothesis at 95% level of significant. The study established that policy and procedural frameworks are not fully adhered to as stated in the National Building Code. It was established that from the initial to completion phases, LCM principles have not been adequately applied leading to projects being delivered at high cost, and to time and quality standards being compromised. Despite LCM principles successful use in BI (UK, USA and Singapore), its use in Nigeria is yet to be optimal. The study recommends that LCM principles be adopted to improve project delivery according to time, cost and quality standards in the BI in Abuja, Nigeria.

Keywords: Building Industry, Life Cycle Management, Project Performance
CHAPTER ONE
INTRODUCTION

1.1 Background to the Study
The Building Industry (BI) contributes to socio-economic development through the creation of employment, provision of shelter to millions, as well as provision of basic infrastructure. However, it is faced by many challenges especially in project delivery (Ofori, 2014). The Building Industry (BI) as a key employer in the global economy is saddled with challenges of project management due to its adaptation of traditional project management systems, which lead to its failure to deliver projects efficiently and effectively (Idoro, 2014; Okereke, 2008; Odusami & Ameh, 2006).

According to Daft (2010), project management is the attainment of organizational goals in an effective and efficient manner through planning, organizing, leading and controlling organizational resources. Kalu (1990) added that the growing complexity of the building industry calls for increased effectiveness in the planning and control of projects. However, construction methods use a range of traditional to modern techniques to meet client’s needs based on global economic development. As a result of population explosion and continued demand for new types of buildings, there is the need for professional practitioners who are versed in project management systems (Kamang, 1992 in Usman, 2006; Ofori, 2007) to display their ability and improve BI performance.
The success of any project depends on how effective the project management cycle is from start to finish. A major bottleneck facing the building industry is why projects are not being completed on time, at the budgeted cost and within specified standards. Chandra (2010) noted that building projects especially in the public sector compromise on quality, are not completed on time, and have cost overruns.

Project management is very important in the building industry - a sector which ranks very high among other sectors in terms of inter-sector linkages. The importance of this sector as an agent of development is enhanced by its ability to provide gainful employment for an increasing global population. According to Chandra (2010), "noticeable development and the aesthetic transformation of the environment is bound up with and predicated on the building industry". This industry is pivotal to the social and political integration of society and ranks high on development budgets (Nwachukwu, 2008; Kamau, Mireri and Usman, 2013). The building industry has proven to be the cornerstone of rapid economic growth for any nation (Bhavesh, 2006).

A building project's success depends on the strategy adopted by the organization responsible for its implementation and execution (Gilbert & Jones, 2000; Cole & Lassorn, 2000). How a project is implemented and managed with respect to time, cost and quality, using the LCM principles, determines whether the project will
ultimately succeed. In most cases, public and private building projects are hardly completed on time, within cost, or according to quality and material specifications.

New buildings and newly rehabilitated or maintained infrastructure become decrepit and wrecked within a few months of commissioning despite the capital commitments on them (Jones, Lyon & Gilbert, 2003). LCM principles are sequential phase activities used in enhancing project delivery within cost, time and quality standards. These principles are applied during the initiation, planning, implementation and completion phases.

Achieving success in building project implementation is a major project management function. According to Nwachukwu et al (2010), project failure, abandonment or collapse, is retrogressive for any economy, and is normally blamed on construction industry professionals who may accept the blame but unable to undo the damage. Project success in the building industry lies in efficient project management (Usman et al, 2012a; Kamau et al, 2013).

Building projects need to succeed as they often entail the investment of substantial funds therefore building project’s failure or abandonment, has a crippling effect on an investor's financial situation, especially taking into consideration the fact that scarce resources are utilized in such projects. There is
also a high opportunity cost, and the building project may also be the only investment a client has.

Building project failure, abandonment and collapse do not encourage development and investment (Ofori, 2014). There is therefore urgent need for a solution to this problem. The Life Cycle Management concept was developed in the 1960s and early 70s for space programs, and was used during the construction of the Pyramids in Egypt and the Great Wall of China (Roberts & Wallace, 2004). The algorithm process of LCM was first introduced in Europe (Ofori, 1994) and from 1990 the LCM concept became popular in the building industry (Chih-Chiang, 2004, Chih-Chiang et al, 2006) across the globe and was used to enhance project delivery (Usman et al, 2014). LCM is a management process used in the building industry to enhance project delivery. Patel & Morris (1999) opined that LCM has four phases: initiation, planning, implementation and completion. Proper initiation is central to the overall construction process because it is the foundation of LCM and once it is not done correctly will affect the other processes.

The initial phase include: identifying need, defining project size, and conducting the survey and approving funding plans. At the initial stage, clients need has to be made clear to contractors to enable them plan for the project very well. For example, carry out survey and environmental impact assessment to enable proper
cost analysis. Once this is done, the planning phase would be easier. The planning phase is to enable contractors identify project activities, establish project objectives, design and specify building activities, choose a strategy, break the project to sub-units, determine performance standard, determine a proper sequence for building production, design cost estimates, determine personnel and material resources, and design the time/schedule. This is to improve on the issues of high cost and longer project duration before completion. The implementation phase is to properly execute project activities according to plan. The contractor mobilizes, commission project, procure, determine cash flow, and the determination of consultants/government agencies. Project decommissioning, auditing, preparation of a final report, handover of the facility to the client, reassignment of the project team, and project closure, is the final stage of project completion. The issues of quality, high cost and longer project duration will be minimized once the initiation, planning, implementation and completion stages are carefully followed.

Project Performance is attained through efficiency and effectiveness of cost, time and quality standards. This was in light of its inability to deliver services efficiently and effectively (Ibrahim & Musa-Haddary, 2010). According to Kabir, Kolo & Bustani (2009), project delivery is an illusion in Nigeria. Thus, the performance of the building industry in terms of project delivery is far below expectations (Aniekwu & Audu, 2010; Usman et al, 2010; Bailey et al, 2008).
The proportion of the Nigerian population living in urban areas is on the increase, for example, 7% of Nigerians lived in urban areas in the 1930s and 10% in the 1950s. However, by 1970, 1980 and 1990, 20%, 27% and 35% lived in urban areas respectively (Kabir et al, 2009; Okupe, 2002) and in FCT Abuja, the population was 371,674 in 1991; 1,568,583 in 2006 and increased to 2,193,613 by 2011 (National Bureau of Statistics, 2014).

Studies have shown that the building industry in Abuja has been performing below expectation in terms of efficiency and service delivery on time, cost and quality standards (Idoro, 2014).

1.2 Problem Statement and Justification

The building industry is critical to the Nigerian economy and provides shelter and gainful employment to the citizens (Usman et al, 2014). This is clearly shown by the increasing demand for housing and the increase in building industry. These increase in demand for more building, has provided employment to many people (Idoro, 2014). Past studies have shown the movement of the administrative capital of Nigeria from Lagos to Abuja brought about an expansion of infrastructural development in the Federal Capital Territory (FCT) Abuja, which is driven by public and private sector growth. This resulted from the need to cater for an increasing population. Over 40% of Nigerians now live in urban areas of varying sizes (Kabir et al, 2009).
Increased urban population has created severe housing problems resulting in overcrowding, inadequate dwellings, poor service provision, and poor management of projects, poor project implementation, inadequate planning and budgets, costly project execution, untimely completion of projects, abandoned or non-functional facilities, and collapsed buildings (Idoro, 2014). The crisis is more acute considering some Nigerians are homeless especially in rural areas (Kabir et al, 2009, Ibrahim & Musa-Haddary, 2010, Usman et al, 2014).

According to the National Population Commission (2010), FCT had a population of 371,674 in 1991 and 1,406,239 in 2006 and by 2011 it increased to 2,193,613 (National Bureau of Statistics, 2014). It has a population density of 181.4 with a growth rate of 9.28. This has attracted both private and public investments in the BI to engage in building production to cater for the increasing population (Saleh, 2004).

Despite this expansion, issues of quality, cost, reliability, and human and environmental safety in the building industry pose a challenge to the growth of the industry (Oladimeji & Ojo, 2012). Similar studies by Idoro (2014) reveal that planning and budget provisions, costly project execution, inefficient service delivery (Ibrahim and Musa-Haddary, 2010), and abandoned or non-functional facilities and collapsed buildings pose serious challenges on project performance in the industry (Jambol, 2012; Usman et al, 2010).
According to studies carried out by Nwanchukwu and Fedelis (2011), issues of poor quality and the high cost of buildings, as well as the longer duration before project completion are some of the problems faced in the building industry, which is now described as a sleeping giant in Africa (Nigerian Building Industry), due to its inability to deliver services efficiently and effectively (Idoro, 2014; Ofori, 2014; Ibrahim & Musa-Haddary, 2010). Saleh (2004) revealed that this prevents the building industry from successful project delivery.

Studies express concerns over issues of poor quality and the high cost of buildings as well as longer duration before project completion which prevent the building industry from successful project delivery. Hence the problem of this study which focused on the assessment of the potentials of life cycle management system on project performance in the building industry in Abuja, Nigeria

1.3 Research Questions

i. What policy measures and procedural framework enables optimum project performance in the building industry in Abuja, Nigeria?

ii. Are initial phase principles adopted within the building industry in Abuja, Nigeria?

iii. Can planning phase principles influence project performance in the building industry in Abuja, Nigeria?
iv. How can implementation phase principles influence project performance in the building industry in Abuja, Nigeria?

v. Do completion phase principles establish project performance within the building industry in Abuja, Nigeria?

1.4 Objectives
The general objective of this study was to assess the potentials of LCM on project performance in the building industry in Abuja, Nigeria. This could be achieved through the following specific objectives:

i) To examine policies and procedural framework within the building industry in Abuja, Nigeria.

ii) To investigate the extent to which LCM initial phase principles affect project performance within the building industry in Nigeria

iii) To examine the extent to LCM planning phase principles influence project performance within the building industry in Abuja, Nigeria

iv) To determine the extent to which LCM implementation phase principles influence project performance within the building industry in Abuja, Nigeria

v) To ascertain whether or not LCM completion phase principles can improve project performance in the building industry in Abuja, Nigeria.
1.5 Hypotheses

H$_{01}$: There is no significant relationship between procedural framework and project performance in the building industry in Abuja, Nigeria.

H$_{02}$: There is no significant relationship between LCM initial phase principles and project performance in the building industry in Abuja, Nigeria.

H$_{03}$: There is no significant relationship between LCM planning phase principles and project performance in the building industry in Abuja, Nigeria.

H$_{04}$: There is no significant relationship between LCM implementation phase principles and project performance in the building construction industry in Abuja, Nigeria.

H$_{05}$: There is no significant relationship between LCM completion phase principles and project performance within the building industry in Abuja, Nigeria.

1.6 Justification of the Study

The findings of this study will benefit contractors, clients and professionals to improve their performance in project delivery in the building industry in Abuja, Nigeria, as well as in the global building industry. In addition, construction firms and other organizations may also use the findings in personnel training workshops on the management of projects and improving project performance to help staff keep abreast with the best-practice of the profession. Life Cycle Management concept may be effective and efficient in the building industry and also enhance technology transfer to the user through training workshops.
The findings of this research can also be used to help a project management team face the challenges of project management in the building industry. This is because, through management systems, prediction of challenges and how to mitigate them becomes easier. Project managers will be able to plan for eventualities in the building industry. It can also enhance communication between the designers and the contractors to improve efficiency in project performance. The findings will aid public and the private sectors to improve services and project delivery in building construction.

The findings will broaden the literature in management systems, project performance and the management of building projects. The study will demonstrate the usefulness of employing effective management systems in achieving a desired project performance. This will be useful to future research, reference and teaching. The study will improve the level of compliance of policy and procedural frameworks by the stakeholders so as to achieve project success.

1.7 Scope and Delimitation

The study covers the building industry in the Federal Capital Territory (FCT) Abuja, Nigeria. It covers both public and private building projects. For the case study, some respondents were not willing release information from project files they were thinking that their secrets will be leaked. This problem was tackled by presenting the authorization letter which gave them confidence to release the
needed information. Besides, there was hardship (petroleum scarcity) during the period for data collection which affected the transportation cost.

1.8 Chapter Outline
The thesis is structured as shown in Figure 1.1. Specifically the chapters are described as follows:

Chapter One
This chapter provides the background information for the research. It explains why the research was undertaken and how it is significant to the building industry. Aim and objectives, and hypothesis are highlighted.

Chapter Two
This chapter provides a theoretical basis for the research by reviewing related literature. It presents the building industry and the Life Cycle Management principles and its influence on project performance in the building industry.

Chapter Three
This chapter deals with the research methodology. It presents research design, area of study, target population, sample and sampling techniques. Others include data collection, instrument for data collection, quality control, data analysis and limitations of the research.
Chapter Four

Chapter four deals with the data presentation, data analysis, as well as discussions of results; specifically demographics, policy and procedural framework, initial, planning, implementation and completion phase principles findings are discussed.

Chapter Five

Chapter five present the summary, recommendation and conclusions as well as areas for further research.
CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction
This chapter reviews relevant literature on the purpose and effect of life cycle management systems on project performance in the building industry, based on the policy and procedural framework, initial phase, planning phase, implementation phase, completion phase principles; building industry, theoretical and conceptual frameworks are enumerated hereafter. The potential of LCM improve efficiency, cost-effectiveness and adhering to time lines in the industry, this encourages cost savings for the country and greater contribution to the national economy (Ofori, 2014).

2.2 LCM Principles and Project Delivery
LCM principles are laid-down procedures used for project delivery in the building industry. They include the policy and procedural framework, and initial, planning, implementation and completion phase principles.

2.2.1 Policy and Procedural Frameworks
Policy and procedural frameworks are laws governing the building industry (BI) to enhance project delivery. Globally, building laws, regulations and codes are established for use in the building industry. For example, UK has professional and regulating bodies, research institutions as well as effective utilisation of their tertiary institutions to ensure the production of buildings and proper management at every stage (Jambol, 2012).
The production and management of buildings have requirements backed by law such as:

i. Method of controlling (inspecting and reporting building construction)

ii. How services, fittings and equipment may be used

iii. The inception and maintenance of any service, fittings or equipment

In a similar study, Jambol (2012) and Ofori (2014) found that USA developed building legislation from a Uniform Building Code (UBC), to the Standard Building Code (SBC), and on to International Building Code (IBC) (Ofori, 2014). UK had an organized legislative system that guides the building in achieving project success. Like the UK legislation, the American system promotes good building practice in USA. In Nigeria, Jambol (2012), point out that the National Building Code (NBC) has elaborately provided for safety of operations at all stages of building construction.

In section 13, it provided for the control of building works under building enforcement units in all three-tiers of government, and by the various professionals who have power to control building works. The section covers scope, pre-design, design, and construction and post construction (NBC, 2006). Contract for building management are as provided in section 2.32. For actual construction, section 13 provides for control of building works with respect to workmanship and supervision.
However, Jambol (2012) lamented that the Nigerian Building Industry (NBI) is fragmented, underperforming, uncoordinated, indiscipline, and operating as if there are no laws guiding its operations. This is evident, according to Jambol (2012), by disrespect for constituted authority, no industrial training, output by professionals not being commensurate to best practice, and use of rudimentary technology. These are serious threats to project delivery within the building industry.

i. Impacts of Policy and Procedural Frameworks

Policy and procedural frameworks are supposed to be the guiding principles for building construction. Unfortunately, Government officials do not follow town planning standards and allocate plots without following rules and procedures (Ede, 2010). Ike (2012) agrees with this contention that town planning departments are no longer performing their role as per the law. Contrarily, in Dubai, studies have shown that before any project starts, specialized property development consultants are engaged (Ike, 2012; Ede, 2010). These consultants assess the soil and carry out additional investigation. The construction design is then carried out based on the soil investigation reports. Usman et al (2010) points that in Nigeria, policies are there but complying with them is the problem.

Ike (2012) adds that in Dubai, it takes eight months for a building plan to be approved and adds that contractors are not allowed to mobilize to site until after the approval processes Materials are also certified by a consultant before their use
on site and each building construction level must be inspected and approved. Within this policy and legal frameworks, government and professional bodies track and monitor building production from the initial to completion phases.

In spite of laws guiding the BI in Nigeria, the problems of using sub-standard building material and lack of compliance have increased (Idoro, 2012). This negatively influences cost, time, and quality standards, and ultimately project delivery.

According to Odeyinka et al. (2006), experience has shown that houses built by government are outrageously expensive when compared with similar houses built by non-governmental agencies or individuals. Such houses have the following characteristics:

i) The quality standards are too high

ii) The space standards are too generous

iii) Fees charged by professionals are too high

iv) Project margins of contractors are excessively high

Pheng and Tan (1996) observed that many building firms are small and cannot raise money through public offers. Lacking in collateral, borrowing costs for such firms are therefore higher and this discourages investment in capital equipment. Banks also consider it risky to offer loans to small building firms. Mbamali
(2002) and Idoro (2012) argue that the erratic economic conditions which Nigeria witnessed during the second half of the 1980s have made contract overruns in terms of time and money a regular feature of building projects in the country.

Contract clauses provide the basis for claims and it is the contractor’s responsibility to initiate, prepare and present such clauses in a clear and convincing manner according to standard practice. However, Idoro (2010) observes that most contractual claims are either totally rejected or settled with relatively insignificant awards. This leads to lack of evidence and therefore lack of contractual basis for claims. Huge investment running into several billions of Naira has been put in the building industry in Nigeria through low-cost housing programmes under the Shagari Administration (Kehinde et al, 2002).

It is interesting to note that both civilian and military administrations have made housing for all (new or improved) a policy priority. This was a workable concept but its implementation was lacking. Poor management and delay of projects have caused indigenous contractors to suffer.

The inability to implement policies, plans or projects is widely recognized as a major weakness of contemporary planning in developing countries (Achuenu et al, 2000; Idoro, 2012). A project is desired to bring changes as a result of the processes involved in achieving its goals and objectives. However, goals and
objectives are transformed into actions that provide advancement that leads to changes in economic, social and physical environments (Usman, 2006).

Policy and procedural frameworks help in the avoidance of the ills inherent in the construction sector and which lead to project failure, incompletion, and abandonment (Idoro, 2012; Idoro, 2014; Usman et al, 2010). However, the success of any building project in public or private sectors depends on the level of compliance to policies, procedures and control, as well as strict monitoring of time, cost, material, quality and environmental constraints (Nwachukwu & Fedelis, 2011, Kamau et al, 2013). An environment is seen as the external, natural, physical and residential conditions which directly or indirectly affect man, and which are influenced by economic decisions and technological development (Chandra, 2010).

Project compliance can be used to mean the whole process of translating broad policy and procedures into specific programmes of action that can enhance project delivery. This forms the interaction between the setting of goals and the actions required to achieve them. However well formulated a policy, unless action is taken to implement it, it remains only as paper work. Adherence to policy and procedures includes the full range of managerial activities associated with putting the chosen strategy into place, supervision of its implementation, and achieving the targeted result (Shen et al, 2010, Idoro, 2010).
However, if there is no commitment from the organization's leaders to implement policies and procedures to achieving quality, any effort to actualize it can lead to cynicism and lessen the likelihood of its adoption and success in future. Proper compliance is a result of administrative decisions on how to do things and create fits between management policies and operations. Kabir et al, (2009) and Idoro, (2012) opined that administrative and managerial elements are necessary to put a management policy into place and that full implementation can take several months or years depending on the amount of coordination required.

2.2.2 Initial Phase Principles

The initial phase is the beginning of building construction. In this phase, the feasibility and the viability of project delivery takes place. The principles in this phase includes: identifying the project, determining its project goals and objectives, determining preliminary materials required for the project, conducting soil tests, conducting a survey, determining the level of equipment and personnel required, developing a budget and schedule, identifying the project team, and conducting an Environmental Impact Assessment, among others (Ofori, 2014).

Kamau et al (2013) pointed out that project delivery can be achieved when the initial phase principles are applied correctly. However, project delivery in building construction is solely dependent on how well the consultants and contractors carry out the initial phase principles (Banki et al, 2009; Ng et al,
2009; Palaneeswaran & Kumaaraswanry, 2001); selecting the right contractors, will ensure quality, time and cost effectiveness of projects.

Project performance is enhanced through setting goals and objectives and deciding how these will be achieved as seen in the phase principles (Figure 2.4), which are series of activities that set standards for the project team to deliver within quality standards, and cost and time specification (Chan & Chan, 2004).

Basically, initial phase principles are activities that help meet project goals and expectations are met (Chan et al, 2002). According to Kamau et al (2013), initial phase principles are the determining factors to enhancing project delivery especially when surveys, EIA, resources and feasibility studies are carried out according to plan. A study by Idoro (2014) shows that environmental issues during building construction receive more attention from governments, non-governmental institutions and the general public. Shen and Tam (2002) assert that building projects affect the environment during their life cycle and are considered a major contributor to environmental impact.

Usman et al (2014) reported that 14 million tons of waste is put into landfills in Australia annually. Forty-four percent of this waste comes from the building industry. In developing countries, the building industry consumes 62.86% of non-metallic minerals, such as glass, cement, clay and lime (Chan & Chan, 2004).
Banki et al (2009) argue that 30% of the annual waste in UK comes from the building industry. These wastages have damaged the environment which could be accounted for economic growth affects time, cost and quality of project delivery.

Similarly, Belout and Gauvreau (2004) conducted a research on project delivery and found significant predictors of project performance included: setting out goals and objectives; resources (human, material and equipment), cash flows, as well as carrying out a survey and soil tests. This is consistent with findings by Nguyen et al (2004) that people are responsible for creating, managing, operating and utilizing projects towards success or failure in project delivery. The results also revealed that contractors with adequate resources (human, materials and equipment) are more successful in project delivery. This is in agreement with Wong et al (2003) as they found that on-site productivity can be affected by availability of resources for building projects.

In a related development, Banki et al (2009) found out that the size or project scope depending on what the client needs are of paramount importance in project delivery. Isik et al (2009) also reported that clients' need, project scope and financial resources show a contractor's credibility and reputation and ability to handle projects.
Although the findings by Isik et al (2009) revealed that the overall test of quality was not statistically valid, the size of past projects delivered appears to be statistically significant. This finding is in line with Holt et al in Kamau et al (2013) who asserted that contractors who have experience from similar projects tend to have more positive impact on project delivery.

2.2.3 Planning Phase Principles

The planning phase is a principle in coordinating project activities to improve project delivery and enhances development of a building plan. This is analogous to the development of a good facility design (Hendrickson, 1998 in Usman, 2006). Hendrickson states that the planner must weigh the costs and reliability of different options while ensuring practical possibility. Building production requires changes environmentally and physically which is difficult but it's eminent though the processes differ from one project to the other (Idoro, 2012).

Building contractors opined that the planning process consists of three stages that take place from the moment of planning the building of the facility to the moment the valuation of the final building process (Usman, 2006). These stages include: estimation, monitoring, control, and evaluation. The process of building production is quite interesting but its tedious. Making a good building plan is challenging and there are numerous plans available for any given project. While past experience is a pointer to good planning, every project is unique and has
special threats or opportunities that need originality or creativeness to elucidate them. Unfortunately, it is hard to offer direction regarding procedure or strategy regarding the formation of good plans (Ofori, 2014; Idoro, 2014). One can provide good recommendations for a good plan but it is up to the actual planners to come up with his own plans (Hendrickson, 1991 in Usman, 2006).

Planning is rooted in concepts developed during the Industrial Revolution in the late 19th and early 20th centuries. Of import during that period was the research by Max Weber (1864-1920), a German sociologist. Weber believed that bureaucracies, staffed by bureaucrats, represented the ideal organizational form. Weber based his model on legal and absolute authority, logic, and order, where responsibilities for workers are clearly defined and behaviour is tightly controlled by rules, policies, and procedures (Northcraft & Neale, 1990). In effect, Weber's bureaucracy was designed to function like a machine; the organization was arranged into specific functions, or parts, each of which worked in concert with the other parts to form a streamlined process.

Weber's planning principles, like others of the period, reflected an indifferent and impersonal attitude toward the people in the organization. Indeed, personal aspects of human behaviour were considered unreliable and were viewed as potentially detrimental to the efficiency of any system. Humans were likened to a bundle of skills that could be inserted into the system like a cog in a wheel.
Although his principles are now considered mechanistic and outdated, Weber's views on bureaucracy provided important insight into process efficiency, division of labour, and hierarchy of authority.

In a similar study, another important contributor to planning principles in the early 1900s was Henri Fayol (Daft, 1997). He is credited with identifying four basic managerial functions that characterize successful organizations:

a. **Planning**: Thinking before acting

b. **Organizing**: Setting up policies and procedures that regulate employee behaviour

c. **Staffing**: Recruiting a suitable work force

d. **Controlling**: Motivating workers to pursue the goals of the organization

Weber's and Fayol's planning principles found broad application in the early and mid-20th century, largely as a result of the work of Frederick W. Taylor (1856-1915). In a 1911 book entitled *Principles of Scientific Management*, Taylor outlined his principles and eventually implemented them on American factory floors. According to Chandra (2010) Taylor's principles of scientific management mimicked the four basic managerial functions identified by Fayol, and adopted the same basic attitudes about process efficiency championed by Weber. Although elements of Taylor's research and findings have been criticized, he is
credited with helping to define the role of training, wage incentives, employee selection, and work standards in organizational performance (Robbins, 1983).

i. Economic and Financial Planning

Appraisal of the economic viability of any project should be carried out at its inception. The project value and cost are of paramount importance. A project’s value is defined by the utility or benefit of the completed project (Hutchinson, 1993). A project’s cost encompasses the expenditure incurred in completing it and is included in its valuation. A cost benefit analysis helps a client determine his level of commitment to a project, which depends on perceived benefits and cash flow of the project.

Planning is critical to project management. The project manager defines a series of actions required to complete the project and this stems from the planning process. Planning enhances the preparation of a meaningful budget and time estimates. Bustani (2002) stated that payments must be made by the client to contractors in timely fashion to ensure work progresses without interruption.

ii. Economic Factors Influencing Building Activities

Building is characterised by two important factors (Usman, 2006): fluctuations in demand, which can factors of production, and the use of various techniques and factor combinations (particularly of capital and labour) needed to finish
production. These two factors are also influenced by economic measures. Demand is influenced by planning and demand management, while factor combinations are influenced by pricing policies that influence economic measures (Idoro, 2012a; Ofori, 2014, Usman et al, 2014).

iii. Characteristic of Demand
The output of building fluctuates considerably more than that of manufacturing (Kerzner, 1986 in Usman, 2006). This tendency is based on the demand structure of the capital goods industries where relative small changes in demand by consumers will cause the production capacity to expand or contract considerably (Ofori, 2014). Not only do the private sector resources and demand fluctuate with export earnings, but important public sector investments also tend to increase during periods of rapid economic growth, thereby accentuating the cyclical variations. The fluctuations in building activity, relative to those of other sectors, tend to be greater in stabilizing the economy (Usman et al, 2014; Usman, 2006).

The public sector plays a dominant role in generating demand for building. This is particularly so in developing countries, where it accounts for 80% of building jobs (Ofori, 2014; Idoro, 2012b). For instance, Usman (2006) and Ofori (2014) asserted that a building industry survey in Liberia estimated the total building volume in the formal sector to be slightly about 20 million US dollars in 1978, while the private sector accounted for about 4 million US dollars. Similar ratios
apply in Burma, NEPAL, New Guinea and several countries in Africa. Surveys made in Egypt and Indonesia in 1979 placed the public sector share of the total demand for building jobs at 65% (2.3 million US dollars) and 75% (4 million US dollars) respectively (Usman, 2006).

The government’s share of total demand is also high in such capital-abundant countries as Kuwait, Libya, and Saudi Arabia, which continue to develop their basic infrastructure. The importance of the public sector as a major source of demand for building is not limited to developing countries alone, although the share tends to decrease at higher levels of development (Usman et al, 2014). In the United States for instance, building demand from the public sector in 1982 was roughly 50% of total demand; this estimate, however, excludes the building of single family homes (Henroid, 1986 in Usman, 2006).

The two-fold role of government as a policymaker at macro-economic level, and as an originator of demand and executor of works at the micro-economic level, underscores the importance of government to the sector. The timing of government investments can therefore cause fluctuations in building demand. Similarly, the government’s overall economic policies and specific interest in industry-related regulations can have a profound influence on private sector building investment decisions (Kabir et al, 2009; Inuwa & Usman, 2008).
iv. Cost Effect of building on the Economy

According to a World Bank Report (1986) fluctuation in building demand can affect demand for labour and materials as well as the time taken for the building production. Backward linkages, in particular can have widespread impact because much of the raw, semi-processed; and processed materials can be provided by relatively unsophisticated labour-intensive domestic sources, and by basic industries such as cement and steel manufacturing. However, forward linkages affect practically all other sectors of the economy. In fact, Henroid (1986) further asserted that building has been ranked among the top four out of the twenty economic sectors in terms of intersectional linkages.

The linkages, combined with a high value-added output-ratio, indicate that building provides a substantive growth stimulus for the economy. Its importance as an agent for development is enhanced by its ability to provide gainful employment for people across the globe. Substantial claim for work is often obtainable by unproven workers from urban areas that can be proficient for more exciting jobs. Building is often the only important substitute for plantation labour, chiefly as it can regulate to the labour needs of harvesting seasons to a higher amount than the manufacturing sector.

The main inputs in building are management, personnel, equipment, materials, and capital. The relative importance of these inputs varies from job to job, ranging
from civil to building construction and on the choice of technology. Table 2.1 illustrates differences in output arising from the adoption of two different building methods, one using more labour than equipment, and vice versa. There are also considerable differences in the overhead costs between projects. However, the added requirements for personnel management in labour-intensive construction are balanced to some extent by heavy capital servicing in equipment-intensive construction. Labour-intensive building requires a different form of organisation and supervision from that which uses modern equipment. The composition of costs also varies with each project.

The choice of technology is influenced by prices of labour and equipment, especially when they do not reflect real economic costs. For example, prices for imported equipment may be set below their economic costs as a result of undervalued exchange rates or exceptionally low trade tariffs. Consequently, real labour costs may be high as a result of minimum wage legislation or trade union conditions.

Table 2.1: Percentages of Building Production Methods

<table>
<thead>
<tr>
<th>Input</th>
<th>Production method (as % of total cost)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Labour-intensive</td>
</tr>
<tr>
<td>Labour</td>
<td>55 – 70</td>
</tr>
<tr>
<td>Equipment</td>
<td>10 – 20</td>
</tr>
<tr>
<td>Overhead &amp; profit</td>
<td>10 – 20</td>
</tr>
<tr>
<td></td>
<td>10 – 20</td>
</tr>
</tbody>
</table>

v. Project Planning Management Techniques

According to Chandra (2009) once a project is selected, the focus shifts to its implementation, which involves the completion of numerous project components and the use of various resources (human, material, machine, money and time) for a project on paper to be translated into reality. The activities of a project have inter-relationships arising from physical, technical, and other considerations (Chandra, 2009). For proper planning, scheduling and control of project activities, given the inter-relationships and constraints, network techniques have been found quite useful.

Chandra (2009) noted that in India, financial institutions and the government insist on a Network Plan when assessing feasibility reports. Network planning is a significant project management systems used in the preparation, development and control of a project. Planning techniques are important in all stages of a project life cycle. Network technique is a pictorial presentation of the inter-relationship between activities, which is prepared before planning, scheduling and controlling the complex project consisting of various work activities (Sharma, 2006).

It is a continuous process as one keeps track of progress in technical conditions. Nwachukwu et al. (2010) advocated that delays and changes in project implementation are controlled by the application of critical path methods (CPM). They enable management to cope with the complexities, messes of data, and tight
Network analysis is a popular technique used for planning, scheduling, monitoring and coordinating large and complex projects comprising a number of activities (Sharma, 2006). Planning is the establishment of objectives, definition of project content, and the determination of the relationships between activities. However, scheduling is the development of a time-table that puts time estimates next to the plan and indicates when activities are to be completed. More so, network analysis involves the development of a network to indicate a logical sequence of work elements in a complex situation. Sharma (2006) identified three basic steps in network analysis:

a. Define the job to be done

b. Integrate the elements of the job in a logical sequence

c. Control the progress of the project

Network analysis is concerned with minimizing project completion time and its overall cost. It is designed for projects that are not routine or repetitive in nature. Thus, network analysis is an organized application of systematic reasoning for planning, scheduling and monitoring large and complex projects.
vi. Types of Network Techniques

There are two basic network techniques: critical path method and programme evaluation review technique (PERT). These were originally designed to facilitate the planning and scheduling of the Polaris Fleet Ballistic Missile Project of the US government. It was designed to handle risk and uncertainty. PERT is suitable for research and development programmes, aerospace projects, and other projects involving new technology. In such projects the time required for completing various activities can be variable (Chandra, 2010). Hence, the orientation of PERT is based on probability.

Critical Path Methods (CPM) is similar to PERT. It was developed independently in 1956-1957 by the Du Pont Company in the US to solve scheduling problems in industrial settings (Chandra, 2010). CPM is primarily concerned with the trade-off between cost and time. It has been applied mostly to projects that employ a fairly stable technology and are relatively risk-free. Hence, its orientation is deterministic. Both these techniques have been successfully applied to problems involving construction work (Sharma, 2006).

Prior to the development of PERT and CPM, the most popular technique for project scheduling was the bar or Gantt chart. These charts show a graphic representation of work on a time-scale. The basic limitation of this technique is its inability to show the inter-relationships and interdependencies among the many
activities, which control the progress of the project. Sharma (2006) observed that although it is possible to redraw the chart to show the inter-relationships, confusions arise as the size of the project increases. To overcome such limitations PERT and CPM were proposed as alternatives.

a. Gantt Chart Method

Gantt chart is a plane bar chart that vividly displays the time relationship of the phases in a project. Each phase of a project is represented by a line placed on the chart in the time period when it is to be commenced. When completed, the chart shows the flow of actions in systems, as well as those that can be underway concurrently.

According to Gupta (2010), to create a Gantt chart, one must list the steps required to complete a project and estimate the required time for each step, then list the steps down the left side of the chart and the time intervals along the bottom. One then draws a line across the chart for each step, starting at the date planned to begin that step, and ending on the completion of that step.

Parallel steps can be carried out at the same time with one taking longer than the other. This allows some flexibility regarding when to start the shorter step, as long as the plan takes into consideration that the step will be completed on time to flow into subsequent steps. However, when your Gantt is completed, you will be able
to see the minimum total time for the project, the proper sequence of steps, and which steps run concurrently.

b. Critical Path Method

Critical Path Method is used for optimising resource allocation and minimising overall cost for a given project (Sharma, 2006). Chandra (2009) said that the principal focus of CPM is on variations in activity times as a result of changes in resource assignments. These differences are intended and interrelated to resource tasks and are not produced by random factors outside the control of management as in the case of PERT analysis. Thus, the key drive of CPM analysis is on time-cost relationships and it pursues to regulate project plan, which minimalizes total cost.

Sharma (2006) argued that CPM uses two time and cost estimates for each normal and crash situation. It was based on the assumption that the time, which each activity in the project will take, is precise and known. The relationship between the amount of resources employed and the time needed to complete the project is also assumed to be known. The critical path is the longest one through the network and as such identifies essential steps that must be completed on time to avoid delay in completing the project.
According to Sharma (2006) iterative procedure in determining the critical path involves the following steps:

i. Break down the project into several activities. Arrange all activities in consistent sequence and label them. Make the arrow diagram.

ii. Figure all the events and activities. Find the time for each activity seeing it to be deterministic. Indicate the activity times on the arrow diagram.

iii. Calculate the earlier finish time, latest start time and latest finish time. Construct a table showing earliest times, latest and normal times.

iv. Identify the critical activities and connect them with double line arrow. This gives the critical path.

v. Calculate the total duration of the project.

vi. Determine the total float for each activity on the basis of difference between the earliest time and latest time.

vii. If it is intended to reduce the total duration, crash the critical activities.

viii. Optimise the cost by shifting resources.

ix. Update the network and smooth the network resources.

c. Programme Evaluation and Review Technique (PERT)

PERT is a very popular management technique for planning and controlling projects. There are two types of PERT: deterministic and the stochastic (Nwachukwu et al., 2010). Deterministic PERT assumes that the time needed to complete each all project tasks is known with reasonable certainty. PERT is used
to plan either research or one-of-a-kind development projects because of the valuable insights gained by the very act of identifying intermediate milestones and establishing a logical process among them.

In PERT, it is assumed that the completion time is uncertain and unknown. Therefore, the probability of activity completion time is estimated. Sharma (2006) identified three time estimates for each activity: optimistic, pessimistic and normal time. However, optimistic time is the best time that could be expected if everything went well, while, pessimistic time is the worst time that could be expected if everything is carried out erroneously in the project.

PERT differs from CPM in the procedure for determining activities' duration. Under PERT, the expected time of completing an activity can be determined, using the formula:

\[ T_e = \frac{(T_o + 4T_m + T_p)}{6} \]

Where \( T_e \) = Expected completion time

\( T_o \) = Optimistic completion time

\( T_p \) = Pessimistic completion time

(Agundu, Okwandum & Mba, 2010)
Steps of PERT

a. *Preparation of network:* Prepare a list of activities that constitute the project. Determine the predecessor and successor activities, and then prepare a network diagram on the basis of dependence between different activities and events. This is the project planning phase of PERT and events are numbered in ascending order from left to right.

b. *Network analysis:* Estimate the time required to perform each activity. These estimates are based upon manpower and equipment availability. At this stage, the probability of completing the project or part of it by a specific time can be computed.

c. *Scheduling:* Expected time for each activity is computed from the earliest, latest start time, and finish time for each activity, which are determined. Then the critical path through the network is determined. The slack time associated with the non-critical activities is also computed.

d. *Resource allocation:* The feasibility of each schedule is checked with respect to manpower and equipment requirements; re-planning and rescheduling may be necessary if resources are limited.

e. *Time-cost trade-offs:* If management want to reduce the project completion time, crashing or compressing of the project is done. The cost of reducing the project completion time is computed. Time-cost trade-offs for the critical path are considered.
f. *Project control:* Once the network plan and schedule are developed to satisfactory level, they are complete. The project is controlled by checking progress against the schedule, assigning and scheduling manpower and equipment, and analysing the effects of delay. Whenever major changes are made in the schedule, the network is reversed accordingly and a new schedule is prepared. Thus, monitoring of progress may require periodic updating of the project and rescheduling to ensure completion of the project in time.

2.2.4 Implementation Phase Principles

The inability to implement policies, plans or projects is widely recognized as a major weakness of contemporary planning in developing countries (Achuenu, 1997). If a project does not result in change necessary to achieve desired goals and objectives, it is meaningless. Goals and objectives have to be translated into action and it is their implementation that provides progression from plan to action and to changes in economic, social and physical environments (Inuwa *et al.*, 2013; Usman *et al.*, 2010; Usman *et al.*, 2014).

Project implementation and management is a means of avoiding the ills inherent in the building sector, which lead to project failure, incompletion, and abandonment (Idoro, 2014; Ofori, 2014). However, the success of any building project in public or private sectors depends on the project manager’s staff appointment and control, and strict monitoring of time, cost, material, quality and
environmental constraints (Nwachukwu & Fedelis, 2011). An environment comprises of external, natural, physical and residential conditions, which directly or indirectly affect man, and which are influenced by economic decisions and technological development (Chandra, 2009). The construction environment is illustrated in Figure 2.1.

Figure 2.1: Construction Environment

Source: Daft, 2010
Project implementation can mean the whole process of translating broad policy goals and objectives into visible and specific programmes of action. This forms the interaction between the setting of goals and the actions required to achieve them. However well formulated a management programme or policy, unless action is taken to implement it, it remains only as paper work.

Programme implementation is the full range of managerial activities associated with putting the chosen strategy into place, carrying it out, and achieving the targeted result (Obi, 1999). However, if there is no commitment from the organization's leaders to implement a strategic plan and to achieve quality, any effort to actualize it can lead to cynicism and lessen the likelihood of its adoption and success in future. Plan implementation results from administrative decisions on how to do things and create fits between management policies and operations.

Kolawole (1994) opined that administrative and managerial elements are necessary to put a management policy into place, and that full implementation can take several months to years depending on the amount of coordination involved. His findings include: building an organization capable of carrying out the policy successfully; developing budgets and sharing resources internally on activities critical to strategic success; motivating people and modifying their duties and jobs to better fit the requirements of successful policy implementation; and providing the internal leadership needed to implement the plan and to keep improving on
policy execution. Kolawole (1994) further proposed three steps for effective strategy implementation: Developing an organizational structure to delineate lines of authority and relationships; managing organizational activities, ensuring effective performance, and monitoring the effectiveness of policies. These implementation tasks help in the building of a capable organizational structure and are further explored in detail hereafter.

Obi (1999) defined the structure of an organization as the sum total of the way in which it divides its labour into distinct tasks and then achieves their coordination. Structure is designed to support the accomplishment of goals and implementation of policies. Jones et al (2003) stated that when a capable organizational structure is built, each functional unit within the organization is clear regarding what is expected of it in the planning process, and it is made aware of how its respective contribution underwrites the success of planning in the organization.

Fellows, Langford, Newcombe and Urry (1991) pointed out that structure of a firm is the framework within which both strategy and strategic management occur and further advised that both strategy and structure are interrelated. This link between strategy and structure has been verified by an extensive research programme conducted under the auspices of Harvard University and Manchester Business School by a number of scholars (Gransberg & Ellicott, 1997). Their findings summarized the fact that structure follows strategy, and that a company's
strategy determines its structure. According to Obi (1999), subsequent study further extended this exploration of the link between resources, strategy and structure within small and medium size building firms.

Human, capital, and material resources are key elements in the development of any project within the building industry. Stoner & Freeman (1989) in Usman (2006) recognized the important role people play in management. Studies show that management is getting things done through people (Daft, 2010). However, the job of managers is to give direction to their organizations, provide leadership; and decide how to use organizational resources to accomplish goals (Druker, 1974 in Daft, 2010). Organising resources and getting things done through people is illustrated in the figure 2.2

![Management Functions Diagram](image)

**Fig. 2.2: Management Process**

Source: Daft, 2010
From the above, it can be deduced that for any building project to succeed, the management system has to be effective and functional. Thus, the project goal has to be defined for organisational performance and deciding on the tasks and resources needed. This has to be organised by grouping tasks into various units and allocating resources appropriately. Thus, the employees are better motivated, which makes it easier to track their activities and ultimately attain the project goal.

Management functions enhance project performance. For instance, management of resources is very vital in any organization. Human, financial, materials, technological and information must be coordinated in order to achieve organisational goal. These resources are planned according to policy and procedural framework. When the organisation achieves this, the employees can performance better because they’re motivated; so the control becomes easier. Project performance will be achieved by applying the management principles.

i. Building project management

Building project management expands tremendously in principle and practice because each project has a unique style of management adopted for it. Pilcher (1992) advocated that a manager of a building project must assess each situation, noting its difference from others, and then select the appropriate management approach. Wong (2003) argued that certain fundamental and strategic orientations emerge from projects, depending on the different actions institutions use to build management standards in developing countries.
Walker (1992) argues that alternative approaches such as design and build, management contracting, and building management have been on the increase. He further notes that complex building projects undertaken by multinational corporations need efficient project managers. According to Ofori (2014) project management is the planning and implementation of project from initial to completion on time, within cost and according to agreed quality.

Rapidly advancing technology, increasing complexity of operations, and growing competition in the market, have made project management essential for organizations (Obi, 1999). Badaru (1992) advised that for companies with little or no experience in technology, the need for successful project management becomes more critical. Kerzner (1989:96) defined project management as the "planning, organizing, directing and controlling of company resources for a relatively short-term, that has been established to complete specific goals and objectives." Project management techniques also play a major role in the development of new technologies and systems.

ii. Obstacles to Quality Building Work

Quality is a major concern for all sectors of the national economy including the building industry. This is because it accounts for a greater part of the country's economic indices. According to Xie and Simon (2006), achieving quality in building enhances project success which is influence by factors such as: the site,
building structures, construction, technical skills and abilities, financing, and the end-user. By implication, this shows that as soon as building is occupied, the management is transferred to the end users who either maintain the quality or incur high cost of maintenance.

2.2.5 Completion Phase Principles
Completion phase is the step of building production. A project is completed successfully when the client is satisfied. Timely project completion is crucial to project delivery (Atkinson, 1999). Toors and Ogunlana (2010) in a related study in Thailand found that timely completion of projects carried more weight than other success criteria. The study revealed that projects and criteria for project delivery differ, but timely completion and cost effectiveness are essential to its overall process.

According to Lam, Chan and Chan (2007), cost effectiveness is a measure of project delivery due to its relationship between cost and time. Atkinson (1999) argued that in projects, where money is the major constraint, completing the project within budget is the overriding factor for project delivery. Frodell et al (2008) opined that exceeding the budget is permissible if it improves project delivery. However, completion within budget, time and quality standards is mandatory in project delivery.
Quality standards are described as the degree to which a set of inherent characteristics fulfils requirement (PMI, 2008; Chan & Chan, 2004). However, Atkinson (1999) opined that quality is a benchmark above others. This includes cost and time and is linked to the organisational benefit of project goals and functional specifications. Chan et al. (2002), on the other hand, considers quality as fundamental to project delivery.

Shenhar et al (1997) advocated that quality of the building project must meet the clients' standard. Toors and Ogunlana (2010) express concern over poor quality of building construction as a result of project delays, disputes and non-project delivery. Large projects are difficult to manage because they involve many stakeholders, each with different perceptions of success, discipline and skills, as well as technology (Kolltveit & Gronhaug, 2002; Liu et al, 2012; Pheng & Chuan, 2006). Ofori (1994a) considers the role of transfer of technology to influence project performance in the building industry. In this regard, Ofori (1994b) proposed the need to develop building technology.

The effectiveness of the joint venture is evident in the transfer of technology in Singapore from foreign contractors to their local counterparts (Ofori et al, 2001). It was found that local contractors benefitted from the programme. In a similar study, Holt et al (1994) discovered that contractors who completed and delivered projects successful are more likely to achieve project target in their future. Jaman
et al (2012) advocated that predictive performance of contractors can be determined by investigating contractors’ past performance. In the same vein, Khosrowshahi (1999) asserted that higher priority needs to be given to contractors past performance since delay in building performance has significant cost and quality implications on project delivery. Xiao and Proverbs (2003) added that contractors of high reputation and high past performance improve clients confidence and raise the possibility of future business. So LCM process, when carefully followed will improve project performance. Clear evidence is the transformation of the building industry in Singapore (Ofori, 2014).

2.3 Project Management

Kumar (1999) states that project management is a means of avoiding the ills inherent in the construction and production sectors of the economy that cause projects to fail or become abandoned. The project manager’s role arises from the need for a technical expert who will control the project implementation process; someone who makes the decisions concerning coordinating, controlling, organizing and directing the professional team. The success of any public or private project implementation process in the construction industry depends largely on the project manager’s concept regarding staff appointments and control, as well as strict monitoring of time, cost, material, quality and environmental constraints (Yaseen & El-Marashly, 1989).
According to Daft (2010), management is simply defined as planning, directing, controlling and coordinating of individual, group or organizational goals and objectives with the ultimate aim of achieving maximum benefit. In the view of Daft (2010), management means getting things done through and with people, which has to do with planning and directing efforts toward a common objective. The traditional functions of a manager include managing, planning, decision-making, organizing, staffing, leading, motivating and controlling. These functions constitute a cycle of action with one component leading to the next. Building construction involves: architects, engineers, quantity surveyors, builders, estate surveyors, and urban and regional planners. Non-professional stakeholders are also included hence the need for a project manager to coordinate their interactions, interests and diverse roles.

Assudani and Kloppenborg (2008) asserted that a set of related work activities that collectively have as their goal creating a unique outcome based on a specified period and using scarce resources, is normally defined as a project. They added that a successful project achieves goals without exceeding set limits and helps the organisation and its client further their objectives. Project management entails all of the initiating, planning, executing, monitoring, controlling and terminating activities to successfully meet project desirables (Assudani & Kloppenborg, 2008).
These activities are carried out by the project team over its life cycle. However, project management includes establishing objectives, balancing competing demands, and adapting to the expectations of various stakeholders (PMBOK, 2004). Success in building construction supports other economic sectors because of strong linkages between them, and also provides much needed employment for youth.

Project planning and management optimize resources to bring about desired change. In 1970's the World Bank developed a project development methodology, which comprises of five stages: identification, formulation, appraisal, implementation and evaluation (Akintoye, 2000a). However, the major characteristics of a project in any industry include, a clearly defined start and finish; an aim; a definable result (output); uniqueness; responsibility; as well as risk, cost, resources and time (Idoro, 2014).

The building industry continues to occupy an important position in the nation's economy even though it contributes less than the manufacturing industries. Through improved efficiency in the industry, cost-effectiveness and adhering to time lines, there will be cost savings for the country and greater contribution to the national economy. However, one of the failures in the building industry is inadequate knowledge of project management (Inuwa & Usman, 2008) and it is this shortcoming that has necessitated this study.
2.4 Project Performance

According to Robert and Wallace (2004), a project is termed successful if it passes four tests: time criterion – completed on time; the cost or money criterion – completed within budget; the effectiveness criterion – completed in accordance with the original performance and quality standards; and the client’s satisfaction criterion – accepted by the intended users or clients (whether from within the organization or elsewhere). The above success criteria call for successful project implementation by the utilization of proven management techniques of planning, organizing, directing and control.

The issues on life cycle management, time management, conflict resolution and management, networking, contracts management, project choice and project quality are key factors that contribute to project success (Idoro, 2014). Effective project choice, for example, greatly increases the probability of project success especially when the project is executed in accordance with project management implementation guidelines. From the citations made with regard to project management in the building industry, it becomes apparent that project management helps avoid failure, collapse and abandonment in the construction industry and other production sectors of the economy.

In Nigeria, the building industry is critical to the Nigerian economy and the need to cater for the increasing population was eminent. However, despite the rapid
expansion of the building sector, issues of quality and high costs of repair and maintenance have emerged with collapse of buildings reported (Jambol, 2012). The incidences of building failure and collapse, as well as the alarming loss of life that results, have become major issues of concern in Nigeria (Ike, 2012). For example, FCT (Abuja) recorded the following incidences of building collapse and failures (Fagbenle & Oluwunmi, 2010, NBBRI, 2011; Ike, 2012): multi-purpose indoor, storey sports complex (March, 1993); multi-storey building NICON-NUGA staff housing project (March, 1993); duplex building (1998); three-story residential building Four Square Gospel Church (October, 1999); three-storey building along Aminu Kano crescent, wuse II (July, 2005).

In the way, four-storey shopping mall located at plots 230/1101 Utako District (July, 2008); six suspended commercial purpose floors with basement on plot 702, Port-Harcourt Crescent, Garki II (July, 2010); another building located on plot 528, Durumi District, for residential purpose, partially collapsed (July, 2010); five-story shopping complex building under construction (August, 2008); uncompleted four-story building (August, 2010); four-storey building at Pape and another two-storey building collapsed at Marraba (2011) a one-storey building located at 45 road, 1st Avenue Gwarinpa Estate (January, 2012). This has led several construction companies to adopt management systems to mitigate the challenges that have affected the industry, which include declining client confidence (Jambol, 2012).
2.4.1 Project Performance Indicators

In the early 1990's, project success was considered to be tied to performance measures which were tied to project objectives. Project success was measured by the project duration, cost and performance (Chan et al, 2004). Time, cost and quality are the basic criteria of project success and they are identified and discussed in almost every article on project success (Chan, Scott and Lam, 2002).

In addition to these basic criteria, Pinto and Pinto (1991) advocated that measures for project success should also include project psychosocial outcomes, which refer to the satisfaction of interpersonal relations among project team members. Subjective measures such as participants' satisfaction level are known as soft measures and are also important for the success of any project. Sageh et al (2000) further suggested the absence of legal claims is an indication of project success. Safety, health and hazard prevention are very important in the execution of any project and serve as success indicators for contractors and clients.
Shenhar *et al* (1997) proposed that project success is divided into four dimensions:

**Project efficiency**
- Short term measure
- Completed on time?
- Within specified budget?

**Project on Customer**
- Customer and/or User satisfaction
- Meeting performance measure?

**Business success**
- Measure of performance, life cycle time, yield, quality and total improvement of organizational performance

**Preparing for the future**
- Long term dimension
- Preparing organizational and technological infrastructure for the future

Fig. 2.3: Four Dimensions of Project Success

Source: Shenhar *et al*, 1997
As shown in figure 2.3, these four dimensions are time dependant. The first dimension is the period during project execution and right after project completion. The second dimension can be assessed shortly after the project has been delivered (1 - 2 years). The third dimension can be applied when the client is satisfied. Finally, the fourth dimension can only be assessed three (3) to five (5) years after project completion. This is applicable to most projects because it is a good process to performance of a project.

In the same vein, Sageh et al (2000) divided project success into four dimensions. The first dimension is meeting design goals, which applies to the contract that is signed by the customer. The second dimension is the benefit to the end user, which refers to the benefits the customer derives from the end products. The third dimension is the benefit to the developing organization, which refers to the benefit gained as a result of executing the project. The last dimension is the benefit to the technological infrastructure of the firms involved in the development process. The combination of all these dimensions reflects overall project success.

According to Harris and McCaffter (2001), a client is especially concerned with the quality of their project and this is achieved when work specification is adhered to strictly to ensure low cost, to avoid a compromise on quality, and to ensure that the job is carried out according to the time planned. Poor project
Quality and performance results in increased costs and extended time schedule. Quality of building products and processes is crucial to the contractor's competitiveness in the market. However, Koskela (2000) contended that building quality may sometimes be taken for granted though insufficient attention may be paid to it. This is deeply rooted in the traditional procurement system where competitive bidding emphasizes the easy quantified building cost and time (Usman, 2006).

Palaneesward and Kumaraswamy (2000) advocated that quality accreditation and assessment including past performance ratings, are suitable indicators of a contractor's quality performance. Furthermore, to objectively evaluate and compare a contractor's quality performance, the average number of defects on previous projects, his educational background, and client satisfaction levels are appropriate indicators.

Clients need not only the best quality possible within budget, but also a guarantee on the products (Usman, 2006). Agundu, Okwandu and Mba (2010) added that some buildings do not reveal their defects immediately but that these show up in future. They suggested that the building industry should produce structures that will last for a very long time like durable products in the other industries (Hasegawal, 1994). Latham (1994) suggested the provision of ten-year latent defect insurance for commercial, industrial and retail building. This kind of
quality assurance gives clients more confidence in the building product. LCM processes provides an enabling environment for achieving project success, especially when the initial, planning, implementation and completion phase are logically followed.

2.5 The Building Industry
According to Low and Jiang (2004), the building industry is one of the oldest across the globe. Similarly, Ngowi, Pienaar, Talukhaba and Mbachu (2005) assert that the building industry relied on environmental resources for optimum project performance such as land and good climatic condition. Agundu et al (2010) viewed the building industry as an aggregation of businesses that are engaged in closely associated activities. The building industry is a conglomeration of participants in diverse fields who then form a sector of the economy (Hendrickson, 1998).

The building industry plays a central role in national welfare, development of residential housing, office buildings and industrial plants, and the restoration of the nation's infrastructure and other public facilities (Achuenu et al, 2000). They opined that its importance lies in the function of its products, which provide the foundation for industrial production, and that its impacts on the national economy. This importance cannot be measured by the value of its output, or the number of persons employed in its activities alone. But its contribution to the growth of the can never be overemphasized.
Chan and Chan (2004) advocated that most industries are dynamic in nature and the building industry is no exception. Its environment has become more dynamic due to increasing uncertainties in technology, budgets, and development processes. A building project is completed as a result of a combination of many events and interactions planned or unplanned, over the life of a facility.

Sanvido et al (1992) opined that this characteristic of building projects being temporal and fragmented is inherent in the construction industry and greatly affects the effectiveness of project teams, especially the project managers. However, this concept has remained ambiguously defined among construction professionals. Many project managers still manage and allocate resources across various project areas in an intuitive and ad-hoc fashion (Freeman & Beale, 1992).

The ability of the building industry to innovate and manage change has been widely debated over the years (Betts & Ofori, 1992; Gale & Fellows, 1990; Lansley, 1987 in Usman, 2006). A range of factors in the building industry have changed over the last 20 years resulting in construction firms moving away from a traditional to a more business approach (Barret, 1993).

In order to solve complex issues that confront management in the building industry, Lansley (1987) in Usman (2006) suggested the use of reasoning and problem-solving skills including the use of physical, technical and human
resources tailored to the rapid changes in the building industry, and in line with the preferred procurement methods of clients. Such flexibility requires highly innovative and creative problem-solving skills, as well as organizational structures and managerial value systems, which support and encourage their development (Usman, 2006).

The Nigerian building industry is made up mainly of building and civil engineering manufacturing. The industry has recorded some major achievements including extensive road and irrigation networks, airports, seaports, housing estates, power stations and industrial complexes (Jambol, 2004).

The management of construction projects is an enterprise that involves many people with diverse interests, talents and backgrounds (Bennett, 2000), most importantly the construction professionals and the clients, who in collaboration with other parties of the project team are tasked with the responsibility of ensuring a successful project (Usman, et al, 2012; Bennett, 2000). According to Ogunsemi and Saka (2006), building projects (facility infrastructures) like roads, ports, dams and bridges are part of the critical elements on which human development is based. Less developed nations, such as Nigeria face tremendous challenges in providing infrastructure for economic development (Ogunsemi & Saka, 2006).
In spite of the achievements recorded in the building industry, the Nigerian economy, according to Dahiru and Mohammed (2012), has grossly underperformed despite her enormous resource endowment and relative to her peer nations. Nigeria is endowed with both gas and crude oil and is the sixth largest gas reserve and the 8th largest crude oil reserve worldwide (Central Bank Governor, 2010 in Anago, 2012).

In addition, Nigeria is endowed with commercial quantities of about 37 different minerals. In the 1970s, Nigeria’s economic performance was weak relative to its Asian economic peers such as: Thailand, Malaysia, China, India, and Indonesia, which have transformed their economies to become major players in the world economy (Dahiru and Mohammed, 2012). This is ascribed to Nigeria’s political instability, lack of focused and visionary leadership, economic mismanagement, and corruption (Dahiru & Mohammed, 2012). This shows noncompliance to the policy and procedural framework in the Nigerian building industry.

The building industry (BI) has continued to play a significant role in the socio-economic development of Nigeria. Apart from creating employment, it provides shelter to millions and operational infrastructure such as offices, schools and hospitals (Idoro, 2014; Usman et al, 2012).

From the aforementioned, the BI in Abuja faces challenges such as poor feasibility and viability study at the initiation stage, inadequate project planning at
the planning stage, which eventually results in poor implementation, as well as poor project management performance (Ogunsemi, Oyediran & Ekundayo, 2008; Okereke, 2008).

The Traditional Management System (TMS) adopted by the industry is not fulfilling its mandate (Dada & Akpadiaha, 2012; Andawei & King, 2001). In TMS, the project coordinator (the architect or the engineer) performs the role of project manager (PM) in project delivery. Besides, the PM is appointed by the client as coordinator of the project delivery system (Ogunsemi et al, 2008; Andawei & King, 2001).

TMS, when adopted by the BI could be having challenges influencing project performance, but the role it plays in project delivery has not been established by research. Countries like Egypt, China, Great Britain, Singapore and USA that at times faced similar challenges, successfully applied the LCM approach in the project management to overcome them (Roberts & Wallace, 2004; Lee-Kuo & An-Lisiang, 2001; Ofori, 2014; Gransberg & Ellicott, 1997; Ja’afari, 2000; Chalfant, 2001; Xie & Simon, 2006). LCM is a management approach derived from the manufacturing industry and adapted in the construction industry for project management (Daft, 2010).

Several authors had claimed that LCM can be applied to attain project management success (Chih-Chiang, 2004; Chih-Chiang et al, 2006; Ofori, 2014;
Gransberg & Ellicott, 1997; Jaafari, 2000; Chalfant, 2001; Xie & Simon, 2006). LCM approach has been used successfully in managing many projects and improving service effectively and efficiently. It is therefore a valuable tool that helps the project manager to better understand the various steps of a project and the resources required for it. It reflects every management requirement for successful project delivery and communication between participants (Gransberg & Ellicott, 1997).

2.5.1 Potentials of the Building Industry

Idoro (2014) advocated that the building industry is bedevilled by serious planning and management problems, which have stunted its growth and viability and caused rampant project abandonment, high project costs, and prolong duration. Project planning and management is central to all construction projects and is a requisite to achieving objectives.

Shenhar et al (1997) suggested strategies that would enable the achievement of a project’s objectives. These include: ensuring that all projects are preceded by a feasibility report; recognizing, financing, designing and constructing projects as distinct and separate phases of project implementation that are preceded and controlled by proper planning and management. Providing up-to-date planning information and data for the construction industry, funding projects to ensure adequate planning design, construction and management; utilizing local expertise
and resources in project planning and management; adopting an appropriate
standard contract system

Olomolaiye, Wahab and Price (1987), opined that problems in the building
industry include corruption during the awarding of contracts, and abandonment of
projects owing to severe cash flow problems. As a result, construction operatives
have been subjected to a work environment, which has not encouraged high levels
of efficiency. The non-payment of wages, the interruption of work due to lack of
materials or tools, and the consequent loss of morale, have all led to an exodus of
traditional craftsmen from the industry. This is important because the craftsmen
contribute immensely to the growth of the industry by exhibiting their skills and
wealth of experience. The adoption of appropriate planning, monitoring and
evaluation techniques in the preparation of Master Plans for construction projects
are essential tools for the achievement of success by the contractors in executing
building projects. This is a process of achieving project success using LCM.

2.5.2 Problem of Cash Flow in the Nigerian Building Industry

Traditionally, building focuses on cash flow and is almost completely driven by
projects and their schedules. As a result, there is little incentive for investment in
research and development by companies. Most building technologies are not
protected by patents, so a competitor can use them on their own project without
seeking permission (Gould & Joyce, 2002). However, building construction is a
noble profession that involves creating with one's hands, solving problems in the field, working collaboratively with many individuals, and across many disciplines, to create a product that will last and enjoyed by future generations. The LCM process can minimize these challenges and enhance project performance.

2.5.3 Labour Production in the Nigerian Building Industry

Building operatives in Nigeria have been subjected to a work environment, which has not encouraged production, which has resulted in a loss of morals and a mass exodus of traditional craftsmen from the industry (Oyegoke, 2001). The Nigerian building industry lack motivation, for instance, a manpower survey conducted by Egan (1998) revealed that the building industry's 9.1% contribution to employment in the modern sector was much smaller than the 15.1% recorded in 1977. Egan (1998) noted that building productivity has been declining steadily in spite of the rising costs and large labour-intensive building projects around the world. This decline on productivity shows the failure of the building industry to deliver good quality projects and in a timely fashion.

The problem of low productivity is not limited to Nigeria but across the globe especially developing economies (Ofori, 2014). Proverb (1990) added productivity in the building industry in the UK was reportedly lower than in many other European countries despite the encouraging signs observed during the 1980
oil boom and this has affected the growth of the industry lowering the productivity output. Kolawole (1994) categorised the major factors that affect both labour and productivity into two project characteristics:

i) Building methods, skills of the work force, and work practice.

ii) Work sampling procedure such as site area shifts, preference, and bases, among others.

However, cost and poor management are the primary factors causing work rate delays. Odeyinka et al (2006) reported that a significant relationship exists between productivity, building planning, and the organizational structure of a building firm. Gransberg and Ellicott (1997) observed that productivity is related to management, labour, government regulation, owner characteristics and finance. Unproductive time within a working day can be caused by many factors such as the level of supervision, lack of resources, low level of education, an unfriendly working atmosphere, unbalanced distribution of resources, and interference between operatives.

Crossen (2006) contended that these management deficiencies soon result in operative frustration; if workers observe that site management is poor, unfair or corrupt, their morale, motivation and consequent productivity reduces. The decline in productivity reflects in failure of the building industry to deliver quality
projects in a timely fashion. The implementation of LCM will minimize the challenges and improve project performance.

2.6 Theoretical Framework
2.6.1 Theory of Project
This study employs the theory of project as propounded by Koskela (2000), which is provided by the transformation view on operations; a transformation of inputs to outputs. There are a number of principles followed for project management. These principles suggest, for example, decomposing the total transformation hierarchically into smaller transformations and tasks, and minimizing the cost of each task.

The theory further contends that indulgent of management is grounded on three sub-theories: management-as-planning, the dispatching model, and the thermostat model. In management-as-planning, management at the operations level is seen to consist of the creation, revision and implementation of plans (Koskela, 2000). This approach to management views a strong causal connection between the actions of management and the outcomes of the organization. The dispatching model assumes that planned tasks can be executed by a notification of the start of the task to the executor. The thermostat model is the cybernetic model of management control that consists of the following elements: a standard of performance; performance measured at the output; a variance between the
standard, and the measured value, which is used for correcting the process so that the standard can be reached.

This study finds various tenets that are useful in achieving the set objectives. For instance, the emphasis on “project” presupposes processes that have to be undertaken systematically to achieve results. Second, the three sub-theories; management-as-planning, the dispatching model and the thermostat model provide clear guidelines of creation and implementation plans, initiation of tasks and measurement of desired standards. The theory of project was chosen because of the processes involved in accomplishing task which suit the building industry in achieving project performance.

2.6.2 System Theory
System theory addresses management problems in the building industry. A system theory is a conventional of unified parts that role as a complete to attain a collective resolve (Daft, 2010). A system purposes by getting efforts from the external environment, changing them in some way, and discharging yields back to the environment. Figure 2.4 shows the basic system principles of organisations. It consists of five components: inputs, a transformation process, outputs, feedback and the environment. Inputs are the physical materials, human, financial or information resources used to produce goods and services. The transformation process is management’s use of production technology to change the inputs into
outputs. Outputs include the organisation’s products and services. Feedback is getting knowledge of the results that influence the selection of inputs during the life cycle of the process. The environment surrounding the organisation includes the social, political and economic factors.

![Diagram of the systems view of organisation](image)

Figure 2.4: The systems view of organisation
Source: Daft (2010)

2.7 Conceptual Framework
LCM phases are the initiation, planning, implementation and completion phases. These phases determine the state of the project performance as a dependent variable. For example, if a survey of a building site is not properly carried out, possibilities of the building collapsing or facing other structural challenges is
high. Similarly, if health and safety factors are not adequately addressed at the planning stage, the project might either face litigation charges from environmentalists, or become a health hazard. Project performance therefore ultimately depends on the series of independent variables (initiation, planning, implementation and completion phases) with their attributes as indicated in figure 2.5.

The building processes begin at the initial phase where preliminaries survey and soil investigation are carried out. Environmental impact assessment is also conducted at this stage of the building processes. This enables the Quantity Surveyors to make cost benefit analysis to enhance planning of the project. Project planning involves designing, preparation of contract document, preparation of budget and time overrun. Seeking approvals and planning bill of materials as well procurement of personnel and material resources.

The planning phase is preceded by project implementation. At this phase, procurement is done and materials are mobilized to site. Skilled workers are employed and resources are allocated appropriately. At this phase, monitoring and supervision has become necessary. This is to enhance productivity by achieving project success. From the implementation phase is the completion phase where the project has to be decommissioned and auditing of the project is carried prior to
handing over. Once the project is completed, the personnel and the equipment’s are transferred to other sites.

Figure 2.5: Conceptual Framework of Life Cycle Management
Source: Adapted from Westland, 2006; Roberts and Wallace, 2004; Kerzner, 2000
2.7.1 The Life-Cycle Principle
An effective project management procedure trusts on two actions – planning and action. These two successive activities form the basis of every project life-cycle principle, and can be expanded to suit the control requirements in every area of project management application (Assudani & Kloppenborg, 2008). The project life-cycle, characterized by a series of ‘indicators’ determines when the project starts, the ‘control gates’ through which it must pass, and when the project is finished. The project manager makes use of the life cycle concept as a valuable tool for better understanding of project stages and the likely resources required for its successful implementation (Nwachukwu & Fedelis, 2011).

The life cycle is used to pictorially explain organisational phases in building, the production line, and the sales life cycle of a product. It is also one of the instruments that help managers conceptualize work and budgetary requirement of the project. The basic life cycle concept holds true for all project and systems and is useful because it reflects different management requirements at various stages. However, project performance would be assessed by the degree to which the product meets specific requirement or goals. A detailed explanation of the four phases is shown in Table 2.2:
Table 2.2: Life Cycle Management Principles

<table>
<thead>
<tr>
<th>Initial phase principles</th>
<th>Planning phase principles</th>
<th>Implementation phase principles</th>
<th>Completion phase principles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify need</td>
<td>Implement schedule</td>
<td>Procure materials</td>
<td>Train functional personnel</td>
</tr>
<tr>
<td>Establish feasibility</td>
<td>Conduct studies &amp; analysis</td>
<td>Build &amp; test tooling</td>
<td>Transfer materials</td>
</tr>
<tr>
<td>Identify alternatives</td>
<td>Design systems</td>
<td>Develop requirements</td>
<td>Transfer responsibility</td>
</tr>
<tr>
<td>Prepare proposal</td>
<td>Build &amp; test prototypes</td>
<td>Produce system</td>
<td>Release resources</td>
</tr>
<tr>
<td>Develop basic budget &amp; schedule</td>
<td>Analyse results</td>
<td>Verify performance</td>
<td>Reassign project team members</td>
</tr>
<tr>
<td>Identify project team</td>
<td>Obtain approval for construction</td>
<td>Modify as required</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Adapted from PMBOK, 2003

Projects may eventually end while others may be abandoned. They begin with a need for transformation within an organization. The idea to transform was conceived at the initial phase which marks the beginning of the project. Once a project is identified, budget and scheduled is prepared to enable planning to continue. At the planning as indicated in table 2.2, design prototypes are produced, to prepare for approval process. When approval is obtained the project is being implemented using various resources for efficiency and effectiveness. As a project developed to completion it passed through a number of phases. Each project phase created is a deliverable. For example, consider a project to build a new warehouse. A construction company has some clear project phases (Figure 2.4) including: research, blueprints, approvals and permits, breaking ground,
laying the foundation, and so on (PMBOK, 2003). Each phase results in some admirable accomplishments.

At the beginning of the project, through planning, research, experience, and expert judgment, the project manager and the project team will plot when each phase should begin and end, and the deliverable for each phase, which is referred to as a milestone. This milestone is a significant point in the schedule that allows the stakeholders to see how far the project has progressed, and how far the project has to go to reach completion. Table 2.2 shows the LCM principles that guide the building industry in enhancing project success.

2.8 Summary of Literature Review
The chapter began with an overview of Life Cycle Management origin and its application on project performance in the global building industry. It is structured according to the objectives of the study which was based on the conceptual framework.

The chapter diagnoses policy and procedural framework and its impacts on project performance. It also explains the initial phase principles, planning phase principles, implementation phase principles and the completion phase principles. The chapter further explains terms like project management, project performance
indicators as well as the building industry. It discusses the challenges of the building industry.

The latter portion of the chapter explains the theoretical and conceptual frameworks. The theoretical framework was based on the theory of project promulgated by Koskela (2000). Finally, the study objectives were explained based on the theoretical framework and its relationship with the theory of project established which formed the basis for the conceptual framework.
CHAPTER THREE
METHODOLOGY

3.1 Introduction
This chapter describes the method and procedures used in carrying out the study. It focuses on research design, area of the study, population of the study, sample size and sampling techniques, instruments for data collection, and method of data analysis.

3.2 Research Design
Research design according to De Vans (2001) is a process of making sure that the data gathered are sufficient and appropriate for hypotheses testing. There are different approaches to research designs. For instance, Hakim (2000) identified eight types of study design viz: (a) Literature reviews, secondary data analysis and meta - analysis of existing data (b) Qualitative research includes in-depth interview and focus groups (c) research based on administrative records and documentary evidence (d) ad-hoc interview surveys (e) regular and continuous interview surveys (f) case studies (g) longitudinal studies and (h) experimental research.

Bryman (2001) argued that there are only five types of research design in the social sciences. He identified as follows (i) Experimental designs (ii) Cross-sectional or survey designs (iii) Longitudinal designs (iv) Case study designs; and (v) Comparative designs. However, McNabb (2009) classified research design
into two namely: qualitative (positivist) and quantitative design (post-positivist) designs. He further states that each approach supports a variety of designs and methods for gathering data. In this case, each approach allows the researcher different ways of analyzing and interpreting actions. A fundamental issue in research is selecting the appropriate research design for the research problem and the study objectives.

Scientific inquiry is based on theory, concept building data collection and interpretation (Babbie, 1995). A research collects data based on the theoretical concept unfolding certain empirical variables (Wanyona, 2005). Basically, a research design should be determined (Creswell, 1994). It explains proceedings using a theory (Wanyona, 2005).

Creswell (1994) advocated that research may be completed by qualitative methods while adding a complimentary quantitative component that assists in building a theoretical circumstantial on which a new theory is being developed. Wanyona (2005) added that a choice of research method depends on the objectives of the research. If the objective is to gather opinion and future intentions, Silverman (2000) recommends field’s survey research, but when exploring case history or activities or events, Creswell (1994) supports’ qualitative methods such as case interviews.
Three merits of survey methods are evident in any research design (Nkado, 2000; Elkington & Smallman, 2002). Firstly, primary data was collected through questionnaire method. This allows for data to be collected from the field. Survey method is useful in describing the characteristics of enormous population (Akintoye, 2000; Kometa et al, 1995; Nkado, 2000; Wang et al, 1998). Thirdly, using a standardized questionnaire enables up-to-date data to be collected with the required precision (Akintoye & Fitzgerald, 2000).

The study was carried out using both questionnaire to obtain quantitative data and case to obtain qualitative data. A pilot study was conducted by giving out questionnaire to some respondent (Architects, Builders, Contractors, Engineers, Quantity Surveyors and Urban and Town Planners. These are professionals who are experienced from both the public and the private sectors respectively. The interview is geared toward getting information on the potentials of LCM and how it affect costs, time, wastage and issues related to durability of projects. The information obtained from the interview and literatures were used to develop the questionnaire which was tested to obtain data for the research. The questionnaire was used to obtain data for the research as well as case study or documentary analysis was also carried out to obtain qualitative data for the research.
3.3 Area of the Study

The study was carried out in Abuja, the Federal Capital Territory of Nigeria. The territory is located north of the Niger and Benue Rivers. It is bordered by the States of Niger, Kaduna, Nasarawa, and Kogi (figure 3.2), lying between latitude 8.25 and 9.20 north of the equator and longitude 6.45 and 7.39 east of the Greenwich Meridian. Abuja is located in Central Nigeria. The Federal Capital Territory covers an area of approximately 7,753.853 km², and occupies 275.3 km² with a population of 1,406,239 (NPC, 2010; NBS, 2014). It has a population density of 181.4 with an annual growth rate of 9.28. It is situated within the Savannah region with moderate climatic conditions. The territory is made up of six Local Councils: Abuja, Abaji, Gwagwalada, Kuje, Bwari and Kwali (figure 3.2). The Local Government Authorities are controlled by the Federal Capital Development Authority, Abuja.

3.3.1 History of the Study Area

The Master Plan for Abuja was designed by the International Planning Association (IPA) and approved by the Federal Government (FG) in 1979. Construction work began in 1980 and the FG finally shifted from Lagos to Abuja in 1991. The Land Use Act of 1978 was the principal law guiding land acquisition, resettlement, and its allocation to all eligible Nigerians, private sectors, Government Organizations and Non-Governmental Organization (Jibrin, 2006).
The Federal Capital Territory (FCT) was formed on 3\textsuperscript{rd} of February, 1976. It is made up of Nasarawa, Niger and Kogi States respectively. The land of Abuja was the southern part of the ancient kingdom of Zazzau (Zaria). The name Abuja was derived from Abu Ja a brother to Muhammadu Makau. Makau was the last Hausa ruler of Zaria; left Zaria after being defeated by Fulani and settled in Abuja. His brother Abu Ja succeeded him as the 62\textsuperscript{nd} King of Zaria (Njeru, 2012). According to Njeru (2012), Abu was derived from Abubakar whereas; Ja was given to him.
because he was light in complexion (in Hausa Ja means fair). He was known as Abu Ja (Abu the fair one). Others claimed that the name Ja was derived from his father’s name “Jatau” Abu Ja built a new capital for his kingdom called Abuja (Njeru, 2012 and Jibrin, 2006).

Late Gen. Murtala Mohammed constituted a panel of experts in August 1975 who studied and recommended several alternatives places such as Okene, Kafanchan, Makurdi, Ile, Auchi and Agege; during the then military administration (Jibrin, 2006). The panel recommended and settled on Abuja as the FCT and this recommendation was accepted. Abuja officially became the FCT on 12 December 1991 with six Area Councils: Abuja Municipal, Gwagwalada, Abaji, Kuje, Bwari and Kwali.
The FCT became the headquarters of Economic Community of West Africa States (ECOWAS) as well as its military arm. The Economic Community of West African States Monitoring Group (ECOMOG) which serves as OPEC headquarters (Njeru, 2012). Njeru (2012) added that FCT is blessed with a mix of
agricultural produce such as yams, cassava, maize, guinea-corn, rice and plantain and has mineral deposits such as marble, tin and tantalite, among others. The feature of Abuja is the Aso Rock – a 400 square metres monolith left by water erosion. Aso-Rock is the seat of power where the presidential villa, National Assembly and the Supreme Court are located. The Nigerian National Mosque and the National Christian Centre are located at the FCT. Abuja is served by Nnamdi Azikiwe International Airport (Jibril, 2006).

3.4 Study Target Population

Table 3.1 indicates the target population comprising of professionals in the built environment. The target population size was obtained from records of professional bodies, FCDA and Corporate Affairs Commission (CAC) (Leed & Ormond, 2005). These are corporate institutions responsible for registering of construction professionals, property development and corporate bodies in Nigeria respectively.

3.5 Sample Size and Sampling Technique

The study uses proportional stratified sampling and purposive sampling techniques to select the sample. Stratified sampling technique was used to select the responses from the strata for the purpose of data analysis. Stratified sampling technique identified strata in the population and their proportion, and selected from each strata to form a sample from the population of 2310. A sample of 341
respondents was selected for the survey. Olatunji (2010) opined that the major characteristic of the simple stratified random sampling is that all the strata of the population are equally important in size. Proportional stratified sampling is characterized by a population that contains definite strata that appear in different proportion within the population. Olatunji added that a sampling option once chosen, it will not disadvantage any strata for the selection of sample sizes. Leedy and Ormrod (2005) and Gay, 1987 affirmed that each member of each stratum has an equal opportunity of being selected. This means that the selection of sample size is done proportionally.

The target population is not uniform because the various categories of professionals may not necessarily be having similar characteristics. This shows individuals within the same profession may not always think the same over a given issue. So the strata used were the Architects, Builders, Contractors, Engineers, Quantity Surveyors and Urban and Regional Planners. As such the target population cannot be regarded as homogeneous. Stratified sampling technique was therefore used to ensure that the target population was divided into different strata, and that each stratum was represented in the sample population equivalent to its size in the population. This ensured representation of each stratum in the sample thus raising the external validity of the study.
Olatunji (2010) advised that the larger the sample size, the more likely its mean and standard deviation will be represented in the population’s mean and standard deviation. Leedy and Ormrod (2005) asserted that researchers should maximize the sample size by providing the following guidelines (Table 3.1).

### Table 3.1: Guidelines for Sample Size

<table>
<thead>
<tr>
<th>Population</th>
<th>Sample Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small Population</td>
<td>Survey the entire population</td>
</tr>
<tr>
<td>500</td>
<td>50%</td>
</tr>
<tr>
<td>1500</td>
<td>20%</td>
</tr>
<tr>
<td>About 5000 or more</td>
<td>400 sample size should be adequate</td>
</tr>
</tbody>
</table>

Source: Leedy and Ormrod, 2005; Olatunji, 2010

Yamane formula was used to calculate the sample size from the population which agrees with the guideline in Table 3.1. The various strata were multiplied by the sample and divided by the population to obtain the ratio for each stratum. The sample size was 15% of the population. Purposive sampling was used to obtain data for the case study analysis. This was found from 24 project files representing 40%. The result of the documentary analysis could be considered as biased and of little value if the response was lower than 30 – 40% (Usman, et al, 2012a and Usman, et al, 2012b. The response rate for this research is 70% which indicate an unbiased and higher value of survey. The formula used to determine the sample size from the population (Enshassi, Al-Hallaq and Mohammed, 2006) is given by Yamane (1967) as shown below:
\[ n = \frac{N}{1 + N (e)^2} \]

Where,

- \( n \) = Sample Size
- \( N \) = Population
- \( e \) = the error of sampling (0.05)

\[ n = \frac{2310}{1 + 2310(0.05)^2} \]

\[ = \frac{2310}{1 + 2310(0.0025)} \]

\[ = \frac{2310}{1 + 5.775} \]

\[ = \frac{2310}{6.775} \]

\[ = 341 \]

The sample size is 341 agree with Leedy and Ormrod (2005) and Olatunji (2010).

To ensure equal representation of each category, the sample was distributed as follows:

Architects = \[ \frac{350 \times 341}{2310} = 52 \]

Builders = \[ \frac{352 \times 341}{2310} = 52 \]
Engineers = \frac{354 \times 341}{2310} = 52

Quantity Surveyors = \frac{354 \times 341}{2310} = 52

Urban and Regional Planners = \frac{350 \times 341}{2310} = 52

Contractors = \frac{550 \times 341}{2310} = 81

**Table 3.2: Target population and sample**

<table>
<thead>
<tr>
<th>Professionals</th>
<th>Population based on registration</th>
<th>Sample Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Architects</td>
<td>350</td>
<td>52</td>
</tr>
<tr>
<td>Builders</td>
<td>352</td>
<td>52</td>
</tr>
<tr>
<td>Engineers</td>
<td>354</td>
<td>52</td>
</tr>
<tr>
<td>Quantity Surveyors</td>
<td>354</td>
<td>52</td>
</tr>
<tr>
<td>Town Planners</td>
<td>350</td>
<td>52</td>
</tr>
<tr>
<td>Contractors</td>
<td>550</td>
<td>81</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2310</strong></td>
<td><strong>341</strong></td>
</tr>
</tbody>
</table>

*Source: Field Survey, 2013*

3.6 Case Study Sample Size

A case study can purposely be used to study a situation when the cases are systematically chosen (Guthrie, 2010). According to Guthrie (2010), revealed a high probability for the results of the case study to represent cases being studied.
However, the same size of the case study was obtained through purposive sampling from 24 project files of both private and public projects respectively. Three projects each were selected from both the private and the public sectors. Purposive sampling was used for the case study because the selected files have records that give quality information. The project files that have been well documented were selected. This means that these files have all the details of the contract and due signed by the contractor and the client. Out of the 24 files, only 6 have all the information needed, while other files don’t have all the document required that is why purposive sampling was applied.

3.7 Data Collection

The study utilized both of primary and secondary data. The following techniques were used in data collection.

3.7.1 Primary Data Collection

The primary data were collected through interview and questionnaire methods.

3.7.1.1 Interview Method

According to Guthrie (2010) interview method of data collection involves presentation of oral-verbal stimuli and replying items of oral-verbal responses. This study used personal interview in collecting information on the LCM phase
principles and project performance for the study. It is a method that entails the interviewer asking questions in a face-to-face contact to the interviewee.

Collecting information from personal interview could be structured or unstructured. Structured interview involves the use of a set of predetermined questions that are standardized in its techniques and recordings. In this context, a structured questionnaire was used in asking the respondents questions on project performance within the building industry in Abuja, Nigeria.

3.7.1.2 Research Questionnaire

The questionnaire was designed to collect data based on the study objectives. The questionnaire was designed on two sections: Demographic information to ascertain the wealth of experience of the respondents and the LCM principles and project performance so as to attain to the study objectives. Basically, initial phase principles, planning phase principles, implementation phase principles and completion phase principles which form the independent variables; while project performance forms the dependent variable. These were established based on the conceptual framework.

The respondents were Architects, Builders, Contractors, Engineers, Quantity Surveyors and Urban and Regional Planners. The questionnaire on general information based on the study objectives was structured in such a way Likert scale was used to obtaining data on the potentials of LCM and project
performance in the building industry. The scale 5 – Strongly Agreed, 4- Agreed, 3- average, 2- Disagreed and 1- Strongly Disagreed.

3.7.2 Secondary Data
The secondary data was gathered from literatures. These were obtained from books, journals, conferences and theses.

3.8 Instruments for Data Collection
Questionnaires, interviews and document analysis were used as the main tools for collecting data. The selection of these tools was guided by the nature of the data collected, the time available as well as by the objectives of the study. The overall aim of the study was to examine the potential of LCM system on project performance in the building industry in Nigeria. This was done through collection of views, opinions, perceptions, feelings and attitudes of professionals in the built environment, through the use of questionnaire and interview techniques. Document analysis technique was used to obtain data on policy and procedural framework within the building industry. This is because the performances of the industry can only be found from records of projects executed. Semi-structured instruments in form of interview guide were also utilized.

The completed projects from the public and the private sectors were sampled using purposive sampling from project files for comparison and analysis. To address the issue of performance using LCM requires the administration of
questionnaires, conducting interviews and project case studies. The number of registered professionals was retrieved from their respective registration offices.

Documentary analysis on three completed projects from both public and private sectors were carried out to establish the influence of LCM principles on quality, time and cost overruns. Purposive sampling was used to pick those files that contain complete documents for the purpose of quality analysis. The aim was to find out how these projects were carried out and whether LCM principles were used in the process of building construction. For the public sector, the Federal Ministry of Housing and Environment were relied upon, and for the private sector, private construction firms were the focus.

3.8.1 Enumerators
Three enumerators were employed for the administration and collection of questionnaires. They were also involved in conducting interviews. The enumerators were trained before carrying out the survey. This was to enable them understand the survey and the questionnaires (Appendix A).

3.8.2 Pilot Study
A pilot survey was conducted after training the enumerators. This was done to pre-test the ability of the enumerators and the validity of the instruments. After the pilot study, adjustments were made on the questionnaires to correct the anomalies before their final administration. For the pilot study, 30 questionnaires
were distributed as follows: Architects 5, Builders 5, Engineers 5, Quantity Survey 5, Urban and Regional Planners 5 and Contractors 5. Their responses necessitate the following adjustments:

i. Used the University letter headed paper

ii. Questionnaire for project performance which is the dependent variable was omitted.

iii. There are some professionals that have only Certificate and National Diploma. No provision was made for such category.

iv. Other professions, for example National Association Technology Engineers which were not included in the option for professional category.

v. Inclusion of sector in the demographic data.

vi. Use of polite approach such as kindly indicate or please

3.8.3 Case Study
Case study method is one of the popular approaches used in getting information for a particular study (Whelan, 1989). It is a narrative event that constitute or leads to a decision (Stein, 1952 in McNabb, 2009). However, Guthrei (2010) observed that project evaluations have case study characteristics. He added, they usually analyze the entire activity of a project especially documents records and interviews. Yeager (1989) defined case study as a description of a management situation based on interview, archival, naturalistic observation and other data
deemed sensitive to the context in which management behaviour takes place. Case studies are often intensive studies of events or processes in making a decision (Lang and Heiss, 1990; Arenson, 1993).

Arenson (1993) promulgated an appropriate research method when some noteworthy success or failure in a case is contemporaneous. He added that a qualitative case study usually address programs directed towards individualized results. McNabb (2009) buttressed that a subject selected as a case study is chosen for study because it exposes some fundamental truths.

Stake (2004) identified three different types of case study: instrumental, intrinsic and collective case study. McNabb (2009) observed case study illustrates some specific characteristics or problem. In this regard, it will provide a better understanding of the phenomenon. The case study is expected to contribute to a better understanding of a topic of interest and a design for applying performance measurement (McNabb, 2009).

Fischler (2000) noted that case studies are uniquely suited for exploring the interaction of personal behavior and collective institutions, and the underestimate of agencies and structure. According to Fischler (2000) the cases contribute to the development of a theory of government planning practices. He added case studies that explore the behavior and experience of innovative practitioners and
innovative organizations, whether public, private or non-profit, should be prioritized. Bailey (1994) also identified a variety of purposes for the case study. They could be descriptive, interpretive, critical, for solving administrative problems, or for the purpose of formulating theory. They can be purely practitioner-oriented focus or esoteric scholarly studies. For maximum value, however, Bailey concluded that the ideal case study was one that had value for both practitioner and academics. However, most authors agree with Lang and Heiss (1990) who contend that the following fundamental principle underlies all case studies.

The basic rationale for a case study is that there are processes and interactions which cannot be studied effectively except as they interact and function within the entity itself. Thus, “if we study an organization, we will know more about how the processes serve as factors in themselves and perhaps apply these to other similar type persons of organization” (Lang and Heiss, 1990: 86). According to McNabb (2009) most case studies are focused on individuals, pairs, small or large groups, processes or organizations. For the purpose of this study, six completed building projects from both public and private sectors were studied and analyzed based on their performances within the building industry. The variables studied include initial project duration, final duration, initial cost, final cost, qualification of the project manager, sector as well as the variation in cost and time overrun. The cost of the variation was also studied. This was to find out the challenges of
projects being completed at a high cost and longer duration which prevents the building industry from successful project delivery.

3.9 Data Analysis
The data collected was coded and entered into the computer using MS Excel 2010. The data was then subjected to data validation procedures that were designed to identify inconsistencies, key punching errors, and miscoded entries, among others. Statistical Package for Social Sciences (SPSS) version 17 was used for the analysis of data.

In this study, one-way ANOVA was used for the purpose of data analysis. ANOVA is an analysis technique that compares individual and group differences of subjects that are exposed to different treatments. Treatment in this study was the different statuses of LCM phase’s principles (example good, moderate, poor). ANOVA is usually used when data is made up of individual scores and the researcher wants to estimate the individual as well as the group differences as a result of treatment and determine if one variance is larger than another (Field 2005; Oso & Onen, 2009; McNabb, 2009).

Data was collected from the respondents and in form of strongly agreed, agreed, average, disagreed and strongly disagreed. A response of strongly agreed was scored 5, agreed 4; average 3, disagreed 2, strongly disagreed 1, and the scores of each respondent on each variable was added together. Since each main variable
has other subsidiary variables (see the conceptual framework), the maximum score for each variable on each objective was 10 and the minimum was 2 on each variable for each respondent. The responses of respondent in each category of the professionals were pooled together to get the overall score for each profession. The scores for each profession were converted to percentages by expressing each score as a percentage fraction of the total. The score of each profession was rated: less than 36%, very poor; 37% - 53%, poor; 54% - 70%, moderate; 71% - 87%, good; and 88% - 100%, very good (Leedy and Ormrod, 2005). This was based on the responses received. For further analysis and summary, those rated very good and good were regarded as simply good, while those rated very poor and poor were regarded as poor. The rating was based on success rate.

One-way ANOVA technique was used to compare the differences between the means of project performance. This is in view to determine if one variance is bigger than the other especially on project performance. This is the main domain of ANOVA (Field, 2005; Oso & Onen, 2008; McNabb, 2009).

Data was analysed at 5% level of significance. This value ($\alpha = 0.05$) has been chosen at the discretion of the researcher and because it is most commonly used value (Kathuri & Pals, 1993; Oso & Onen, 2009). In this level of significance, the researcher is 95% confident that any differences noticed are due to initial phase, planning phase, implementation phase, completion phase and not a result of
chance. Thus, in 100 possible cases, only 5 of such differences could be due to chance (Oso & Onen, 2008, McNabb, 2009).

3.9.1 Method of data analysis
The ANOVA test was used to determine the significance of the effects in a model by calculating how much of the variability project performance could be explained by the potentials of LCM in project delivery (Field, 2005). This was done by calculating a quantity called Mean Square which is similar to the variance. This quantity is calculated by dividing the sum of squares of deviation from the effects (the number of parameters that the model is estimating to test for significance of the effect). For means effects, the number of degrees of freedom is one less than the number of discrete values for that factor in question (McNabb, 2009).

Finally this Mean Square was divided by the estimate of variance known as the Residual Mean Square. This ratio (mean square of the effect divided by residual mean square) resulted in an F-statistic that can be used to test the importance of the effect explained the behaviour of project performance. A low probability value associated with an F-statistic for an effect means it is unlikely that the F-statistic as large as the one calculated would have happened by chance. Thus, we assumed that the effect in question is important as it explains the dependable variable (Concept, 1994).
3.9.2 Chi-Square Test

The chi-square statistics was used at 5% level of significance. The chi-square statistics test procedures tabulates variables into categories and computes a chi-square statistic. Chi-square is a statistical procedure which examines the relationship between project performance and the potentials of LCM on project delivery in the building industry. The test is based on the discrepancy between the initial, planning, implementation, completion and project performance in each stratum.

The goodness of fit test compares the potentials of LCM and project performance in each category to test whether all categories contain the same proportion of values or each category frequencies are corresponding to cells in a contingency table calculated by assuming that the cross-classified dimensions are statistically independent. Usman (2006) opined that the expected value of the test statistic is $N - 1$ when $H_0$ is correct.

$$\chi^2 = \sum \frac{(F_o - F_e)^2}{F_e}$$

Where

$\chi^2$ = Chi-squares

$\sum$ = Summation

$F_o$ = Observed frequency

$F_e$ = Expect frequency

$df$ = Number of degree of freedom

$df$ = $(r - 1)(c - 1)$
Where,
\[
\begin{align*}
    r & = \text{number of rows} \\
    c & = \text{Number of columns}
\end{align*}
\]

### 3.10 Quality Control

Controlling quality is a method of confirming acceptable levels of validity and reliability of the study through proper mechanism of extraneous variables (Oso & Onen, 2009). This extraneous variable is any other potential of LCM principles that may also affect project performance which the researcher intends to investigate in this study (Oso & Onen, 2009). Quality must be controlled to moderate its effects on project performance and to avoid confusing the results. Oso and Onen (2009) asserted that the values of validity and reliability coefficients adopted depend on the nature of the study. However, a value of at least 0.70 is acceptable in research (McNabb, 2009).

The questionnaire were piloted in Bauchi State which was not included in the study sample were modified to improve their validity and reliability coefficients to at least 0.70. Items with validity and reliability coefficients of at least 0.70 are accepted as valid and reliable in research (Field, 2005). McNabb (2009) argue that validity and reliability ranges between 0.000 to +1. This means that the closer the alpha is to 1, the greater the consistency of items in the instrument being assumed.
3.10.1 Validity Test
Validity is the extent to which results can be accurately interpreted and
generalized (Oso & Onen, 2009). It is the degree to which an instrument measures
what it is supposed to measure (Oso & Onen, 2008). Fellows and Liu (2003)
noted that validity is a measure of the truthfulness of a measuring instrument. It is
used in evaluating instruments and it measures in twofold: criterion-oriented and
construct validity. The criterion-related validity test measures correlation
coefficient between paragraph of one field and all the fields of the questionnaire
that have the same level. In the criterion-related test, the correlation coefficients
test each factor and the total fields. The p-value is significant when alpha is less
than 0.05.

3.10.2 Content Validity
Content validity is the extent to which a measuring instrument covers a
representative sample of the domain behaviors' that are measured. A systematic
examination of the content of the instrument determines whether it covers a
representative sample of the domains of behavior to be measured by the
questionnaire.

3.10.3 Criterion Validity
Criterion validity is the extent to which a measuring instrument accurately
predicts behaviors in a given area. The criterion validity used is concurrent
validity because it is used to measure project construction performance in Nigeria.
3.10.4 Construct Validity

This is an important validity in any study. It is the degree to which a measuring instrument (questionnaire) accurately measures the LCM principles. One means of establishing construct validity is through correlation of performance on the test with performance on a test for which construct validity has already determined (Emuze, 2011).

3.10.5 Reliability

It tests the degree of consistency which measures attributes (Field, 2005). Reliability is the ability of a measure to produce consistent results when the same entities are measured under the same condition. According to Fellows and Liu (2003), reliability concerns the consistency of a measure. They noted that 0.8 is appropriate for reliable results; while Field (2005) added that when a reliability test is above 0.8, indicates a good reliability. However, Cartina (1993) argued that the value of the reliability depends on the number of items in the scale. The less the variation an instrument produces in repeated measurement of an attribute, the higher the reliability.

George and Mallery (2003) revealed that cronbach’s coefficient alpha is designed to internal consistency of the instruments. The normal range measure of cronbach’s alpha (α) value is between 0.000 and +1. This means that the closer
the alpha is to 1, the greater the consistency of items in the instrument being assumed. It is calculated as thus:

\[ \alpha = \frac{k \cdot r_{ll} + (k-1) \cdot r}{k} \]

Where \( r \) = average item correlation

\( K = \) Variables (number of items)

\( \alpha = \) cronbach alpha

As the number of items in the scale increases, the value \( \alpha \) becomes large. So also if the inter-correlation between items is large, the corresponding \( \alpha \) will also be large. Since alpha value is inflated by a number of variables, then there is no set interpretation as to what is an acceptable alpha value. In this case, a rule of thumb applies, thus:

- \( 0.9 \leq \alpha \leq 1.0 \)  Excellent
- \( 0.8 \leq \alpha \leq 0.9 \)  Good
- \( 0.7 \leq \alpha \leq 0.8 \)  Acceptable
- \( 0.6 \leq \alpha \leq 0.7 \)  Questionable
- \( 0.5 \leq \alpha \leq 0.6 \)  Poor
- \( 0.0 \leq \alpha \leq 0.5 \)  Unacceptable

### 3.10.6 Reliability Tests

The results of the items conducted to determine the reliability of the summated scores calculated for various factor categories are reported in this section. The
items analysis was conducted for the 64 items in the questionnaire that summed into scores for six factor categories. For each factor, Cronbach’s coefficient alpha was calculated.

3.10.7 Cronbach’s Coefficient Alpha Test

Tests for the internal reliability of the factors in each category were conducted by determining their cronbach’s coefficient alpha value. Table 4.3.1 presents the results

<table>
<thead>
<tr>
<th>Item</th>
<th>Number of items</th>
<th>Cronbach’s alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographic</td>
<td>7</td>
<td>0.713</td>
</tr>
<tr>
<td>Initial phase principles</td>
<td>13</td>
<td>0.995</td>
</tr>
<tr>
<td>Planning phase principles</td>
<td>12</td>
<td>0.993</td>
</tr>
<tr>
<td>Implementation phase principles</td>
<td>9</td>
<td>0.993</td>
</tr>
<tr>
<td>Completion phase principles</td>
<td>11</td>
<td>0.994</td>
</tr>
<tr>
<td>Project performance</td>
<td>12</td>
<td>0.996</td>
</tr>
</tbody>
</table>

Source: Field Survey, 2013

Cronbach’s alpha values for factor category were > 0.70, which means its adequate proof for consistency.
3.11 Response to Questionnaire

Table 3.4 Respondents Response Rate

<table>
<thead>
<tr>
<th>Profession</th>
<th>Questionnaire distribution</th>
<th>Questionnaire received</th>
<th>Questionnaire success response rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Architects</td>
<td>350</td>
<td>70</td>
<td>15.15%</td>
</tr>
<tr>
<td>Builders</td>
<td>352</td>
<td>70</td>
<td>15.15%</td>
</tr>
<tr>
<td>Contractors</td>
<td>550</td>
<td>110</td>
<td>23.81%</td>
</tr>
<tr>
<td>Engineers</td>
<td>354</td>
<td>71</td>
<td>15.37%</td>
</tr>
<tr>
<td>Quantity</td>
<td>354</td>
<td>71</td>
<td>15.37%</td>
</tr>
<tr>
<td>Surveyors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban and Regional Planners</td>
<td>350</td>
<td>70</td>
<td>15.15%</td>
</tr>
</tbody>
</table>

Total 2310 462 100%

Source: Field Survey, 2013

3.11.1 Response Rate

The following steps were taken in order to improve the response rate:

i. The respondents were assumed to have equal opportunity

ii. The covering letter made a human appeal to the respondents

iii. The length of the questionnaire was kept to a minimum for a study of this level

iv. Phone calls were constantly made to remind the respondents about completing the questionnaire.
3.11.2 Missing Value

Missing values in the questionnaires are inevitable though not desirable, as some of the respondents may have limited understanding of some factors. The questionnaire was designed in such a manner as to provide the respondents with the opportunity to tick the ‘unsure’ option rather than a factor wrongly.

3.12 Limitation of the Research

The major limitation of this study was that most professionals were involved in project supervision; this had a negative impact on the response rate, though a significant and representative sample was still achieved. Little has been done on project performance using LCM in Nigeria to which results could be compared with.

The projects surveyed were traditional contract systems which are mostly used in public projects. In traditional system, the architect is in charge of the supervision from the initial to the completion phase. Several factors such as distance, high cost of transportation, challenges in contacting the professionals and other similar research work could not allow for this procedure.

The issue of distance, high cost of transportation and accommodation, getting the professionals who are on site supervision, and lack of previous work on LCM, could lower the validity and reliability of the study. However, this was the most suitable forum because if the data was to be collected from a different place rather
than the study area, it would not have given a true picture of project performance in the building industry in Abuja, Nigeria. The challenges were overcome by increasing the period for the data collection and the both researcher and enumerators worked extra mile to achieve the goal within the time frame.

3.13 Summary of the Chapter
In this chapter, discussion was on the methodology which comprises the research design, study area, target population, sampling size and sampling techniques, case study sample size, data collection, instrument for data collection, method of data analysis, quality control and the limitation of the study.
CHAPTER FOUR
RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the analyses and the interpretation of results. The chapter is organized under the following headings: analyses of demographic data, test of hypotheses, case study analysis and discussions of results.

4.2 Demographic Characteristics of Respondents

The demographic data show the experience of the respondents in the building industry. The analysis is shown in Figure 4.2.1 and Table 4.2.1

Figure 4.2.1 Background Information of Respondents

Source: Field Survey, 2013
As shown in Figure 4.2.1 the background information of the respondents comprised the architects 16%, builders 15%, contractors 24%, engineers 15%, quantity surveyors 15%, and urban and regional planners 15%. These are the various stratum of the respondents.

<table>
<thead>
<tr>
<th>Qualification</th>
<th>PhD %</th>
<th>MSc %</th>
<th>BSc %</th>
<th>HND %</th>
<th>Others%</th>
<th>Total %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Architects</td>
<td>1</td>
<td>13</td>
<td>19</td>
<td>7</td>
<td>12</td>
<td>52</td>
</tr>
<tr>
<td>Builders</td>
<td>4</td>
<td>10</td>
<td>15</td>
<td>9</td>
<td>14</td>
<td>52</td>
</tr>
<tr>
<td>Contractors</td>
<td>2</td>
<td>29</td>
<td>16</td>
<td>13</td>
<td>21</td>
<td>81</td>
</tr>
<tr>
<td>Engineers</td>
<td>-</td>
<td>5</td>
<td>20</td>
<td>5</td>
<td>22</td>
<td>52</td>
</tr>
<tr>
<td>Quantity Surveyors</td>
<td>-</td>
<td>5</td>
<td>23</td>
<td>9</td>
<td>15</td>
<td>52</td>
</tr>
<tr>
<td>Urban and Regional Planners</td>
<td>-</td>
<td>5</td>
<td>25</td>
<td>12</td>
<td>10</td>
<td>52</td>
</tr>
</tbody>
</table>

Total 7 2.05 67 19.65 118 34.6 55 16.13 94 27.57 341 100

Source: Field Survey, 2013

As shown in Table 4.2.1 the qualification of architects comprising of PhD 0.29% respondent, MSc 3.81%, BSc 5.57%, HND 2.05% and others 3.52% (PGD holders, ND and certificate holders). Builders comprising of PhD 1.17% respondents, MSc 2.93%, BSc 4.40%, HND 2.64% and others 4.11% (PGD, ND and certificate holders). For contractors, it shows PhD 0.59% respondents, MSc 8.50%, BSc 4.69%, HND 3.81% and others 6.16% (PGD holders, ND and certificate holders).
The analysis for engineers has shown that MSc constitutes 1.17% respondents, BSc 5.87%, HND 1.47% and others 6.45% (PGD holders, ND and certificate holders). For Quantity Surveyors it shows that MSc constitutes 1.17% respondents, BSc 6.74%, HND 2.64% and others 4.40% (PGD holders, ND and certificate holders). While Urban and Regional Planners shows MSc constitutes 1.47% respondents, BSc 7.33%, HND 3.52% and others 2.93% respondents. Based on the analysis, BSc holders constitute the majority in the building industry in Abuja, Nigeria. The issue of quacks in the building industry has greatly reduced. Studies by Jambol (2012) have agreed with the elimination of quacks in the building industry.

Figure 4.2.2 Sector of Respondents

Source: Field Survey, 2013
Figure 4.2.2 shows the sectors of the respondents. It shows 53% comes from the public sector while 47% were from the private sector.

Table 4.2.2 Professionals Years of Experience

<table>
<thead>
<tr>
<th>Qualification</th>
<th>5yrs %</th>
<th>5-10yrs %</th>
<th>11-15 yrs %</th>
<th>16 yrs above%</th>
<th>Total %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Architects</td>
<td>6</td>
<td>11.54</td>
<td>12</td>
<td>23.08</td>
<td>52</td>
</tr>
<tr>
<td>Builders</td>
<td>8</td>
<td>15.38</td>
<td>4</td>
<td>7.69</td>
<td>52</td>
</tr>
<tr>
<td>Contractors</td>
<td>9</td>
<td>11.11</td>
<td>11</td>
<td>13.58</td>
<td>81</td>
</tr>
<tr>
<td>Engineers</td>
<td>3</td>
<td>5.77</td>
<td>8</td>
<td>15.38</td>
<td>52</td>
</tr>
<tr>
<td>Quantity</td>
<td>4</td>
<td>7.69</td>
<td>4</td>
<td>7.69</td>
<td>52</td>
</tr>
<tr>
<td>Surveyors</td>
<td>7</td>
<td>13.46</td>
<td>4</td>
<td>7.69</td>
<td>52</td>
</tr>
<tr>
<td>Urban and Regional Planners</td>
<td>37</td>
<td>64.95</td>
<td>43</td>
<td>75.11</td>
<td>101</td>
</tr>
<tr>
<td>Total</td>
<td>37</td>
<td>64.95</td>
<td>43</td>
<td>75.11</td>
<td>101</td>
</tr>
</tbody>
</table>

Source: Field Survey, 2013

Table 4.2.2 shows the years’ experience of professionals in the building construction industry. Thus, 1.76% of architects had less than 5 years of experience while 3.52% had between 6 and 10 years’ experience in the field and others 4.11% and 5.87% had between 11-15 years, and above 16 years respectively. The years’ experience which builders are involved in construction shows that 2.35% respondent had less than 5 years of experience while 1.17% had between 5 and 10 years’ experience in the field and others 4.99% and 6.74% were between 11-15 years, and above 16 years respectively. For contractors, it shows 2.64% respondents had less than 5 years of experience while 3.23% had between 6 and 10 years’ experience in the field and others 7.62% and 10.26% constitute the largest numbers between 11-15 years, and above 16 years respectively.
The years' of experience of engineers in the building industry revealed that 0.88% respondents had less than 5 years of experience in the field while 2.35% had between 6 and 10 years of experience and others 4.69% and 7.33% had experience between 11-15 years and above 16 years respectively. This shows that most of the engineers are experienced. Quantity Surveyors involved in construction shows that 1.17% had less than 5 years of experience in the field while 1.17% had experience between 6 and 10 years and others 2.93% and 9.97% between 11 and 15 years and majority had above 16 years of experience respectively. However, Urban and Regional Planners are involved in construction shows that 2.05% had less than 5 years of experience in the field, while 1.17% between 6 and 10 years and others 5.28% and 6.74% had experience between 11-15 years and above 16 years respectively.

Figure 4.2.3: Percentage of Combined Respondent Years of Experience
Source: Field Survey, 2013
The analysis has shown that 46.91% of the professionals are more experienced in the building industry. This shows the experiences of the respondents should be able to transform the industry by providing quality service as well as timely project delivery.

Figure 4.2.4: Professional Affiliation
Source: Field Survey, 2013

Figure 4.2.4 shows professional affiliation. Thus, 13% are registered with the Nigerian Institute of Architects (NIA), 14% Nigerian Institute of Builders (NIOB), 12% Nigerian Society of Engineers (NSE), 14% Nigerian Institute of Quantity Surveyors (NIQS), 12% Nigerian Urban and Regional Planners (NIURP), and 7% acquired other forms of professional registration such as the Nigerian Association of Technology Engineers (NATE), and the Nigerian Society of Engineering Technicians (NISET) among others whereas, 28% were not
professionally registered. The implication is that most these who claim to be professionals are not duly registered and their output definitely affect project performance. These are the reasons why projects are not delivered on time, according to budget and quality standards.

The results in Figure 4.2.5 shows 29.33% of the respondents are at top management level, 40.76% middle management and 18.77% lower management levels, while 11.14%, are staff who does not occupy any management position. This shows that majority of the respondent are the middle class management who handles most of the projects. So by implication, this shows that they are not as experienced as their superior officer. Studies by Ofori (2014) argue that the middle class management are more experienced because it has become part of
their daily routine. This argument was supported by Idoro (2014). The management had passed through stages before getting to their present position so this had adversely improved their competencies on project delivery.

4.3 Results

4.3.1 One-Way ANOVA
In this section, one way ANOVA was used to evaluate the respondents’ perceptions of the factors that can enhance LCM adoption for project performance in the building industry.

Table 4.3.1: One-Way ANOVA Test Results

<table>
<thead>
<tr>
<th>Objective</th>
<th>F</th>
<th>P - Value</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5.657</td>
<td>0.05</td>
<td>4,336</td>
<td>0.000</td>
</tr>
<tr>
<td>2</td>
<td>91.574</td>
<td>0.05</td>
<td>4,336</td>
<td>0.000</td>
</tr>
<tr>
<td>3</td>
<td>72.315</td>
<td>0.05</td>
<td>4,336</td>
<td>0.000</td>
</tr>
<tr>
<td>4</td>
<td>81.820</td>
<td>0.05</td>
<td>4,336</td>
<td>0.000</td>
</tr>
<tr>
<td>5</td>
<td>122.346</td>
<td>0.05</td>
<td>4,336</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Source: Field Survey, 2013

Table 4.3.1, results indicate that there is a significant relationship between policy and procedural framework and project performance in the building industry (F = 5.657; P < 0.05; df = 4, 336). The study therefore established that project performance depends on compliance to policy and procedures. It is clear that non-adherence to policy and procedures do affect project delivery.

Results also indicate that there is a significant difference between adherence to initial phase principles and project performance in the building industry (F = 91.574; P < 0.05; df = 4, 336). The study therefore established that project
performance depends on how well the initial phase principles are observed. It is clear that adherence to initial phase principles does affect project delivery. Results of the ANOVA test in Table 4.3.1 (F= 72.315; P<0.05; df = 4, 336) which suggest that there is a significant difference between project performance and the planning phase principles. The study therefore established that project performance depends on proper planning. None adherence to planning phase principle leads to failure or abandonment of projects. Hence, projects are rarely completed within expected quality standards, cost, and time schedules. It means that project performance can be improved by good planning. This is confirmed by the fact that the relationship between planning phase principle and project performance was statistically significant.

This shows that the relationship between implementation phase principles and project performance was statistically significant, F = 81.820, P = 0.000, df = 4, 336 whereas, with alpha = 0.05, project performance can be influenced by proper implementation phase principles adoption since the probability value is less than the chosen alpha. It is therefore established that project performance depends on effective adoption of implementation phase principles. Projects are completed with high cost and time overruns due to lack of adoption of implementation phase principles and as a result, projects are rarely completed within cost and time schedules.
ANOVA results indicate that $F = 122.346; P=0.05; df = 4, 336$. Thus, there is significant difference between completion phase principles and project performance within the building industry.

The study therefore established that project performance depends on how effective the adoption of completion phase principles is. Completion phase principles can improve project performance in the building industry; but in Nigeria this is not what is happening. Projects are completed with high cost and time overruns due to lack of proper completion phase principles. As a result, projects are rarely completed within quality standards, cost, and time schedules.

### 4.3.2 Chi – Square Test

The result for the test of hypothesis using Chi-Square is shown below:

**Table 4.3.2: Chi – Square Test for Hypothesis**

<table>
<thead>
<tr>
<th>H0</th>
<th>$\alpha$</th>
<th>Sig.</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.05</td>
<td>0.000</td>
<td>Reject</td>
</tr>
<tr>
<td>2</td>
<td>0.05</td>
<td>0.019</td>
<td>Reject</td>
</tr>
<tr>
<td>3</td>
<td>0.05</td>
<td>0.000</td>
<td>Reject</td>
</tr>
<tr>
<td>4</td>
<td>0.05</td>
<td>0.195</td>
<td>Accept</td>
</tr>
<tr>
<td>5</td>
<td>0.05</td>
<td>0.000</td>
<td>Reject</td>
</tr>
</tbody>
</table>

Source: Field Survey, 2013

### 4.3.2.1 Test for Hypothesis on Policy and Procedural Framework

**H0$_1$:** There is no significant relationship between policy and procedural framework and project performance in the building industry in Abuja
Chi - square results shows that p-value 0.000 < 0.05 meaning that there is statistical significance at 95% level of confidence (Table 4.3.2).

Since the p-value 0.000 is less than the chosen alpha value the Null Hypothesis is rejected. This means that there is significant relationship between policy and procedural framework and project performance in the building industry. It shows that project performance can be improved by complying with policy and procedural framework.

4.3.2.2 Test for Hypothesis on Initial Phase Principles

$H_0$: There is no significant relationship between initial phase principle and project performance in the building industry in Abuja.

Chi - square results shows that p-value 0.000 < 0.05 meaning that there is statistical significance at 95% level of confidence (Table 4.3.2).

Since the p-value 0.000 is less than the chosen alpha value the Null Hypothesis is rejected. This means that there is significant relationship between initial phase principle and project performance in the building industry. It shows that project performance can be improved by adhering strictly to initial phase principles.

4.3.2.3 Test for Hypothesis on Planning Phase Principles

$H_0$: There is no significant relationship between Planning phase principle and project performance in the building industry in Abuja.
The results of Chi-square indicates that the p-value 0.000 < 0.05 at 95% level of confidence.

From the analysis, p-value was found to be less than the chosen alpha value 0.05 at 95% level of confidence suggesting the rejection of Null Hypothesis. This means that there is a significant relationship between project performance and the planning phase principle. So, planning phase principle can influence project performance in the building industry.

4.3.2.4 Test for Hypothesis on Implementation Phase Principles

H04: There is no significant relationship between implementation phase principle and on project performance in the building industry in Abuja.

The results of the analysis on Chi-square test show that p-value 0.195 > 0.05 at 95% level of confidence. Since the p-value is greater than the chosen alpha (0.195 > 0.05), it shows no significant relationship between project performance and the implementation phase principle. Therefore, accept Null Hypothesis; meaning that implementation phase principles have no influence on project performance since LCM principle is not adopted; obviously project delivery cannot be achieved. It means that project performance can be improved if implementation phase principle is adopted.
4.3.2.5 Test for Hypothesis on Completion Phase Principles

**H0**: There is no significant relationship between completion phase principles and project performance in the building industry in Abuja.

Chi-square results show that p-value 0.000 < 0.05 at 95% level of confidence. Since the p-value is less than the chosen alpha (0.000 < 0.05), Null Hypothesis was rejected. It means that there is a significant relationship between project performance and the completion phase principles. This shows that completion phase principles do improve project performance in the building industry.

4.4 Case Study Analysis

The case study analysis obtained from six project files show three projects from public (CS 2: Housing Estate, CS 5: Four Storey Office Block and CS 6: Secondary School Laboratory) and three projects from the private (CS 1: Classrooms Block, CS 3: Commercial Building and CS 4: Housing Estate).

**CS1: Classrooms Block**

The CS 1 is classrooms estimated at the cost of 0.91418 million USD with planned duration of 28 months. This was completed at 3.91618 million USD within 60 months. This shows high cost and time overrun. This study revealed that the variation was due to late project approval and increase in fuel prices which invariably affects the cost of materials. The project was done in 2006.
CS 2: Housing Estate

The CS 2 is a housing estate project constructed in 2004. The project was planned to cost 1,133.75 million USD but completed at 1,165.5 million USD with a variation of 31.75 million USD. However, the project was completed in 64 months as against 24 months. This shows a high cost and longer duration in completing the project. The project was completed in 2010. The delay was as a result of bureaucracy during approvals as well as design variations and misallocation of resources.

CS 3: Commercial Buildings

CS 3 is a commercial building estimated to cost 0.49265 million USD but completed at 0.49412 million USD with a variation of 0.00147 million USD; whereas, the project duration was initially planned to be completed in 26 months but eventually completed in 47 months. Analysis indicates a high cost and longer duration which was due to delay in approvals, late honoring of certificate of payment and non-release of mobilization fee on time. The delay has affected cost of material procurement. The project was completed in 2009.

CS 4: Housing Estate

CS 4 is a housing estate contracted by a private firm. It was budgeted for 0.44718 million USD but completed at 0.45371 million USD with a variation of 0.00653 million USD. The planned duration was 24 months but finished in 56 months.
This was also completed with high cost and time overruns. The delay was due to design inadequacies, poor feasibility study and inflation. The project was completed in 2010.

**CS 5: Four Storey Office Block**

This project was completed at 0.64308 million USD as against the initial plan of 0.60668 million USD with initial duration of 30 months which was eventually completed at 76 months. Analysis shows that there was delay in payment of mobilization fee as well as additional scope for the project. This project was completed in 2008.

**CS 6: Secondary School Laboratory**

The secondary school laboratory was completed in 2005 at the cost of 0.41136 million USD as against the initial cost of 0.35477 million USD. The initial duration was 28 months instead; it was completed in 64 months. The delay in time and cost overrun was due to government bureaucracy which resulted to high cost of materials.
Table 4.4.1: Case Study Analysis of some Completed Projects

<table>
<thead>
<tr>
<th>Project</th>
<th>Initial Period (Months)</th>
<th>Final Period (Months)</th>
<th>Period Variation (Months)</th>
<th>Initial Cost (million USD)</th>
<th>Final Cost (million USD)</th>
<th>Cost Variation (million USD)</th>
<th>Sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS1</td>
<td>28</td>
<td>60</td>
<td>32</td>
<td>0.91448</td>
<td>0.91618</td>
<td>0.0017</td>
<td>Private</td>
</tr>
<tr>
<td>CS2</td>
<td>24</td>
<td>64</td>
<td>40</td>
<td>1.13375</td>
<td>1.1655</td>
<td>0.03175</td>
<td>Public</td>
</tr>
<tr>
<td>CS3</td>
<td>26</td>
<td>47</td>
<td>21</td>
<td>0.49265</td>
<td>0.49412</td>
<td>0.00147</td>
<td>Private</td>
</tr>
<tr>
<td>CS4</td>
<td>24</td>
<td>56</td>
<td>32</td>
<td>0.44718</td>
<td>0.45371</td>
<td>0.00653</td>
<td>Private</td>
</tr>
<tr>
<td>CS5</td>
<td>30</td>
<td>76</td>
<td>46</td>
<td>0.60668</td>
<td>0.64308</td>
<td>0.0364</td>
<td>Public</td>
</tr>
<tr>
<td>CS6</td>
<td>28</td>
<td>64</td>
<td>36</td>
<td>0.35477</td>
<td>0.41136</td>
<td>0.05659</td>
<td>Public</td>
</tr>
</tbody>
</table>

Source: Field Survey, 2013

4.4.1 Policies and Procedural Framework

Policies and procedural frameworks are regulations guiding the building industry. These rules and regulations include environmental laws, health and safety, Environmental Impact Assessment, approval processes, building processes and other ethical practices.

The first objective of the study was to examine the policies/procedural framework within the building industry in Abuja, Nigeria. To achieve this objective, professionals (architects, builders, engineers, Quantity Surveyors, Urban and Regional Planners and Contractors) were asked to react to several statements intended to describe the policies/procedural framework within the building industry in Abuja, Nigeria.

Policy measures/procedural framework is ethical standards used in enhancing project performance within the building industry. These are laid down rules and
regulations guiding the various stakeholders on project delivery within the building industry in Abuja, Nigeria. Data on this objective was analyzed using documentary techniques from project files of both public and private firms.

Table 4.4.1 shows the effect and influence of project performance with regards to time, cost and quality standard. The analysis indicated that little delay has serious implications on time and cost overruns. The analysis indicates that most projects were completed at a sum and period higher than planned. For instance, public projects CS2, CS5 and CS6 (Table 4.4.1) were completed at $1.1655 million, $0.64308 million and $0.41136 million as against the initial cost $1.13375 million, $0.60668 million and $0.35477 million respectively. The three projects (CS2, CS5 and CS6) were completed 40, 46 and 36 months higher than scheduled. One could wonder why these variations exist and may ask how well the policies are implemented and strictly followed.

According to Gupta (2010), policy is a basic precept, which guides project team actions and defines the authority and the respective relationships required to accomplish the objectives of the BI. Procedural framework is a series of logical steps by which all respective building processes are initiated, performed, controlled and finalized and it establishes the required action, who acts, and when the action is to take place (Gupta, 2010). This scenario was completely absent in
the BI in Abuja. The issues of quality, cost, and time overruns are evidenced by the incessant collapses and failures of buildings (Jambol, 2012).

i. Environmental Impact Assessment
The study revealed that projects CS1, CS2 and CS4 carried out Environmental Impact Assessment (EIA), while in projects CS3, CS5 and CS6 EIA were not conducted. According to National Building Code (NBC), EIA is mandatory at the beginning of any project in the building industry (FRN, 2006). From the findings, projects that did not conduct EIA were found to engage in unethical practices at expense of the project policy procedures to make money. The unethical practices constitutes compromising standards to make more gains as a result of bribery and corruption. This is a form of corruption in the BI. EIA help in the cost analysis of a project, but in practice it is hap hardly done and this affect project delivery.

ii. Approvals
According to the National Building Code, projects approvals should not take more than three months (FRN, 2006). In spite of this, projects CS1, CS2, CS3, CS4, CS5 and CS6 were approved after 10, 12, 14, 8, 15 and 18 months respectively. The delays were caused by lack of design compliance and other statutory requirements like recommendations from ward and village heads. These delays cause time and cost overruns. The prices of materials have also increased due to the petroleum crisis in the last ten decade and the cost of labour is also high. Delays also increase the rate of corruption, especially with public projects.
It is a policy that once a project is approved, contractors should mobilize to site within three months (FRN, 2006). However, only project CS1 met this standard; whereas, projects CS2 took seven, CS3 six months, CS4 four months, CS5 eight months, and CS6 nine months respectively. The implication is that projects have longer duration and this affect the cost of project.

iii. Project Commissioning and Decommissioning

In the same vein, projects CS2, CS3 and CS5 were commissioned, while, projects CS1, CS4 and CS6 were not. The statutory requirement demands that all projects must be commissioned at the takeoff (FRN, 2006). It was discovered that projects CS1 applied direct labour and CS4 and CS6 contracts were not awarded based on merit. This scenario creates unethical professional practice, which affects time, cost and quality standards of the project.

Besides, projects are supposed to be decommissioned after completion; but from the findings, no singled project was decommissioned. Since the projects were not commissioned in the first place, they could not be decommissioned. This affect the supervision of the projects and the contractors abuse the opportunity by compromising standard. Thus, the non-compliance results in delay, high cost and time overruns. It is therefore, a clear indication under such conditions that projects cannot be delivered. The BI is engulfing with corruption (Idoro, 2014), bureaucracy, and unethical professional practice (Usman et al, 2012), non-
adherence to regulations and policies, and ineffective monitoring and supervision (Gollenbeck, 2008; Aniekwu and Audu, 2010).

From the above discussion, it implies that the more the delay, the higher the duration of the project, and the higher the cost, which is an impediment to project performance. However, the analysis shows that private projects are better managed than public projects. This is because the private firms fear been barn from practice and tries to maintain standard. Ofori (1994b) opined that the BI could not perform due to wrong policy adoption, inappropriate policies and non-compliance to correct policy/procedural frameworks. He suggests that a long-term strategy for the BI should be developed, continuously synchronized, coordinated and monitored. This will ensure project delivery.

The study therefore established that project performance depends on how well the policy measures and procedural framework are adhered to. Though policy measures and procedural frameworks exist within the building industry, they are minimally complied with. This could be accounted for incessant collapse of buildings, project abandonment and lack of timely delivery (Idoro, 2014; Ofori, 2014). Perhaps that is why projects are rarely completed within quality standards, cost and on time.
4.4.2 Initial Phase Principles

The initial phase principle is the primary activity of a project. These activities include: project identification, project goals and objectives, determination of preliminary materials, equipment and personnel; others are development of budget and schedule, identification of project team and conducting Environmental Impact Assessment.

The study investigated how the initial phase principle affects project performance within the building industry in Abuja, Nigeria. The initial phase is the beginning of the project execution. Once the initial phase is carried out correctly, it enhances project performance.

i. Scope

The scope is a project's span of work. Time, cost and quality are the characteristics of work. These are used to control variations within a specific limit. Since work has to be controlled and directed towards completion, no lapse at this end is acceptable (Gupta, 2010). However, the scope of projects CS3, CS4 and CS5 were found to have increased due to project variations and design alterations. Invariably this affected time, cost and quality of the building projects.

ii. Project Brief

The project brief is a mechanism of the project initiation phase in the form of either a standard document, or a specific document. It contains a set of
instructions, information and a letter authorizing the use of internal and external resources to a certain limit. From the case study analysis, only project CS2 meets the requirements. This shows the non-compliance of the BI, which inevitably leads to its underperformance.

iii. Goal and Objectives
The BI is expected to set a goal and objectives for every project so as to guide the industry towards achieving results. Though projects CS1 to CS6 have goals and objectives, the level of performance was below expectations, and the outcome was not effective. This is why all the projects were not delivered according to time, cost and quality standards; and this could be accountable by cheap labour whereby the contractors were trying to make more gains (Ike, 2012; Ekundayo et al, 2013). This cause delay in the feasibility and vitality of the projects. According to Daft (2010) and Gupta (2010), these objectives should be identified where performance and results are expected because it directly affects the survival of the building processes.

iv. Environmental Impact Assessment (EIA)
The EIA is the conduct of feasibly and viability of a project to be carried in the BI. EIA is mandatory for every building project within the BI. For instance, projects CS1, CS2 and CS4 carried out Environmental Impact Assessment, while projects CS3, CS5 and CS6 were not conducted. According to National Building
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Code (NBC), EIA is mandatory for any project in the building industry (FRN, 2006).

4.4.3 Planning Phase Principles

The planning phase principle is the second stage of the activities of a project. It is used in improving project delivery. This planning phase principles are: identifying project activities, establishing project objectives, design and specifications; choosing a strategy, breaking project activities into sub-units; determining the performance standards, determine proper sequence, design cost estimate, determine time and personnel, as well obtaining approvals.

The study was to examine the influence of planning phase principles on project performance within the building industry if properly delivered. To achieve this, professionals (architects, builders, engineers, Quantity Surveyors, Urban and Regional Planners and Contractors) were asked questions on how planning phase principles influence project performance within the building industry in Abuja, Nigeria.

i. Design and Drawings

For instance, National Building Code specifies that drawings and specifications, which are prepared by architects in the Urban Development Planning Unit, be approved within three months once the required standards are met. Consider the following projects CS2 (Housing Estate), CS3 (Commercial), CS5 (Four Storey
office Block) and CS6 (Secondary School Laboratory blocks) respectively. For example, project CS2 took nine months to be approved, project CS3 five months, project CS5 six months and project CS6 seven months as against three months respectively.

ii. Budget and Schedule
Table 4.4.1 shows the influence of planning on project performance of time, cost and quality standard. The analysis indicated that little delay has serious implications on time and cost overruns. The results revealed that most projects were completed at a sum of money, and period higher than planned. For instance, public projects CS2, CS5 and CS6 (Table 4.4.1) were completed at $1.1655 million, $0.64308 million and $0.41136 million as against the initial budget of $1.13375 million, $0.60668 million and $0.35477 million respectively. These projects were completed at a period of 40, 46 and 36 months higher than scheduled.

iii. Planning
A project involves a large number of activities. Constraints and resources cannot be visualized easily hence, the projects demands for formal planning and scheduling (Gupta, 2010). Gupta added that for planning, the question is what is to be done? And who is to do it? However, for scheduling, when is to be done? And how is to be done? These are planning principles that were lacking in the BI as per the results of case study projects. For instance, project activities were not
listed at the planning phase, there was no clear sequence of activities to be taken up, as well as date and time for the finish of each activity were not clear. The study revealed that the planning phase principles were not followed.

iv. **Determination and Appointment of Personnel**
This is a process of identifying prospective personnel, stimulating and encouraging human resources in a building firm. In determining the personnel selection, the objectives provide a framework of implementation of programme in the form of procedures (Gupta, 2010). This functional related issue was only practiced with projects CS2 and CS4.

The BI in Abuja is blamed for its inefficiency in recruiting the right personnel to execute projects (Usman et al, 2012). Gupta identified remuneration and expenses of trainees and trainers; preparing and maintaining training programs, materials, equipment and premises; and lower efficiency of trainees until fully trained. Lack of proper appointment of personnel, however, affect cost and time overruns of projects.

v. **Health and Safety**
Health and safety is an important aspect of any building project. The concept of health and safety is necessary because of its importance in saving lives and property. This study revealed that in projects CS1 to CS6, none prepare health and safety documents. Yet according to the National Building Code 2006, health and safety provisions are mandatory for every building project. Studies have
shown that the ratio of health and safety in UK have estimated to be 15:1 by local authority, while in New Zealand it was estimated to be 20:1 and in Denmark the ratio is an average of 25:1 (Osita, 2013).

Considering the cost of the loss of lives and properties during and after construction of buildings; it is necessary that health and safety provision be made at all the stages of building construction. Bubshait and Almohawis (1994) in Alzahrani and Emsley (2013) define health and safety as the degree to which the general conditions promote the completion of a project without major accidents or injuries. The issue of safety is mostly associated with building processes as most accidents occur during this stage. In the same way, Attala et al (2003) identified quality and safety as crucial aspects of successful project delivery. Similar studies show that the BI has long been known to lag behind industries in terms of health and safety (Alzahrain & Emsley, 2012; Choudhry et al, 2008).

4.4.4 Implementation Phase Principle
The implementation principle is the third segment of the LCM. The implementation phase principles include: mobilization, commissioning of the project, procurement, determination of cash flow, consultants and government agencies, as well as the construction processes which affect cost, time and quality standards. Implementation is the execution of the planned procedures in the building construction process used in enhancing project performance within the
building industry. These are stages that when carefully followed result to project delivery within the building industry in Abuja, Nigeria.

i. Mobilization to Site

Implementation phase is crucial in project delivery. Mobilization to site is a part in the implementation process. The NBC stipulates that within three months of approval, contractors should mobilize to site. However, in the case study, only project CS1 was mobilized to site within three months after approval. Whereas, projects CS2, CS3, CS4, CS5, and CS6 were mobilized after 7, 6, 4, 8 and 9 months respectively (Table 4.4.1). This delay impacted on time by extending the duration of the project schedule. The costs of these projects were found to be higher than planned. The factors that were associated with the poor implementation process include lack of release of mobilization fee on time, lack of cash flow, inadequate manpower, inadequate materials, and non-adherence to construction plan, non-compliance to budgetary provisions, inadequate allocation of resources to project activities, poor monitoring and supervision among other things.

ii. Project Commissioning

Project commissioning is another issue in the implementation phase principles. For instance, projects CS1, CS3 and CS5 were commissioned while; projects CS2, CS4 and CS6 were not. Yet the NBC states clearly that all projects must be commissioned before takeoff (Federal Republic of Nigeria, 2006). It was also
discovered that projects CS2, CS4 and CS6 were not commissioned because of lack of approval due to major contract variations and non-compliance to building regulations.

iii. Allocation of Resources

In order to carry out building processes, it is necessary to determine the activities required and allocate the resources logically into specific project activities. Allocation of resources involves scheduling, budgeting, assigning tasks to subordinates and giving authorization. From the findings, projects CS1 and CS2 were found to have more gravel than cement and sand, while CS3 and CS5 had wet concrete left over during the concreting processes. However, CS4 and CS5 had redundant laborers at the concreting process due to the delay in formwork preparation. This misallocation of resources has led to delays, which in turn affect cost, time and quality of the project. Therefore, the right resources should be allocated to the right activity at the right time in building processes for project delivery.

iv. Coordination

Project coordination is required to achieve project delivery. This can be achieved through effective communication; regular site meetings and clear span of control in the building processes. For instance, the issues of wastages of gravels by CS1 and CS2; wet concrete by CS3 and CS5; and redundant personnel as revealed by CS4 and CS5 were purely as result of poor coordination.
v. Organizing

Organization involves those activities of the building processes performed according to task, authority and responsibility. This is a framework that includes personnel, task, material resources and performance according to the BI project goals. Gupta (2010), asserts that organizing include defining the nature and content of each job in the building industry; setting the base for grouping the project activities together; deciding the size of the project team and delegating authority to assigned supervisors. This is lacking in the Nigerian BI. Studies by Ekundayo et al (2013) revealed that the BI in Nigeria face challenges of project organization and supervision at the implementation phase.

4.4.5 Completion Phase Principles

Completion phase principles comprise the last stage of the LCM process. It is the closure of project activities. These activities include: decommissioning of the project, preparation of the Audit and Final reports, handover of the facility, reassignment of the project team, and final project closure. The study sought to ascertain whether completion phase principles improve project performance within the building industry. To achieve this objective, professionals (architects, builders, engineers, Quantity Surveyors, Urban and Regional Planners and Contractors) were asked to respond to questionnaires that describe the completion phase principles within the building industry.
i. Project auditing

Project auditing is a combination of building analysis and systems survey to determine the effectiveness of project operating functions. Proper auditing was not carried out due to bureaucracy and politics in government. There is political interest so due process was not observed. The factors that could account for the poor completion process include lack of proper monitoring and control, lack of cash flow, inadequate manpower, inadequate materials, and non-adherence to construction plan, non-compliance to budgetary provisions, and poor allocation of resources to project activities, poor implementation and lack of skilled labour among others. Another challenge is project decommissioning. For instance in Table 4.4.1, projects CS1, CS3 and CS5 were commissioned while; projects CS2, CS4 and CS6 were not. Yet the NBC states clearly that all projects must be commissioned before takeoff (Federal Republic of Nigeria, 2006).

It was also discovered that projects CS2, CS4 and CS6 were not commissioned because of lack of approval due to major contract variations. So these projects cannot be decommissioned because they was not commissioned in the first place and lacked statutory requirements. This is an example of the corruption and unethical practices in the building industry.
ii. **Project Handover**

Project handover marks the end of a project. At the completion phase, machines and equipment are handed over to the operation management by the project management department. However, the operation personnel begin working with the project management personnel as soon as plants get closer to the operational stage. This was not the case with projects CS1, CS3, CS4, CS5 and CS6; the plant was not handed over completely in one installment. By implication, this has affected time, increased cost and quality standards.

The study therefore established that project performance depends on how effective the adoption of completion phase principle is. Completion phase principles do improve project performance within the building industry; but in Nigeria most projects are not completed on time, according to budget (Jambol, 2012). Projects are completed with high cost and time overrun due to lack of proper completion phase principles; as a result, project are rarely completed within quality standards, cost and time schedules.

4.5 **Discussion of Results**

4.5.1 **Impact of Policy and Procedural Framework on Project Delivery**

Data analysis and interpretation revealed the following major findings regarding the policy and procedural framework in the building industry in Abuja. Though there are policy measures and procedural frameworks within the building
industry, there is minimum compliance. Procedural approvals of building plans, mobilization fee, mobilization to site, safety and health provisions, standardization and other ethical provisions as stipulated in the National Building Code (NBC) (FRN, 2006) were rarely observed. This is because 60% were not constructed based on the National Building Code (Jambol, 2012).

Jambol (2012) advised that the NBC clearly spelt out contract documentation for building production as provided at section 2.3 to 13.5 (actual production, control of building works, workmanship and supervision). While sections 6, 13.6 to 13.19 of NBC set up requirement for quality and tests of materials, building construction, post construction and components requirements as well as architectural, civil and engineering design requirements.

NBC also provides requirements for building condition survey report, and environmental and general building requirements. In addition, it provides for working drawings; general building limitations. Others include health and safety and quality management plans (FRN, 2006). Jambol (2012) added that the building industry is guided by law throughout its operations from project start to finish.

The findings indicate that there are policies/procedural frameworks but there is poor or no implementation. This was due to non-compliance and bureaucratic
hurdles, poor communication, lack of proper monitoring and supervision, the use of quacks in construction. These are serious challenges that lead to project failures, collapsed buildings and abandonment.

![Project Cost Graph](Figure 4.4.1: Project Cost
Source: Field Study, 2013)

The analysis (Figure 4.4.1 and Figure 4.4.2) has indicated that delay has serious implications on time and cost overruns. The analysis indicates that most projects were completed at an amount of money and period higher than planned. For instance, public projects CS2, CS5 and CS6 (Table 4.4.1; Figure 4.4.1 and Figure 4.4.2) were completed at $1,165.5 million, $0.64308 million and $0.41136 million as against $1,133.75 million, $0.60668 million and $0.35477 million respectively.
These projects were completed within a period of 40, 46 and 36 months higher than scheduled. Another is conducting statutory assessments such as Environmental Impact and Assessment. It was established that projects CS1, CS2 and CS4 carried out Environmental Impact Assessment, while projects CS3, CS5 and CS6 did not. According to National Building Code (NBC), EIA is mandatory for any project in the building industry (FRN, 2006). Equally projects approvals should not be more than three months as per the regulatory requirements (FRN, 2006). In spite of this, projects CS1, CS2, CS3, CS4, and CS6 were approved.
after 10, 12, 14, 8, 15 and 18 months respectively (Table 4.4.1; Figure 4.4.3 and Figure 4.4.4 respectively).

This delay caused time and cost overruns. The price of materials increases due to inflation especially during the petroleum crisis. The cost of labour also increased.

It is a policy that once project is approved, contractors should mobilize to site within three months (FRN, 2006). However, only project CS1 (Table 4.4.1) met this standard; whereas, projects CS2 took seven months, CS3 six months, CS4
four months, CS5 eight months and CS6 nine months respectively. In the same vein, projects CS2, CS3 and CS5 were commissioned, while, projects CS1, CS4 and CS5 were not commissioned. The statutory requirement demands that all projects must be commissioned at takeoff (FRN, 2006).

Figure 4.4.4: Project Duration and Variation
Source: Field Survey, 2013

These findings (Figure 4.4.4) indicate that policy/procedural frameworks are significant factors in enhancing project performance within the building industry in Abuja. These policies/procedural frameworks must be implemented as planned in order to deliver projects successfully. These findings are similar with other research findings that in Nigeria building regulations are not adhered to; and
policies are poorly implemented especially in the building industry (Jambol, 2012; Ike, 2012, Idoro, 2014; Ofori, 2014; Usman et al, 2010)

4.5.2 The Impact of Initial Phase Principles on Project Delivery
The initial phase principle affects project performance diverse ways. For instance, if a survey is not carried out correctly, it may affect other initial processes; and the possibilities of the building collapsing or facing other structural challenges becomes high. Equally, the initial phase principle may not be observed due to ignorance and lack of compliance. The initial phase principles include project and goal identification, determination of preliminary materials, equipment, personnel, budget, schedule; project team and Environmental Impact Assessment as these are all intervening variables to project performance. Responses from the various categories of professionals revealed that initial phase principles affects project performance within the building industry.

The findings indicate that the initial phase principles success is a significant factor of project performance. It must therefore be taken into account while improving project performance and service delivery to clients. The findings are in agreement with (Usman et al, 2014b); Idoro (2012), Nwanchukwu (2008), Nwanchukwu & Fedelis (2010); Usman, Inuwa & Iro (2012) studies hold the same view.
Project performance, as described by Gupta (2010), as the success of a project that must be completed within budget, specified time, and performed to satisfaction. According to Doloi (2009), in Alzahrani & Emsley (2012) project performance is a fundamental issue to governments, users and communities. They added that project delivery involves a multitude of stakeholders. Human, capital and material resources are key elements in the development of any project within the building industry. Stoner & Freeman (1989) in Usman (2006) recognized the role and importance of people in good management. Daft (2010), asserted that management is getting things done through people. However, the job of managers is to give direction to their organizations, provide leadership; and decide how to use organization resources to accomplish goals (Daft, 2010).

4.5.3 The Impact of Planning Phase Principles on Project Delivery
Planning phase principles are central to the overall project performance; any failure in its adoption adversely affects project performance for example, the project might face litigation charges from Environmentalists or it might turn out to be a health hazard. The planning phase principles include, project goal, project activities, design/specification, choosing a strategy, breaking projects to sub-units, determining performance standards, determining proper sequence, designing the project and estimating costs, determining personnel, determining time/schedules, mobilizing funds, and obtaining approvals.
This study indicates that planning phase principles are not fully adopted within the building industry in Abuja. This could be due to poor design, discrepancies in contract documents, project variation, and shortage of materials, inadequate work plans, and poor service delivery. It was established that the National Building Code specifies that drawings and specifications, which are prepared by architects in the Urban Development Planning Unit, are supposed to be approved within three months once the required standards are met (FRN, 2006). However, project CS2 took nine months to be approved; project CS3 five months, project CS5 six months and project CS6 seven months instead of a planned three months (see Table 4.4.1; fig. 4.4.1 and figure 4.4.2). It was discovered that these projects were delayed due to bureaucracies in the approval processes. However, project CS2, CS3, CS5 and CS6 were delayed due to survey and soil analysis. In addition, consultancy fees were not paid on time, which led to a delay in the site and material surveys. The findings indicate that planning phase principles form a significant aspect of project performance. It must therefore be taken into account to improve project performance and service delivery. In the same way, Idoro (2010); Nwanchukwu (2008); Nwanchukwu & Fedelis (2011); Usman, Inuwa & Iro (2012) in their studies found similar challenges.

Past studies show that the application of modern techniques, project management techniques, planning, scheduling and controlling, are bedrock to successful project delivery (Aniekwu & Audu, 2010; Kedzner, 2000; Gollenbeck, 2008).
Krishnamurthy and Ravindra (2010) added that adequate planning must precede the execution of all other managerial functions. Planning facilitates project performance; and when the project is highly complex, it must be well planned (Bailey et al., 2008; Bamisile, 2008).

In Nigeria, poor project delivery was traced to the inability to plan projects adequately (Achuenu et al., 2000; Usman et al., 2012). Saleh (2004) revealed that this prevents the building industry from satisfying the clients need. Thus, Oladimeji & Ojo (2012), assert that it is mandatory to improve efficiency of the Building Industry (BI) as it contributes to the national economy.

The BI is an important sector of the economy and in development (Hillebrandt, 2000; Ofori, 2007) and it is an engine for growth (Ofori & Han, 2003). Ofori (2014), conducted a study on the BI, and established a relationship between construction and the economy. The relationship includes: contribution of value added in construction to GDP; rate of change of this contribution as the economy develops; proportion of capital formation in the industry to the total economy; and contribution to employment. Thus, improving the performance of the BI in developing countries can be achieved through effective and systematic planning (Ofori, 2014).
Planning involves a series of interrelated activities and sequential processes; and its efficiency and effectiveness have a direct impact on the project success or failure (Dada, 2012; Idoro, 2012a; Idoro, 2012b; Ikedishi et al, 2012; Mathonsi & Thwala, 2012; Love, 2002; Ibrahim, 2008). Hendrickson (1998) argued that planning is analogous to the development of good facility design in the BI. Planning is more difficult since the building process is dynamic. However, cash flow is a necessary tool in planning processes (Kerzner, 2000; Bustani, 2002). A project is said to have performed when time, cost and quality standard requirement are met. However, the six projects (Table 4.4.1) that were examined were completed behind schedule and at a higher cost than planned. This could be accounted for by delays as result of non-release of funds to project activities as and when due, high level of corruption, bureaucracy, inflation and unethical professional practices (Usman et al, 2012; Usman, Inuwa & Iro, 2012, Idoro, 2014). According to Gupta (2010), planning is deciding where the organization/or project should be going and how it should get there. He added that this requires the appraisal of external and internal changes and constraints, forecasting, setting objectives, developing strategies and policies, and preparing action plans.

Planning is an organized method to develop on a continuing basis, a specific course of action to improve project delivery (Eigege, 2005). Basically, planning has four goals in the delivery of any building project (Krishnamurthy & Ravindra, 2010). To offset uncertainty and change; to focus attention on the objectives; to
make economic operations possible and to assist project managers in controlling projects. Harris and McCaffer (2005) opined that in developed countries, contractors embraced planning because the results impact directly on project delivery. However, the Nigerian BI is considered unproductive due to management incapacity and inadequate planning (Aniekwu & Audu, 2010; Saleh, 2004; Achenu et al, 2000). This creates problems that affect project delivery in the BI, and prevent it from meeting clients’ need. In spite of this, Oladimeji and Ojo (2012) opined that planning is essential due to its contribution to the national economy and because it improves project delivery.

Consequently, project planning is an endeavour in which human, material and financial resources are organised in a better way, to undertake work of a given specification, within constraints of time, cost and quality, so as to achieve a predetermined goal, in a given environment. Daft (2010) recognised planning as a management principle, and underscores its importance in effective project delivery.

For instance, projects CS1, CS2 and CS4 carried out Environmental Impact Assessment, while projects CS3, CS5 and CS6 did not. According to National Building Code (NBC), EIA is mandatory for any project in the building industry (FRN, 2006). Equally projects approvals should not take more than three months as per regulatory requirements (FRN, 2006). In spite of this, projects CS1, CS2,
CS3, CS4, and CS6 were approved after 10, 12, 14, 8, 15 and 18 months respectively, a delay which caused time and cost overruns. The prices of materials have gone high due to inflation especially during the petroleum crisis. The cost of skilled labour is also high. Project delays increase the rate of corruption especially with public projects.

It is a policy that once project is approved, contractors should mobilize to site within three months (FRN, 2006). However, only project CS1 met this standard; whereas, projects CS2 took seven months, CS3 six months, CS4 four months, CS5 eight months and CS6 nine months. In the same way, projects CS2, CS3 and CS5 were commissioned, while, projects CS1, CS4 and CS6 were not. The statutory requirement demands that all projects must be commissioned at takeoff (FRN, 2006).

This scenario creates unethical professional practice, which affect time, cost and quality of projects. Besides, projects are supposed to be decommissioned after completion, but from the findings, no project was decommissioned. Thus, the non-compliance results in delay, high cost and time overruns. It is therefore, a clear indication that projects cannot be delivered under such conditions. The BI is engulfed in bureaucracy, and unethical professional practice, non-adherence to regulations, politics, and poor planning, and ineffective monitoring and supervision. Other research hold the same opinion that in Nigeria building
regulations are not adhered to; planning and policies are poorly implemented especially in the building industry (Jambol, 2012; Ike, 2012, Idoro, 2014; Ofori, 2014; Usman et al, 2010)

From the above discussion, it implies that the more the delay, the higher the duration and the higher the cost, which is impedes project performance. This could be as a result of non-compliance to the policies and ethical standards, or inadequate planning. Ofori (2014) opined that the BI could not perform due to poor project planning, inappropriate policies and non-adherence to planning phase principles. Besides, he suggests a long-term strategy for the BI to be developed, synchronized, coordinated and monitored on a continual basis to ensure project delivery.

4.5.4 The Impact of Implementation Phase Principles on Project Delivery
Implementation phase principles influences project performance within the BI in Abuja. Data analysis revealed the following major findings. It revealed that the project implementation phase principles are essential to the overall project performance; any failure in their adoption unfavorably affects project performance. It was observed that these principles are not carried out correctly. Other project processes are negatively affected; and the possibilities of the building facing other performance and structural challenges become high.
The NBC stipulates that within three months of approval, contractors should mobilize to site. For the case study, only project A was mobilized to site within 3 months after approval. Whereas, projects CS2, CS3, CS4, CS5, and CS6 were mobilized at 7, 6, 4, 8 and 9 months respectively (Table 4.4.1). This delay impacted on time by extending the duration of the project schedule. The costs of these projects were found to be higher than planned. Another challenge is project commissioning. For instance, projects CS1, CS3 and CS5 were commissioned while; projects CS2, CS4 and CS6 were not commissioned. Yet the NBC states clearly that all projects must be commissioned before takeoff (FRN, 2006). It was also discovered that projects CS2, CS4 and CS6 were not commissioned because of lack of approval due to major contract variations. These findings indicate that implementation phase principle is not adopted within the building industry. This could be due to improper implementation and poor services.

In a study, Shen et al (2010) developed a strategy to diagnose the implementation process for project improvement in Chile. The strategy was applied to selected projects; they discovered that implementation problems were due to delays and lack of resources (money, personnel, materials and skilled labor) to monitor and control the process. In Finland, Oyegoke (2006) identified three project management areas of scope, time and cost as basis for studying clients' anticipations in project delivery. From his findings, he discovered the
shortcoming of the routes in managing these key variables and recommended that proper monitoring and control would enhance implementation phase processes.

Similarly, in Australia, Love and Li (2000) indicated that a single set of criteria is adequate for the series of activities in the implementation of project. Owing to the fact that every project has different implementation criteria, therefore each project is unique in enhancing project performance. Lin et al (2007) added that direct and indirect consequences of rework do not change compared to type in Australia. He discovered building project to be 52% higher than planned cost and with a variance of 26% in project delivery. To enhance project performance, he recommends understanding the proper building processes, effectiveness and efficiency in project delivery within time, cost and quality standards.

In Malaysia, Rashid et al (2006) shows that implementation processes differ from each other in terms of allocation of resources, assigning responsibilities, release of cash flow, adherence to construction plans, proper monitoring and supervision; and this invariably affected project performance of time, cost and quality standards. However, it is desired that all resources are controlled and monitored to enhance project delivery in the building industry. Project performance, as described by Gupta (2010), is the ability to complete a project within the budget, specified time and satisfy the client. According to Doloi (2009) in Alzahrani &
Emsley (2012), project performance is a fundamental issue to governments, users and communities. They add that project delivery involves many stakeholders.

4.5.5 The Impact of the Completion Phase Principles in Project Delivery

Completion phase is essential to the overall project performance; its non-adoption unfavorably affects project performance. Completion phase principles include decommissioning of the project, preparation of the Audit and Final report, the handover of the facility to the client, reassignment of the project team, and project closure. For instance, if project decommissioning, the Audit and Final reports, the hand over, and reassigning the project team are not carried out correctly, this may affect other project completion processes, and the probability of project delay becomes high. Although the completion phase is vital in project processes, it was observed that this important step is not taken due to bureaucracy, poor project implementation; lack of competent personnel; poor supervision, monitoring and control; unethical professional practices; corruption; and lack of budget implementation, all of which seriously affect project performance.

The NBC stipulates that within three months of completion, projects should be decommissioned. However, for the case study (Table 4.4.1); only projects CS1, CS3 and CS5E were decommissioned. Projects CS1, CS2 and CS6 were audited; whereas, projects CS3, CS4 and CS5 were not audited. This delay impacted on time by extending the duration of the project schedule. The costs of these projects
were found to be higher than planned. Worst of all, quality is compromised because contractors try to make more gain contrary to the contract terms. This has an adverse effect on project performance. For instance, projects CS1, CS3 and CS5 were decommissioned while projects CS2, CS4 and CS6 were not. Yet the NBC states clearly that all projects must be commissioned before takeoff (FRN, 2006). It was also discovered that projects CS2, CS4 and CS6 were not decommissioned because of lack of compliance to laws and regulations and lack of approval due to major contract variations.

In a study, Ofori (2014) found that Tanzania and Singapore experienced tremendous changes in the BI in terms of performance. In Ghana, BI was threatened by socio-cultural and historical factors, non-availability of skills, high cost and poor quality of materials. Ofori (2007) notes that the absence of accurate and detailed information especially during the completion phase of a project in developing countries constitutes an obstacle to improving project performance. Ofori (2014) argues that the experience in Singapore is a lesson to be learned in terms of project performance. Ofori (2007) pointed out the need to improve project performance in order to alleviate poverty, illiteracy, high infant mortality and other socio-economic development challenges.

This study found that little delays have serious implications on time and cost overruns, which eventually affects quality standards. For instance, public projects
CS2, CS5 and CS6 (Table 4.4.1) were completed at $1,165.5 million, $0.64308 million and $0.41136 million as against the initial cost of $1,133.75 million, $0.60668 million and $0.35477 million respectively. These projects were completed at a period of 40, 46 and 36 months higher than scheduled. The findings indicate that the adoption of completion phase principles is important for project performance. From the analysis, completion phase principles must therefore be taken into account for improvement of project performance and service delivery to clients.
CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Introduction
This study investigated the impact of the management systems used for project performance within the building industry in Abuja, Nigeria. It examined how management systems influence the performance of projects within the building industry. Specifically, the study assessed how adoption or non-adoption of Life Cycle Management (LCM) principles can influence project performance within the building industry.

5.2 Summary of Findings
The study establishes that policies and procedural frameworks are useful as a guide to achieving effective project delivery. However, project developers do not adhere to these guidelines as stated in the National Building Code. To achieve better project performance, policies and procedural frameworks must be strictly followed.

The study therefore established that project performance depends on how well the initial phase principles are adopted. It revealed that the initial phase is central to overall successful project performance and it is not done correctly it will have adverse effect on the other process which may lead to failure.
The adoption of LCM planning phase principles is central to overall project performance, so by not applying they may negatively affect project performance. For instance, if health and safety factor is not adequately addressed, the project might face litigation charges from environmentalists and public health officials.

Although the implementation phase is vital in project processes, it was observed that this important step is not properly adopted due to bureaucracies, poor allocation of resources, lack of competent personnel, poor supervision, monitoring and control and unethical professional practices. This could be as a result of improper initiation, planning, implementation and poor service delivery. Therefore, projects are completed with high cost and time overruns due to lack of proper implementation.

5.3 Conclusions and Recommendations
5.3.1 Conclusions
Despite LCM's successful use in the building industry worldwide, its use in Nigeria is yet to be adequately exploited. The study concludes that right from the initiation to completion phases, some part of project processes have been faulty and so projects cannot be delivered on time, within budget and quality standards. Several questions emerge: are LCM principles being applied only by a section of the industry in Nigeria or by the entire building industry? Is LCM seen by industry players as an effective tool that will ensure quality and durability in the building industry? The study has shown that there is little compliance to the
building processes and this is not only experience in Nigeria, but cuts across the globe. So these posed a serious challenge in the delivery of projects on quality, cost and time overruns; however, these challenges can be mitigated by applying LCM within the building industry.

In conclusion, right from the initiation to completion phases, project processes have been faulty which led to building collapses abandonments and delays in project delivery. All the projects studied, were completed at a higher cost and time overrun. LCM principles have not been fully applied in project delivery in Abuja, Nigeria. The BI is unable to deliver projects effectively and efficiently due to poor project management, inadequate planning, costly project execution which leads to abandoned or non-functional facilities and collapsed buildings.

5.3.2 Recommendations
The study has established that the building industry in Abuja, Nigeria is could not deliver projects efficiently and effectively. The Study found that issue of poor quality and the high cost of buildings as well as longer duration before project completion which prevents the BI from successful project delivery.

Based on the findings of this study, the following recommendations are made to help in the improvement of project delivery in Abuja.
a. There is the need for Federal Government to review the implementation act for best practices in the building industry
b. The building Industry should improve the level of Adoption of LCM principles for enhanced project performance
c. Monitoring and supervision mechanisms need to be intensified by the 3-tiers of Government and the professional bodies
d. Professional bodies and the Federal Government should ensure continuous capacity building in order to improve project compliance
e. The professional bodies should put appropriate regulations and measures to punish erring professionals for any unethical practices in the building industry.

5.4 Suggested Areas for Further Research

This study has established that LCM principles level of adoption is minimal in project delivery in Abuja, Nigeria. Recommendations have been made to improve on the adoption of LCM principles. Areas for further research include the following:

➢ An evaluation of due process mechanism for optimum project performance in the building industry
➢ An investigation of project financing on project delivery within the building industry.
An investigation on the need for Capacity building for skill development in the building industry

A study on the existing level of professionalism & monitoring mechanisms for effective project delivery
REFERENCES


Institute, P. M. (2000). *A guide to the project management body of knowledge.* Pennsylvania: PMI.


APPENDICES

APPENDIX A: Approval of Research Proposal

KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: kubps@yahoo.com
dean-graduate@ku.ac.ke
Website: www.ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 810901 Ext. 57530

Internal Memo

FROM: Dean, Graduate School
TO: Mr. Usman Napoleon Daniel
     C/o Environmental Planning & Management Department,
     KENYATTA UNIVERSITY

REF: N85F/24682/11

DATE: 11th November, 2012

SUBJECT: APPROVAL OF RESEARCH PROPOSAL

This is to inform you that the Graduate School Board at its meeting of 8th November 2012 approved your Ph.D Research Proposal entitled, “An Assessment of the Management Systems in Project Performance within the Building Construction Industry in Abuja, Nigeria.”

You may now proceed with your Data Collection.

DAVID NJORGE
FOR: DEAN, GRADUATE SCHOOL

C.C. Chairman, Environmental Planning & Management Department

Supervisors:

1. Dr. Peter K. Kamau
   Environmental Planning & Management Department
   KENYATTA UNIVERSITY

2. Dr. Caleb Mireri
   Environmental Planning & Management Department
   KENYATTA UNIVERSITY

DN/fwrk
APPENDIX B: Research Authorization

KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: kubps@yahoo.com
dean-graduate@ku.ac.ke
Website: www.ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 8710501 Ext. 57530

Our Ref: N85F/24682/11 Date: 11th November 2012

The Permanent Secretary,
Ministry of Higher Education, Science & Technology,
P.O. Box 30040,
NAIROBI

Dear Sir/Madam,

RE: RESEARCH AUTHORIZATION FOR MR. USMAN NAPOLEON DANIEL - REG. NO. N85/24682/11

I write to introduce Mr. Usman Napoleon Daniel who is a Postgraduate Student of this University. He is registered for a Ph.D degree programme in the Department of Environmental Planning and Management in the School of Environmental Studies.

Mr. Usman intends to conduct research for a thesis project entitled, "An Assessment of the Management Systems in Project Performance within the Building Construction Industry in Abuja, Nigeria."

Any assistance given will be highly appreciated.

Yours faithfully,

Mrs. Lucy N. Mbaba
FOR: DEAN, GRADUATE SCHOOL

INM//wK
APPENDIX C: Questionnaire for Professionals

QUESTIONNAIRE FOR PROFESSIONALS
This questionnaire is designed to find data on assessment of the management systems on project performance within the building industry in Abuja, Nigeria. The information will strictly be used for the purpose of this research. Please tick (✓) in the box appropriate to your response.

A. Demographic Data

1. Kindly indicate your profession
   - Architecture
   - Building
   - Engineering
   - Quantity surveying
   - Urban and Regional planning
   - Contracting

2. Kindly indicate the highest educational qualification attained
   - HND
   - BSC
   - MSC
   - PhD
   - others (specify)...

3. Kindly indicate to which professional body you are registered to, if not leave out the question
   - NIA
   - NIOB
   - NSE
   - NIQS
   - NIURP
   - Others specify...

4. Kindly indicate the management level of your status in the organization you work.
   - Top management
   - Middle management
   - Lower management
   - Others (specify)...

5. Please, indicate in which sector you work
   - Public
   - Private

6. How long have you been involved in the construction industry?
   - 1 – 5yrs
   - 6 – 10yrs
   - 11 – 15yrs
   - 16yrs and above

7. Kindly indicate how long your organization have been involved in the construction industry
   - Less than 5yrs
   - 5 – 10yrs
   - 11 – 15yrs
   - 16yrs and above
Section B: General Information

The statements listed below describe the factors that relate to phases principles in the management of projects within the building and in Abuja, Nigeria. There is no right or wrong answers. You are asked to express your feelings about each statement by indicating (✓) whether strongly agreed (5), agreed (4), average (3), disagreed (2), strongly disagreed (1). Please indicate your opinion by marking the column which corresponds to the alternative which best describe your knowledge of the subject. Please respond to every item.

A. Initial Phase Principles

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<td>1. Project identification</td>
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<td>2. Identify project goal</td>
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<td>3. Identify project objectives</td>
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<td>4. Determine preliminary materials</td>
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<td>5. Determine the equipment</td>
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<td>6. Determine the personnel</td>
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<td>7. Develop project budget</td>
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<td>8. Develop project schedule</td>
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<td>9. Identify project team</td>
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<td>10. Carry out survey</td>
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<td>11. Conduct soil test</td>
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<td>12. Conduct Environmental Impact Assessment</td>
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<td>13. Determine environmental health and safety provisions</td>
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### B. Planning Phase Principles

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<tr>
<td>1</td>
<td>Identify project goal</td>
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<td>2</td>
<td>Establish project objectives</td>
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<td>3</td>
<td>Compliance to design standards/specification</td>
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<td>4</td>
<td>Planning strategy</td>
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<tr>
<td>5</td>
<td>Break project activities into sub-units</td>
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<td>6</td>
<td>Determine performance standards</td>
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<td>7</td>
<td>Determine proper sequence</td>
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<td>8</td>
<td>Determine cost estimate requirement</td>
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<td>9</td>
<td>Design time/schedule requirement</td>
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<td>10</td>
<td>Determine personnel requirement</td>
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<td>11</td>
<td>Determine material requirement</td>
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<td>12</td>
<td>Obtain approvals</td>
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### C. Implementation Phase Principles

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<td>1</td>
<td>Obtaining mobilization fee</td>
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<td>2</td>
<td>Mobilization to site</td>
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<td>3</td>
<td>Commissioning of project</td>
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<td>4</td>
<td>Procurement of materials</td>
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<td>5</td>
<td>Determine cash flow</td>
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<td>6</td>
<td>Determine consultants/Government agencies</td>
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D. Completion Phase Principles

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<td>1.</td>
<td>Inspection of project</td>
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<td>2.</td>
<td>Decommissioning of project</td>
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<td>3.</td>
<td>Conduct audit of the facility</td>
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<td>4.</td>
<td>Determine timely completion</td>
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<td>Determine budgetary completion</td>
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<td>6.</td>
<td>Determine whether it is completed within quality standards</td>
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<td>7.</td>
<td>Prepare final report</td>
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<td>Hand over facility</td>
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<td>9.</td>
<td>Reassignment of project team</td>
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<td>10.</td>
<td>Client satisfaction</td>
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<td>11.</td>
<td>Project closure</td>
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E. Project Performance

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<td>Compliance with statutory approval processes</td>
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<td>2.</td>
<td>Satisfactory design encompasses good and standard building production</td>
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<td>3.</td>
<td>Proper staff appointment shows a good management skills and leads to successful project delivery</td>
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<td>4.</td>
<td>Good coordination of human resources ensures</td>
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<td>project success</td>
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<td>5. Proper allocation of material resources enhances project delivery</td>
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<td>6. Proper control and coordination of resources enhances project delivery</td>
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<td>7. Effective site meetings</td>
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<td>8. Effective timely delivery</td>
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<td>9. Budget shows effectiveness in project performance</td>
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<td>10. Adherence to quality standards performance in achieved</td>
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<td>11. Safety provisions indicates high proficiency in project delivery</td>
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<td>12. Clients satisfaction</td>
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### APPENDIX D: Proposed Work Plan

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<th>S/N</th>
<th>Activities</th>
<th>Time frame</th>
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<tbody>
<tr>
<td>1</td>
<td>Proposal writing and Presentation</td>
<td>January – June 2012</td>
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<tr>
<td>2</td>
<td>Search and review of documents (Nairobi, Abuja and Internet)</td>
<td>August, 2012</td>
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<tr>
<td>3</td>
<td>Refinement of research instruments (discussion and revision of drafts with relevant scholars)</td>
<td>August, 2012</td>
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<tr>
<td>4</td>
<td>Obtaining research permit</td>
<td>August, 2012</td>
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<td>5</td>
<td>Recruitment and training of two research assistants</td>
<td>September, 2012</td>
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<td>6</td>
<td>Pilot study</td>
<td>October – December, 2012</td>
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<td></td>
<td>- Pre-testing of research instruments</td>
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<td></td>
<td>- Compilation of the list of the universe</td>
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<td>- Planning for field work with resource persons</td>
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<tr>
<td></td>
<td>- Analysis of pilot results and final revision of research instruments</td>
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<tr>
<td>7</td>
<td>Data collection, processing and analysis</td>
<td>January – September, 2013</td>
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<tr>
<td>8</td>
<td>Thesis writing</td>
<td>October 2013 – May, 2014</td>
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<td>9</td>
<td>Thesis submission</td>
<td>July 2014</td>
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<tr>
<td>10</td>
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<td>December, 2014</td>
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<td>11</td>
<td>Incorporating comments</td>
<td>April, 2015</td>
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<td>12</td>
<td>Submission of final thesis</td>
<td>May, 2015</td>
</tr>
<tr>
<td>Time frame</td>
<td>Activities</td>
<td>Expenditure</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>------------------------------</td>
</tr>
<tr>
<td></td>
<td>2. Local transport</td>
<td>Abua – Bauchi (to &amp; fro)</td>
</tr>
<tr>
<td></td>
<td>3. Search &amp; review of documents:</td>
<td>Allowance for 2</td>
</tr>
<tr>
<td></td>
<td>Nairobi, Abuja &amp; internet</td>
<td>research assistants</td>
</tr>
<tr>
<td></td>
<td>4. Establish effective communication on system</td>
<td>Flash drive</td>
</tr>
<tr>
<td></td>
<td>Email/internet</td>
<td>100 KSH</td>
</tr>
<tr>
<td></td>
<td>Browsing</td>
<td>284 KSH</td>
</tr>
<tr>
<td></td>
<td>Phone/fax</td>
<td>142 KSH</td>
</tr>
<tr>
<td></td>
<td>5. Installation of relevant computer software</td>
<td>Notebooks</td>
</tr>
<tr>
<td></td>
<td>Photocopying paper</td>
<td>100 KSH</td>
</tr>
<tr>
<td></td>
<td>Photocopying</td>
<td>200 KSH</td>
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<tr>
<td></td>
<td>6. Refinement &amp; development of the research</td>
<td>Pens &amp; pencils</td>
</tr>
<tr>
<td></td>
<td>Waterproof bags</td>
<td>10 KSH</td>
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<tr>
<td></td>
<td>7. Obtaining research permit</td>
<td>Tape recorders</td>
</tr>
<tr>
<td></td>
<td>Recording cassettes</td>
<td>64 KSH</td>
</tr>
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<td></td>
<td>8. Recruitment &amp; training of research assistants'</td>
<td>Vehicle rental 14</td>
</tr>
<tr>
<td></td>
<td>Petrol charges 14</td>
<td>210 KSH</td>
</tr>
<tr>
<td></td>
<td>days @36 USD</td>
<td>14 days @ 15 USD/day</td>
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<td></td>
<td>9. Pilot study for 14 days in the study area</td>
<td>Allowances for 2</td>
</tr>
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<td>research assistants during pilot study</td>
<td>504 KSH</td>
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<td></td>
<td>14 days @20 USD/day</td>
<td>47,600 KSH</td>
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<tr>
<td></td>
<td>10. Establish a data base</td>
<td>Accommodation for</td>
</tr>
<tr>
<td></td>
<td>3 people for 14 days</td>
<td>504 KSH</td>
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<tr>
<th></th>
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<th>USD</th>
<th>KSH</th>
<th>NAIRA</th>
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<td>1. Travelling (Air return ticket)</td>
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<td>120,105</td>
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<td>Allowance for 2 research assistants @20USD for 14 days</td>
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<td>95,200</td>
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<td>4. Establish effective communication on system</td>
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<td>Email/internet</td>
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<td>Browsing</td>
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<td>24,140</td>
<td>48,280</td>
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<td>5. Installation of relevant computer software</td>
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<td>Notebooks</td>
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<td>200</td>
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<td>34,000</td>
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<td>1,700</td>
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<td>6. Refinement &amp; development of the research instruments</td>
<td>Pens &amp; pencils</td>
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<td>Waterproof bags</td>
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<td>850</td>
<td>1,700</td>
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<td>10,880</td>
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<td>8. Recruitment &amp; training of research assistants’</td>
<td>Vehicle rental 14 days @36 USD</td>
<td>504</td>
<td>42,840</td>
<td>85,680</td>
</tr>
<tr>
<td>Petrol charges 14 days @ 15 USD/day</td>
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<td>17,850</td>
<td>35,700</td>
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<tr>
<td>9. Pilot study for 14 days in the study area</td>
<td>Allowances for 2 research assistants during pilot study</td>
<td>560</td>
<td>47,600</td>
<td>95,200</td>
</tr>
<tr>
<td>14 days @20 USD/day</td>
<td>504</td>
<td>42,840</td>
<td>85,680</td>
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<td>10. Establish a data base</td>
<td>Accommodation for 3 people for 14 days</td>
<td>1,848</td>
<td>157,080</td>
<td>314,160</td>
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<td>Subdate</td>
<td>Item Description</td>
<td>Sub - Total</td>
<td>Total</td>
<td>Grand Total</td>
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<td>----------------------------------------------------------------------------------</td>
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<td></td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td>6,927</td>
<td>588,795</td>
<td>1,177,590</td>
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<td>Jan – Jun 2013</td>
<td>Main Field Work</td>
<td>1,080</td>
<td>91,800</td>
<td>183,600</td>
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<tr>
<td>Data processing and analysis</td>
<td>Vehicle rental for 30 days @ 36 USD/day</td>
<td>450</td>
<td>38,250</td>
<td>76,500</td>
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<tr>
<td></td>
<td>Petrol charges 30 days @ 15 USD/day</td>
<td>1,080</td>
<td>91,800</td>
<td>183,600</td>
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<tr>
<td></td>
<td>Feeding/refreshment for 3 people for 30 days @ 12 USD/day</td>
<td>1,200</td>
<td>102,000</td>
<td>204,000</td>
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<tr>
<td></td>
<td>Research assistants allowance for 30 days @ 20 USD/day</td>
<td>3,960</td>
<td>336,600</td>
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<td></td>
<td>Data analyst Accommodation for 3 people for 30 days @ 44 USD/night</td>
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<td>July – Dec. 2013</td>
<td>Final report write – up</td>
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<tr>
<td></td>
<td>Thesis compilation (production and photocopying)</td>
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</tr>
<tr>
<td>Jan – April 2014</td>
<td>Thesis defence Conferences</td>
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<tr>
<td>May 2014</td>
<td>Submission of final thesis</td>
<td>200</td>
<td>17,000</td>
<td>34,000</td>
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<td></td>
<td>Final production and binding</td>
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<td></td>
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<tr>
<td></td>
<td>Sub – Total</td>
<td>9,020</td>
<td>766,700</td>
<td>1,533,400</td>
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<td></td>
<td>Grand Total</td>
<td>15,947</td>
<td>1,355,495</td>
<td>2,710,990</td>
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**APPENDIX F: Study Design**

**Table 4.4.2: Study Design**

<table>
<thead>
<tr>
<th>S/ N</th>
<th>Research Questions</th>
<th>Objectives</th>
<th>Hypothesis</th>
<th>Variables</th>
<th>Research Tool</th>
<th>Method of Data Analysis</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>What policy measures/procedural framework enables optimum project performance in the building industry in Abuja?</td>
<td>To examine the policies/procedural framework within the building industry in Abuja, Nigeria</td>
<td></td>
<td>Case study Project files Interview</td>
<td>Case study Project files Interview</td>
<td>Explanatory analysis</td>
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<tr>
<td>2</td>
<td>Are initial phase principles adopted within the building industry in Abuja?</td>
<td>To investigate how initial phase principles affects project performance within the building industry in Abuja</td>
<td>H0: Initial phase principles do not affect project performance within the BI in Abuja</td>
<td>Questionnaire</td>
<td>H0: Initial Phase principles</td>
<td>ANOVA, Chi-Square</td>
</tr>
<tr>
<td>3</td>
<td>Can planning phase principles influence project performance within the building industry in Abuja?</td>
<td>To examine the influence of the planning phase principles on project performance within the building industry in Abuja</td>
<td>H0: Planning phase principles cannot influence project performance within the BI in Abuja</td>
<td>Questionnaire</td>
<td>H0: Planning Phase principles</td>
<td>ANOVA, Chi-Square</td>
</tr>
<tr>
<td></td>
<td>How can implementation phase principles influence project performance within the building industry in Abuja?</td>
<td>To assess how the implementation phase principles influence project performance</td>
<td><strong>H0:</strong> Implementation phase principles has no influence on project performance within the BI in Abuja</td>
<td><strong>Dependent Variable:</strong> Project Performance Implementation Phase Principles</td>
<td><strong>Questionnaire:</strong></td>
<td><strong>Test:</strong> ANOVA, Chi-Square</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>4</td>
<td>Do completion phase principles establish project performance within the building industry in Abuja?</td>
<td>To ascertain whether completion phase principles improve project performance within the building industry in Abuja</td>
<td><strong>H0:</strong> completion phase principles do not improve project performance within the BI in Abuja</td>
<td><strong>Dependent Variable:</strong> Project Performance Completion Phase Principles</td>
<td><strong>Questionnaire:</strong></td>
<td><strong>Test:</strong> ANOVA, Chi-Square</td>
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## APPENDIX G: Project Activities

Table 4.4.3: Project Activities

<table>
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<tr>
<th>Phase</th>
<th>Project Activities</th>
<th>Project CS 1</th>
<th>Project CS 2</th>
<th>Project CS 3</th>
<th>Project CS 4</th>
<th>Project CS 5</th>
<th>Project CS 6</th>
</tr>
</thead>
</table>
| Initial phase principles | Project identification  
Project goal  
Project objectives  
Budget estimate  
Determine period  
Design briefs  
Preliminary survey  
Environmental Impact Assessment |              |              |              |              |              |              |
| Planning phase principles | Performance standards  
Design  
Materials  
Personnel  
Equipment  
Cost  
Time  
Environmental provisions  
Approvals |              |              |              |              |              |              |
| Implementation phase principles | Commissioning of the project  
Procurement  
Preliminary structures  
Mobilization  
Project activities  
Allocation of resources |              |              |              |              |              |              |
<table>
<thead>
<tr>
<th>Control of resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitoring/supervision</td>
</tr>
<tr>
<td>Site meetings</td>
</tr>
<tr>
<td>Decommissioning of project</td>
</tr>
<tr>
<td>Project audit</td>
</tr>
<tr>
<td>Final report</td>
</tr>
<tr>
<td>Handover of facility</td>
</tr>
<tr>
<td>Project closure</td>
</tr>
</tbody>
</table>