

**PROJECT PLANNING IN CONSTRUCTION  
PROCUREMENT: THE CASE OF NIGERIAN  
INDIGENOUS CONTRACTORS**

**INUWA IBRAHIM IBRAHIM**

**DOCTOR OF PHILOSOPHY**

**(Construction Project Management)**

**JOMO KENYATTA UNIVERSITY OF  
AGRICULTURE AND TECHNOLOGY**

**2014**

**Project Planning In Construction Procurement: The Case of  
Nigerian Indigenous Contractors**

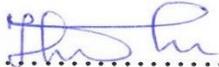
**Inuwa Ibrahim Ibrahim**

**A thesis submitted in fulfillment for the degree of Doctor of  
Philosophy in Construction Project Management in the Jomo  
Kenyatta University of Agriculture and Technology**

**2014**

## DECLARATION

This thesis is my original work and has not been presented for a degree in any other university.

Signature  .....

Date 7/11/2014

**Inuwa Ibrahim Ibrahim**

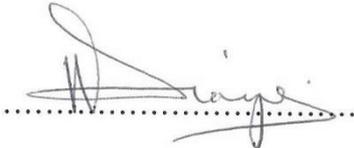
This thesis has been submitted for examination with our approval as university supervisors:

Signature...  .....

Date... 8/11/2014

**Dr. Wanyona Githae, Ph.D.**

**JKUAT, Kenya**

Signature  .....

Date 7th November, 2014

**Dr. Stephen Diang'a, Ph.D.**

**JKUAT, Kenya**

## **DEDICATION**

I dedicate this work to:

- My parents: Alhaji Inuwa Ibrahim and Mairo (Lucy)
- To late Alhaji Baba Isa Tahir
- My wife Amina (Mimi)
- My children: Aisha (Mama), Aliyu, Fatima (Zahra), and Muhammad (Abbati),
- To the entire Inuwa family.

## **ACKNOWLEDGEMENT**

My sincere gratitude goes to my supervisors Dr. Wanyona Githae and Dr. Stephen Diang'a for their profound guidance and patience in seeing me through this study. Their contributions have been tremendous to the completion of this work. I also acknowledge the contributions received from Dr. Gerryshom Munala and Dr. Bernard Mugwima of School of Architecture and Building Science (SABS), Jomo Kenyatta University of Agriculture and Technology (JKUAT), Kenya staff, and from Professor Yakubu Ibrahim, Professor Mansur Usman Malunfashi, Dr. Sani Kunya and Dr. Alhassan Dahiru, all from Abubakar Tafawa Balewa University (ATBU), Bauchi-Nigeria. I also acknowledge the assistance accorded to me by Dr. Susan Kibue (Dean SABS, JKUAT), Dr. Ahmad Alkizim, Dr. Titus Kivaa, Mr Daniel Saiva, Monica Kahura and the entire staff of the construction management department of JKUAT.

My gratitude also goes to my employer ATBU, Bauchi-Nigeria for funding this study. My appreciation is also extended to my family which has endured my absence throughout my stay in Kenya. I love you all and your patience is highly appreciated. This acknowledgement will not be complete without mentioning my dear friend Seneiya Kamothe who edited this work. You have been pleasing and helpful, I appreciate you. I am also grateful to Alhaj Ramadan Nanji for being kind and supportive; may the Almighty GOD continue to shower His blessing on you and your entire family.

Above all, I thank the Almighty GOD for seeing me through this study. You are magnificent and merciful. You are worthy to be worshipped.

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## **LIST OF ACRONYMS**

<b>AMS</b>	Average Mean Score
<b>CM:</b>	Construction Management
<b>CPM:</b>	Critical Path Method
<b>DB:</b>	Design-Build
<b>DBB:</b>	Design-Bid-Build
<b>DC:</b>	Design and Construct
<b>DMC:</b>	Design and Management Contract
<b>EDI:</b>	Electronic Data Interchange
<b>ETF</b>	Education Trust Fund
<b>FGN:</b>	Federal Government of Nigeria
<b>FOCI:</b>	The Federation of Construction Industry
<b>FMHUD:</b>	Federal Ministry of Housing & Urban Development
<b>GDP:</b>	Gross Domestic Product
<b>ICT:</b>	Information and Communication Technology
<b>JCT:</b>	Joint Contract Tribunal
<b>MC:</b>	Management Contract
<b>NCI:</b>	Nigerian Construction Industry
<b>NIA:</b>	Nigerian Institute of Architects
<b>NICs:</b>	Nigerian Indigenous Contractors'
<b>NIOB</b>	Nigerian Institute of Buildings
<b>NSE:</b>	Nigerian Society of Engineers
<b>NIQS:</b>	Nigerian Institute of Quantity Surveyors'
<b>NPC:</b>	National Population Commission

<b>PBPs:</b>	Public Building Professionals'
<b>PERT:</b>	Project Evaluation and Review Technique
<b>PFI</b>	Private Finance Initiative
<b>PMBOK:</b>	Project Management Body of Knowledge
<b>PMI:</b>	Project Management Institute
<b>PPP</b>	Public-Private Partnerships
<b>PTF</b>	Petroleum Trust Fund
<b>QSRBN:</b>	Quantity Surveyors' Registration Board of Nigeria
<b>SAP:</b>	Structural Adjustment Programme
<b>TFV:</b>	Transformation Flow Value
<b>UNCITRAL:</b>	The United Nation Commission on International Trade Law
<b>WBS:</b>	Work Breakdown Structure

## **ABSTRACT**

Nigerian indigenous contractors' (NICs) inadequate project planning has been an impediment to the Nigerian economy. Their inadequacy emanates from: inexperience, incompetence, inappropriate planning techniques application, planning challenges, inadequate understanding of influencing factors for project planning, and poor understanding of project planning success indicators. This study investigated NICs project operational planning in building projects procurement in Nigeria and established a strategy for NICs project planning. Its objectives: established the level of NICs involvement in building procurement systems; examined NICs project time and cost performances in building procurement systems; investigated NICs application of project planning techniques; identified and evaluated NICs project planning challenges; identified and evaluated significant factors influencing NICs project planning and; identified and evaluated contractors' project planning success indicators in building projects. The research design is quantitative and qualitative. The quantitative design employs exploratory and descriptive survey, while the qualitative design employs collective case studies. The absence of authoritative NICs sample frame necessitated the use of purposive sampling technique to administer 300 questionnaires to respondents' in northern Nigeria. The questionnaire administration attains 59% response rate. Data were analyzed for reliability, significance, and correlation test, as well as descriptive statistics. Stratified random sampling technique was used to sample the case study and data analyzed using Bloom's hierarchy taxonomy and descriptive statistics. Result reveals that: NICs frequency of involvement is much lower in the non-traditional procurement systems, underperformed in project time and cost, and inappropriately applied project

planning techniques; identified project planning challenges are severe; identified influencing factors are important; and identified contractors' project planning success indicators are important. This study recommends: NICs acquire skills for the management of non-traditional procurement systems and, public and private clients should patronize the NICs in the execution of non-traditional procurement systems; NICs should adopt project management techniques; consultants/NICs should conduct exhaustive brief evaluation, adequate feasibility study and appropriate scope definition; clients and consultants should adhere to project management procedures; NICs should apply appropriate planning techniques, employ competent personnel, embark on continuous training, use the project planning success indicators as a guide for the management and planning of project operational tasks; form of building contract used in Nigeria should be reviewed to enforce proficiency in contractors project planning; and project management courses should be introduced in the training of construction related discipline in Nigerian institutions. Adherence to these recommendations will enhance NICs project planning and, facilitate their project management performance in meeting construction best practice.

**Keywords:** Construction industry, Indigenous contractors, Nigeria,  
Procurement systems, Project planning.

## CHAPTER ONE

### 1.0 INTRODUCTION

#### 1.1 Research Background

Since time immemorial, man has relied on procurement to acquire what he needs from others. His needs can be for a service, a product or both. Aqua Group (1999) defines procurement as the process of obtaining goods and services from another for some consideration. It seems simple, but not in construction; the execution of modern construction projects according to Chitkara (2012), requires speed and involves interrelationship of the voluminous interdependent activities. In addition, construction projects procurement has been acknowledged as the procurement of a complex system, which offers insights from the procurement of other types of complex systems (Hughes, 2012). Its complexity stems from an extensive process and diverse systems (Idoro, 2012a; Hughes, 2012; Gollenbeck, 2008; Harris & McCaffer, 2005; Anyadike, 2000).

This makes construction specific procurement more complex unlike other forms of general procurement (Ibrahim, 2008). Consequently, the contractor who is regarded as a major player in the construction project delivery team (Chitkara, 2012; Usman, *et al.* 2012a), is saddled with more roles in contemporary construction procurement beyond their traditional role as integrators in a design-bid-build procurement system (Mbamali & Okotie, 2012; Gollenbeck, 2008), to a more complex role in management oriented systems, integrated systems or, discretionary contracts (Mathonsi & Thwala, 2012; Babatunde, *et al.*, 2010; Harris & McCaffer, 2005).

These complexities vis-a-vis the expectation from contractors necessitates adequate project planning if success is to be attained (Passenheim, 2009; Bailey, *et al.*, 2008).

Planning is a fundamental tool in project management used in meeting project scope, time and cost (Passenheim, 2009). Planning defines the activities and actions, time and cost targets, and performance milestones which will result in successful project objectives (Teslang, 2004 in Ubani, *et al.*, 2010). In the developed countries, according to Harris and McCaffer (2005), contractors have embraced planning because the results of a well-planned, carefully monitored and controlled contract directly impact on performance and profitability of the contract and the company.

However, in a depressed economy like Nigeria, projects are vulnerable to failure because of myriad problems. Even if the resources are available, projects fail due to variations in plans, defective plans and inefficient management (Ubani, *et al.*, 2010). This is further compounded by the inability of Nigerian indigenous contractors (NICs) to deliver projects successfully due to inadequate project planning for their contractual requirements.

These resulted in the few foreign firms, which constitute just 5% of the total number of contractors in the formal sector, control 95% of the major public projects in the construction market, giving the indigenous firms just 5% share of the market (Aniekwu & Audu, 2010; Oladapo, 2006). This impedes the Nigerian construction industry (NCI) from meeting the construction needs of the nation and limits the country's economic growth (Odediran, *et al.*, 2012; Aniekwu & Audu, 2010; Saleh, 2004).

Idoro (2014) affirmed that construction is the bedrock of development and no country can think, Dream and experience development without an efficient and effective construction industry. According to Alzahrani and Emsley (2013), and Yimam (2011), construction projects and their success are highly dependent on contractors. Hence, contractors' role in the construction industry cannot be overemphasized; their competence and capability is a function of performance and output in the construction industry (Odediran, *et al.* 2012; Yimam, 2011).

## **1.2 Statement of the Problem**

Numerous problems confronting the NCI, coupled with the inability of the NICs to provide the enabling environment for sustainable development, as well as the requisite potentials to address the challenges of globalization, have remained a serious concern to all in the Nigerian economy (Idoro, 2014; Mbamali & Okotie, 2012; Odediran, *et al.* 2012; Aniekwu & Audu, 2010). Hence, the NICs are frequently criticized by clients' and other stakeholders for poor project performance (Aniekwu & Audu, 2010; Idoro & Akande-Subar, 2008; Saleh, 2004).

Their performances are replete with: abandonment of projects; cost and time overruns; poor workmanship; poor management capability; financial difficulties; poor planning; poor mechanization and high frequency of litigation (Odediran, *et al.* 2012; Oladimeji & Ojo, 2012; Aniekwu & Audu, 2010; Muazu & Bustani, 2004; Achuenu, *et al.* 2000; Adams, 1997).

Consequences of these underperformances has contributed to the inability of the NCI to deliver services effectively and efficiently, hence the industry is routinely accused

of being wasteful, inefficient, and unsafe, falling short of quality and quantity targets, and being late in delivery (Ibrahim& Musa-Haddary, 2010; Omole, 2001). Moreover, construction projects in Nigeria cost more than similar ones in other parts of the world (Nasiru, *et al.* 2012; Quantity Surveyors Registration Board of Nigeria-QSRBN, 2012).

According to QSRBN (2012) and Ubani, *et al.* (2010), high cost, time overruns, and slipped milestone of projects experienced in Nigeria, all have a negative impact on the development of the nation's economy. These amongst other factors have made the NCI unable to address the huge deficit of basic amenities, essential public infrastructure, and population pressure on the urban centres, resulting in 60% of urban inhabitants in desperate need of housing (Dahiru & Mohammed, 2012; Oni & Wyk, 2012; National Planning Commission-NPC, 2004). This makes the attainment of the country's ambition envisioned in the Millennium Development Goals (MDG) target of 2015 and, the Vision 20:2020 doubtful (Dahiru & Mohammed, 2012; Oni & Wyk, 2012).

Consequent to the inefficiency of the NICs, foreign contractors dominate 95% of the major public projects in the country (Odediran *et al.*, 2012; Aniekwu & Audu, 2010; Oladapo, 2006; Muazu & Bustani, 2004). The outcome to the NCI and the economy are: low income generation and redistribution due to expatriates repatriating their profits abroad; inexperience of indigenous contractors; an insignificant value addition to construction and local industries supplying construction materials; and consistent contribution of 1% employment over the last decade as against the World Bank's average observation of about 3.2% in other developing countries (Odediran,

*et al.* 2012; Aniekwu & Audu, 2010; IDr.us & Sodangi, 2010; Bala, *et al.*, 2009; Jinadu, 2007; Muazu & Bustani, 2004; Adams, 1997).

Many researchers have attributed the underperformance of NICs to poor project planning due to: non-adoption of project management techniques; incompetence and inexperience; inefficient policies and practices; weak institutions and an adverse business environment; and complex social and cultural practices (Odediran, *et al.*, 2012; Aniekwu & Audu, 2010; Bala, *et al.*, 2009; Muazu & Bustani, 2004; Achuen, *et al.*, 2000; Adams, 1997). Contractor's planning capability and procurement methods according to Azhar, *et al.* (2008), are part of the qualitative significant factors affecting project procurement performance; hence, it needs adequate attention. This becomes necessary because there is an element of entrepreneurial risk associated with the assignment of procurement tasks due to lack of understanding and implementation of factors to achieve results from work performed by others (Anyadike, 2000).

A review of several studies conducted on NICs and procurement in the NCI shows no evidence of studies on NICs: involvement (experience) and performance (competence), planning techniques application, project planning challenges, planning influencing factors, and contractor's project planning success indicators in construction procurement systems (Inuwa *et al.*, 2013; Iro, *et al.*, 2013; Ujene, *et al.*, 2013; Dada, 2012; Idoro, 2012a; Idoro, 2012b; Ikediashi, *et al.*, 2012; Odediran, *et al.*, 2012; Tunji-Olayeni & Omuh, 2012; Usman, *et al.*, 2012; Fagbenle, *et al.* 2011; Aniekwu & Audu, 2010; Babatunde *et al.*, 2010; Idrus & Sodangi, 2010; Bala *et al.*, 2009; Idoro & Akande-Subar, 2008; Ibrahim, 2008; Hamilton, 2006; Ojo, *et al.*,

2006; Uduak, 2006; Muazu & Bustani, 2004; Saleh, 2004; Ameh & Odusami, 2002; Achuenu, *et al.*, 2000; Adams, 1997).

Underperformance of the NICs is perhaps due to inexperience, incompetence, inadequate understanding of factors that can significantly influence contractors project planning, none or inappropriate application of project planning techniques, none appreciation of indigenous contractors planning challenges and poor understanding of project planning success indicators that will ensure successful project delivery in the NICs organization, unlike other developed countries. The study therefore aims at investigating indigenous contractors' project operational planning in building projects procurement in Nigeria, and establish an appropriate strategy that will facilitate NICs project planning for enhanced building project procurement in Nigeria.

### **1.3 Objectives of the Research**

To achieve its aim the research set up the following objectives:

- i. To establish the level of NICs involvement in building procurement systems.
- ii. To examine NICs time and cost performances in building procurement systems.
- iii. To investigate NICs application of project planning techniques for contractual operations in project procurement.
- iv. To identify and evaluate NICs project planning challenges in building procurement systems.

- v. To identify and evaluate significant influencing factors for NICs project planning in projects procurement systems.
- vi. To identify and evaluate contractors project planning success indicators in building projects procurement systems.

#### **1.4 Research Hypotheses**

This study used nonparametric statistics to test the following null ( $H_0$ ) and alternative ( $H_1$ ) hypotheses:

- i.  **$H_0$ :** There is no disproportionate distribution in the frequencies of responses among NICs to a question on their level of involvement in building procurement systems.  
 **$H_1$ :** There is disproportionate distribution in the frequencies of responses among NICs to a question on their level of involvement in building procurement systems.
- ii.  **$H_0$ :** NICs underperformed in terms of cost and time in building procurement systems.  
 **$H_1$ :** NICs performed in terms of cost and time in building procurement systems.
- iii.  **$H_0$ :** The NICs inappropriately apply project planning tools for their contractual operations in project procurement systems.  
 **$H_1$ :** The NICs appropriately apply project planning tools for their contractual operations in project procurement systems.

- iv. **H<sub>0</sub>**: The distribution of rankings is not the same among the respondents' on NICs project planning challenges in building procurement systems.  
**H<sub>1</sub>**: The distribution of rankings is the same among the respondents' on NICs project planning challenges in building procurement systems.
- v. **H<sub>0</sub>**: The distribution of rankings is not the same among the respondents' on the significant influencing factors for NICs project planning in projects procurement systems.  
**H<sub>1</sub>**: The distribution of rankings is the same among the respondents' on the significant influencing factors for NICs project planning in projects procurement systems.
- vi. **H<sub>0</sub>**: The distribution of rankings is not the same among respondents' on contractors' project planning success indicators in building projects procurement systems.  
**H<sub>1</sub>**: The distribution of rankings is the same among respondents' on contractors' project planning success indicators in building projects procurement systems.

### **1.5 Significance of the Study**

This study will contribute valuable knowledge to contractors' project planning in developing countries, especially in Africa. The outcome of this research will be used to: enhance and facilitate indigenous contractors' efficiency in project delivery in Nigeria; expose how contractors and other parties to a contract contribute to the

failure or success of contractors' project planning and; enrich literature within academia for the training of construction professionals, as well as eventually contribute to high performance in the NCI. The significance of the study stems from the contribution that accrues from the construction industry to the economy.

An efficient construction sector, according to Oyewobi and Ogunsemi (2010), is a pre-requisite to effective national development. This is because, the products of the construction industry are desired mainly for the services which they help to create, as most business, social, religious, economic and, industrial activities operate on her structural base (Nwachukwu, 2008). However, all these benefits can only accrue from the industry to the economy when construction projects are efficiently delivered.

This study's result and recommendations will contribute to the NCI's attainment of best practice globally. The study result will be disseminated through: conferences, workshops, journal publications, and academia-teaching. The research result will benefit: indigenous and foreign contractors in Nigeria, construction professionals, construction clients, and academic institutions.

### **1.6 Justification of the Study**

In almost all countries, the construction sector is always used to invigorate national economies (Mogbo, 2001, p.1), because it contributes to the economy through the various resources, infrastructure and facilities it produce (Shaikh, *et al.*, 2010). The industry produces and maintains infrastructures and facilities required for various social, economic and industrial functions such as buildings, highways, dams, ports,

industries and power stations (Alzahrani & Emsley, 2013; Achuenu, *et al.*, 2000). The infrastructural facilities produced by the industry are used for transportation, housing, communication, water and power supply, manufacturing and waste disposals, and the acquirement of these facilities enhances, supports, and defines the economic growth of a nation (Alzahrani & Emsley, 2013; Achuenu, *et al.*, 2000).

However, Nigeria like other developing countries have a wide range of infrastructure deficits in four infrastructure sectors of the economy (power sector, railway, road, oil & gas), and it is estimated that the country need to invest US\$100 billion in the next 6 years, if it is to meet its annual growth targets and become one of the largest 20 economies in the world by the year 2020 (Draft National Policy on Public-Private Partnership, 2009 cited in Dahiru, *et al.*, 2010). The country attaining a spot in the 20 largest economies in the world by 2020 is also a priority to the Federal Government of Nigeria (FGN) Vision 20:2020, and one of the aims of the Vision is to bridge Nigeria's huge housing deficit of 12-14 million housing units, which is estimated to cost 35 trillion naira (US\$24 billion) (Oni & Wyk, 2012). This has been a point of concern that requires a large stock of competent indigenous firms with qualified personnel (competent and capable) for the Vision to be realized (Oni & Wyk, 2012).

Several studies have acknowledged that for a construction industry of any country to contribute to economic growth, it requires: technological advancement, the use of local material and human resources that has the ability to compete globally (Mbamali & Okotie, 2012; Odediran *et al.*, 2012; Aniekwu & Audu, 2010; Ogunsemi & Saka, 2006). According to Yimam (2011) enhancing the performance of the construction

industry in the developing countries requires an improvement of contractors' project management capability.

However, the current shortage of competent indigenous firms in the NCI has constrained the productive capacity of the sector and aggravated the nation's infrastructure deficits problem (Oni & Wyk, 2012; Aniekwu & Audu, 2010; Jinadu, 2007; Adams, 1997). Consequently, the NICs lack the technical and managerial competence in contributing to NCIs Drive towards the economic growth of Nigeria (Mbamali & Okotie, 2012; Aniekwu & Audu, 2010; Muazu & Bustani, 2004).

The underperformance of the NICs towards the development of the Nigerian economy has informed the call by researchers in Nigeria for a developmental effort towards improving its performance to meet global construction best practice (Mbamali & Okotie, 2012; Aniekwu & Audu, 2010; Achuenu, *et al.*, 2000). Hence, the NCI requires indigenous contractors that are competent in the discharge of their contractual obligation; those who are efficient and able to deliver constructed facility within cost and schedule and according to the desired quality without recourse to litigation or arbitration (Saleh, 2004), and those who will ultimately develop the NICs to a technically and managerially sound position according to international construction best practice (Mbamali & Okotie, 2012; Achuenu, *et al.*, 2000). The improvement of the productive capacity of the NICs will contribute to the economic growth of Nigeria through: the reduction of infrastructural deficits; attract local and foreign investments; create employment; generate income, and augment NICs ability to compete globally and generate foreign exchange.

## **1.7 Scope and Delimitation**

This study investigate NICs project planning in construction procurement systems. This study was conducted in northern Nigeria and delimited its investigation to ascertaining: NICs involvement in all but discretionary building procurement systems, NICs time and cost performance in the targeted procurement systems, NICs application of project planning techniques in building projects delivery, NICs challenges in projects planning, significant factors influencing NICs project planning, and contractor's project planning success indicators.

This study was delimited to main/general building contractors' operational planning at the post contract stage in building procurement systems. The term main/general contractors used in this study is in relation to building procurement systems and it include: construction manager (CM), management contractor (MC), design and management contractor (DMC), design and build contractor (DB), and design and construct contractor (DCC). The scope of this study does not include investigating subcontractors' project planning.

## **1.8 Operational Definitions of Terms**

- I. Contractor:** A corporate body that runs a contracting business that entails the provision of materials or a service to clients for a fee.
  
- II. Construction project procurement:** An organized method or process and procedure of obtaining or acquiring a construction product such as a house, shopping complex or road and jetty. It also involves arranging and coordinating people to achieve prescribed construction goals and objectives.

- III. Consultants:** Core building professionals (architects, building engineers, construction and project managers, service and structural engineers, quantity surveyors) involved in building project procurement, and who are responsible for developing the requirements of project clients, setting targets and deadlines, as well as establishing standards for meeting these requirements, preparing project documents that describe the targets, setting deadlines and standards, and monitoring the activities of contractors.
- IV. Nigerian indigenous contractors (NICs):** Contracting firms that are fully-owned and managed by Nigerians; the nationality of the firms' ownership and management is exclusively Nigeria.
- V. Operations:** Activities or tasks a contractor is expected to accomplish in his contractual obligation in any type of construction procurement system.
- VI. Operational planning:** A method statement and programme of work. The method statement involves establishing a method statement for each activity that allows a detailed look at the project's resource requirements, which are not obvious at the strategic level. A programme of works primarily presents the sequence in which the various activities should occur with their associated durations and resource requirements
- VII. Public Building Professionals (PBPs):** Building professionals (architects, building engineers, construction and project managers, service and structural engineers, quantity surveyors), working under government establishment as

in-house consultants. They serve as the government (client) public works supervisory staff in Nigeria.

- VIII. Procurement:** The process of obtaining goods and services from another for some consideration.
- IX. Procurement process:** A series of operations or actions taken in order to achieve the intended aim of construction project procurement. The scope of construction procurement process covers every aspect of a project delivery system.
- X. Procurement systems:** An organizational system that assigns specific responsibilities and authorities to people and organizations, and defines the relationships of the various elements in the construction of a project.
- XI. Respondents:** This comprised of NICs, consultants and PBPs; they are the elements that make up the study population, and provide answers to the study enquiry.

## **CHAPTER TWO**

### **2.0 LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter covers literature review and includes: Nigeria construction industry (NCI), Nigerian indigenous contractors' (NICs), construction contracting business, construction procurement, contractors' role in procurement systems, application and performances of building projects procurement systems in Nigeria, construction project planning techniques, the NICs project planning challenges, influencing factors for NICs project planning, contractors' project planning success indicators, and the study research gap (review of literature on: construction procurement and contractors).

#### **2.2 The Construction Industry**

The construction industry is considered one of the oldest industries organized on a project basis (Gollenbeck, 2009, p.1). Well known examples are the Egyptian pyramids (3rd millennium B.C.) and the aqueducts carrying water to cities and industrial sites that were constructed in Rome in 312 B.C. (Gollenbeck, 2009, p.1). One thing that is common to all these historic structures is the use of both human and material resources which are planned, organized, coordinated and controlled for the sole aim of realizing the projects. It also involves a complex structure of different trades and professionals working in harmony towards the realization of the projects.

The construction industry is of strategic importance to any nation due to the role it plays in the economy (Gollenbeck, 2009; Jinadu, 2007). It is responsible for the provision of infrastructure and contributes to a country's gross domestic product

(Dada, 2012). The industry worldwide accounts for a sizeable proportion of a nation's economic activities and globally accounts for about 10% of the world economy (Adindu, 2012; Freeman, 2011). Approximately 70% of construction investment is accounted for in the USA, Western Europe, and Japan. The continent of Africa accounts for about 1%. Per capita investment in construction in the developed world is approximately \$2 500 per annum as against \$46 per annum in Africa (Freeman, 2011, p.14).

The low level of construction investment in Africa and lack of human capital potential has created a huge infrastructural deficit and this account for the low socio economic growth of the continent. The industry can be used for the socio economic development of developing economies (Hamilton, 2006). This is because of its unique ability to facilitate development of a nation by providing directly for human needs, stimulating investment, and generating employment (Hamilton, 2006). Hence, the construction industry is a sector that can assist the African continent to develop its economy as well as provide employment opportunity to its teeming population.

### **2.2.1 Nigeria Construction Industry**

The NCI, according to the Nigerian Institute of Quantity Surveyors (NIQS) 2008), has grown from the world wars up to 1960s, and it has been British oriented both in design and operational modus. Thereafter, various incursions were made from other areas of Europe and America. All these innovations and Nigerians own concepts, according to NIQS (2008), metamorphosed into a new complexity, which can rightly be regarded as NCI culture.

In Nigeria, the construction industry plays a fundamental role in national development since the post war era; 1967-1970 (Adindu, 2012). Construction activity in Nigeria is extremely diverse, ranging from simple housing developments to complex infrastructure projects. Its activities include:

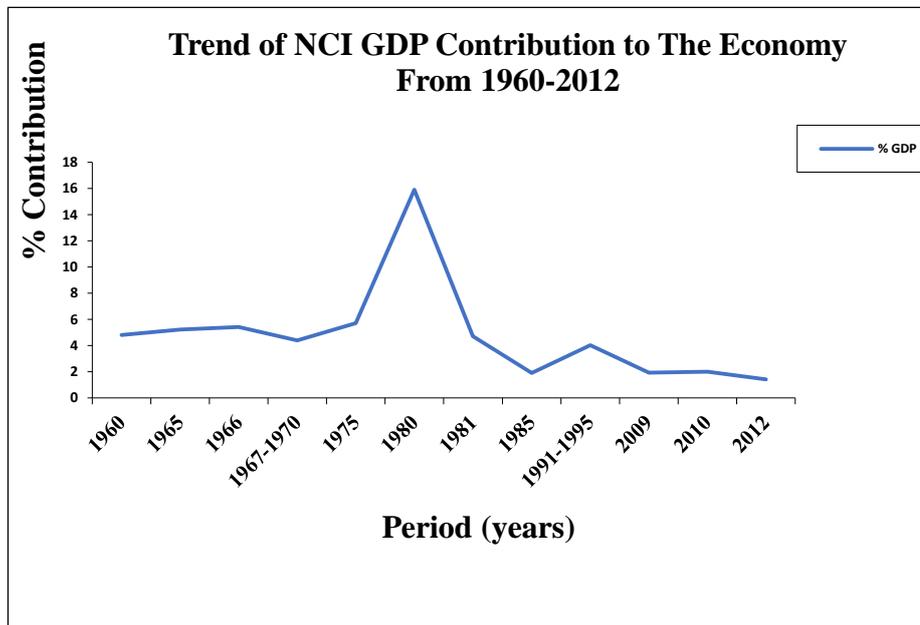
- Creation of infrastructure facilities: This involves projects like power stations, airports, roads, bridges, water schemes, hospitals and administrative facilities;
- Provision of industrial facilities: This involves the provision of buildings and other utilities in order to enhance production and earning capacity of industries; including factories, and workshops and offices
- Provision of accommodation and recreational facilities: Such projects include housing schemes, churches, mosques, sports facilities, recreational centres, and so on (Adindu, 2012).

Mogbo (2001) asserted that the NCI represents an important and crucial sector in the economy. In 1960, it recorded a gross fixed capital formation of 50% and accounted for 4.8% of the GDP of Nigeria (Oladirin, *et al.*, 2014). The industry's contribution remained relatively stable, rising gently in five years to 5.22% in 1965 to 5.4% in 1966, and then declining as a result of the civil war that took place between 1967-1970, to 4.38% (Oladirin, *et al.*, 2014; Mogbo, 2001). In 1975-1980 and 1981-1985, the NCI recorded its share of the gross fixed capital formation as 61.06% and 52.16% respectively (Anago, 2001). Correspondingly, its share of the GDP increased to 5.70% in 1975 and 15.9% in 1980 (Oladirin, *et al.*, 2014; Anago, 2001). This unprecedented increase in GDP between 1975-1980 was attributed to the 'oil boom'

and the reconstruction and rehabilitation works to mend the havoc resulting from the civil war that ended in 1970 (Ojo, *et al.*, 2006; Achuenu, *et al.*, 2000).

However, foreign firm benefitted more because they were the major contracting and competent companies available (Achuenu, *et al.*, 2000). The GDP then Dropped sharply from 15.9% of total output in 1980 to 4.7% in 1981 and a paltry 1.9% GDP in 1985 (Anago, 2001). This declining trend of the industry's contribution to the Nation's GDP was attributed to political instability, a decline in oil revenue in the 1980s, and the Nigerian government restructuring of the economy under the Structural Adjustment Programme (SAP) (Oladirin, *et al.*, 2014; Fagbenle, *et al.*, 2011). Within this period, the rulership of the country had changed hands thirteen times, and each regime had different strategies of solving the economic problems (Fagbenle, *et al.*, 2011). In the late 1980's the contribution of NCI to the economy improved substantially, accounting for about 70% of the country's GDP (Planning Committee on National Construction Policy, 1989 cited in Ibrahim, 2008).

The performance indicators for the period 1991-1995 showed an averaged share of gross fixed capital formation of 54% and a GDP of 4.02%, and this performance according to Anago (2001) has generally remained the same. However, the advent of civilian administration in May 1999, raised the hope that investment in constructions would provide the much needed push to kick-start economic growth (Anago, 2001). However, the NCI GDP share under the democratic dispensation has not been encouraging; it accounted for 1.92% and 2% in 2009 and 2010 respectively (NPC, 2010). The industry's GDP Dropped to 1.4% in 2012 (Odediran *et al.*, 2012). Figure 2.1 shows the trend of the NCI GDP contribution to the economy.



**Figure 2.1: Trend of the NCI GDP Contribution to the Economy**

**Source:** Author (2013)

Despite the dwindling fortunes of the NCI, the industry has been known to be the largest industry employing a good proportion of the work force and controlling over 50% of the Nation’s Gross National Product (Fagbenle, *et al*, 2011). The industry is a major contributor to the national economy, contributing half of the total stock of fixed capital investment (Adindu, 2012). At present, the industry account for about 60% of the nation’s capital investment (Adindu, 2012), and employs approximately 8 million people, making it the largest employer in Africa (Ibrahim& Musa-Haddary, 2010).

Nonetheless, with Nigeria population exceeding 140 million and an annual growth rate of 3.2% (Ibrahim& Musa-Haddary, 2011; NPC, 2010), very little has been achieved as investment in the construction sector; the industry has evidenced

minimal multiplier effects in the economy (Anago, 2001). This has resulted in NCI being described as a '*sleeping giant*' within its continental neighborhood in terms of: service delivery, contribution to the economy and, the capacity to satisfy the needs of its clients (IDr.us & Sodangi, 2010; Idoro, 2014; Ibrahim. & Musa-Haddary, 2010).

NCI is said to be '*sleeping*' because it has severally been credited with inability to deliver services effectively and efficiently (Ibrahim& Musa-Haddary, 2010). For instance there have been several reports of poor management of projects: rushed project implementation, inadequate planning and budgetary provisions, projects executed at high cost, inefficient and poor service delivery, abandoned or non-functional facilities, and collapsed buildings (Ibrahim & Musa-Haddary, 2010). More so, the industry is dominated by foreign contractors due to the incompetence and non-involvement of the indigenous contractors in major construction projects (Odediran, *et al.*, 2012; Aniekwu & Audu, 2010; Muazu & Bustani, 2004)

Additionally, many completed or on-going projects in Nigeria are deficient in performance objectives because clients and customers are not satisfied, project time and cost overruns, low quality and shoddy outputs, project conflict between the contractors and claims arising from variation in contract sum (Ubani, *et al.*, 2010). Oyegoke (2005) cited in Ibrahim (2012) identifies and categorizes the constraint in infrastructure development in Nigeria into two forms:

- **Internal constraints:** This involve the shortcomings in the entire society starting from governance, investment and financial institutions, professional bodies, contracting firms and developers, project owners and educational institutions and;

- **The external constraints:** These are centred on the reputation of Nigeria, especially with regard to scams, a high level of corruption, limited security of life and property, and economic risks and uncertainty.

Moreover, construction, like other industries, has been experiencing profound changes involving both the business environment and internal organization (Marchesan & Formoso, 2000 cited in Inuwa, 2006). Inuwa (2006) reported that most industries are dynamic in nature and the construction industry is no exception. Its environment has become more dynamic due to the increasing uncertainties in technology, budgets and development processes. The industry's construction project of the 21<sup>st</sup> century is becoming a more complex process that spans many phases, is technologically Driven, has many stake-holders, involves new types of clients, and finances and project organizations (Oyegoke, 2006). This has resulted in changes in construction methods that affect the structure of the industry, the roles of parties, and the procurement methods employed (Oyegoke, 2006).

The procurement of building projects, according to Rashid *et al.* (2006), is vast in scope because it involves the gathering and organizing of myriads of separate individuals, firms and companies to design, manage, and build construction products such as houses, office buildings, shopping complexes, and roads, bridges, and so on for specific clients. The different building procurement systems brought changes not only to the process and procedure of project delivery but also to the aspects of management and organization (Rashid *et al.*, 2006; Bennett, 2003). The dynamism in the construction industry and the demand for modern procurement systems obviously

requires the contractors to gear up to the demands brought about by the dynamism of the industry, if they are to remain relevant in discharging their duties.

### **2.3 Construction Contracting Business**

Construction contracting is a business that rapidly emerged in developing countries during colonial rule and shortly after World War II (Laryea & Mensah, 2010; Uduak, 2006; Harris & McCaffer, 2005). The owners of contracting business are referred to as contractors. Their statutory business registration, according to Harris and McCaffer (2005), can either be sole-proprietorship, partnership, or corporation. As a firm, their primary responsibility is to ensure that all resources; manpower, machinery, materials and money are employed optimally for the efficient delivery of a project, and to produce maximum profit for the investors in the enterprise (Olateju, 1992 cited in Fagbenle, *et al.*, 2011; Saleh, 2004). Contractors form the backbone of the construction business as they execute most of the construction work. They occupy a significant position in the construction industry, hence are regarded as major players in it (Chitkara, 2012; Usman, *et al.*, 2012b).

Contractors role in the management of modern construction projects is circumscribed within design and management decisions, direct physical production of the facility on site, project close-out/final accounting, and rehabilitation and maintenance of existing facilities (Windapo, 2013; Babatunde, *et al.*, 2010; Oyegoke, 2006; Rashid, *et al.*, 2006; Harris & McCaffer, 2005). Construction contractors' participation in a building projects can either be in the form of Main/General Contractors', Subcontractors' or Prime contractors' (Laryea & Mensah, 2010; Ricketts, 2000).

The concept of general contracting according to Laryea and Mensah (2010) refers to the professional practice or system where an organization or individual undertakes to supply the resources and services required to execute a project in accordance with a contract document. General contractors usually assume responsibility for an entire construction project, but may subcontract to Subcontractors' all of the actual construction works or those portions requiring special skills or equipment (Popescu, *et al.*, 2003; Ricketts, 2000). Legally, Subcontractors' are in contract with the General Contractors' rather than the client even when the client has stipulated which subcontractor is to be used (Baily, *et al.* 2008; Popescu, *et al.*, 2003; Ricketts, 2000). The essence of subcontracting according to Baily, *et al.* (2008), is to augment the general contractor's limited resources and skills while enabling the general contractor to concentrate on their main area of expertise.

Sometimes (Ricketts, 2000), in addition to a general contractor, the owner's (client's) contracts separately with specialty contractors, such as electrical and mechanical contractors, who perform a substantial amount of the work required for a building. Such contractors are called Prime contractors'. Their work is scheduled and coordinated by the general contractor, but they are paid directly by the owner (Ricketts, 2000). Basically contractors' are required by virtue of their business to provide materials or a service to another (clients') for a set of fee (Inuwa, *et al.*, 2013). In modern day construction business, contractors are faced with challenges which amongst others include: higher clients' requirements through increasing complexity of modern construction procurements, globalization, impact of computerization and, competition within the industry (Mbamali & Okotie, 2012;

Babatunde *et al.* 2010; David, *et al.*, 2007; Oyediran, 2006; Rashid *et al.* 2006; Harris & McCaffer, 2005). Moreover, clients' quest for efficiency and Drive for competitiveness are the fundamental goals of the globalized economy (Oyediran, 2006). Hence, in strategic terms, contractors must understand clients' needs and values if they want to differentiate themselves from their competitors (Holder & Coffey, 1997). Contractors according to Oyediran (2006), who are able to deliver the clients' needs and values (goals) will certainly be the best choice of the industry and this enables a contractor to enjoy full endorsement and patronage from the industry's clients.

## **2.4 Nigerian Indigenous Contractors**

In Nigeria, construction contractors are categorised by several criteria (Idoro, 2011; Idoro & Akande-Subar, 2008; Muazu & Bustani, 2004): scope of operation (local, regional, national and multinational); specialization (building and engineering); size and category of contracts (small, medium and large); and the company's owners' nationality (foreign and indigenous). Most frequently the comparison of the performances of foreign and indigenous firms is of concern to many researchers in the NCI. Indigenous contractors are contracting firms that are fully-owned and managed by Nigerians (Idoro & Akande-Subar, 2008); the nationality of the firms' ownership and management is exclusively Nigeria.

### **2.4.1 The NICs Project Management Performance**

The debate on project management performance in the NCI centres mainly on the performances of foreign and indigenous contractors (Aniekwu & Audu, 2010; Idoro & Akande-Subar, 2008; Muazu & Bustani, 2004). The expectation of construction

clients' and other stakeholders' on contractors' project performance is to meet delivery dates, budgets, quality, as well as stakeholder satisfaction (Gollenbeck, 2008). However, there are conflicting views amongst researchers on the NICs meeting the expected projects management performance. To Uduak (2006) and Y. Ibrahim (2012) the NICs performance in managing projects is better and they claimed that they can be entrusted with large and highly technical projects. On the other hand, most researchers acknowledge that the NICs performance is marred with: abandonment, cost and time overruns, poor quality, poor workmanship; poor management capability, financial difficulties, poor planning, poor mechanization and high frequency of litigation (Oladimeji & Ojo, 2012; Idoro & Akande-Subar, 2008; Muazu & Bustani, 2004; Achuenu, *et al.* 2000).

Many researchers have attributed NICs poor performance to incompetence, inexperience, poor planning and the adoption of a traditional management approach, which has been proven to be ineffective in the management of construction projects (Ekundayo, *et al.*, 2013; Aniekwu & Audu, 2010; Muazu & Bustani, 2004; Adams, 1997). These have resulted in poor management and low productivity of the NICs compared to their foreign counter-parts, and causing a major percentage of the total projects in Nigeria to be given to foreign contractors (Aniekwu & Audu, 2010; Muazu & Bustani, 2004).

Contracting is a high risk business (Seeley, 1986, p.254). Consequently, it is a terrain that calls for high specialization (Muazu & Bustani, 2004). Thus, it is practically impossible to diligently run a construction firm without the requisite project management knowledge (Alzahrani & Emsley, 2013; Yimam, 2011; Freeman, 2011).

However, by comparison, one is at pains to claim finding an indigenous firm in Nigeria able to match, or surpass the skill and competence of foreign firms (Muazu & Bustani, 2004). The greatest single edge a foreign firm has over an indigenous firm according to Muazu and Bustani (2004) is efficient management.

The outcome of the NICs underperformance to the Nigerian economy has resulted in: low income generation and redistribution due to foreign firms repatriating their profits abroad; an insignificant value addition to construction and local industries supplying construction materials; and consistent contribution of 1% employment over the last decade as against the World Bank's average observation of about 3.2% in other developing countries (Aniekwu & Audu, 2010; Idrus & Sodangi, 2010). Consequently, this is preventing the country from fully benefitting from the industry's contribution to economic growth (Aniekwu & Audu, 2010; Bala, *et al.* 2009; Adams, 1997).

## **2.5 Construction Procurement**

Synonymous with the word 'procurement' in the Oxford Dictionary of English (2010) are: 'the act of getting possession of something'; 'to acquire something'; and 'the action of obtaining or procuring something'. The United Nation Commission on International Trade Law (UNCITRAL) (1994) cited in Ibrahim(2008, P.4), defines procurement as the process used for the acquisition of goods, works, and related services (i.e. transportation, insurance, installation, training, maintenance and other similar services) required in the execution of a project, excluding consultancy services.

From the construction point of view (Ibrahim, 2008), procurement is broadly divided into two: general procurement and construction specific procurement. General procurement is concern with the acquisition of goods and services (Ibrahim, 2008). It is simple to execute in comparison to the construction-specific procurement (Ibrahim, 2008). Construction-specific procurement is a series of interdependent operations (process) undertaken within a well-defined framework (system) used in acquiring a construction project. According to Rashid *et al.* (2006) construction procurement is an organized method or process and procedure of obtaining or acquiring a construction product such as a house, shopping complex or road and jetty. It also involves arranging and coordinating people to achieve prescribed goals or objectives (Rashid *et al.*, 2006). According to Ibrahim (2008) construction-specific procurement is more complex than general procurement, hence the need for the management of the process to be undertaken by people with appropriate knowledge, skills, expertise and tools. Its complexity stems from its extensive process and variance of systems (Hughes, 2012; Idoro, 2012a).

### **2.5.1 Construction Procurement Process**

Construction procurement process is a series of operations or actions taken to achieve the intended aim of construction project procurement (Harris & McCaffer, 2005; Anyadike, 2000; Aqua Group, 1999). The scope of a construction procurement process is extensive and covers every aspect of project delivery (Idoro, 2012a; Hughes, 2012; Harris & McCaffer, 2005; Ayandike, 2000). According to Ayandike (2000), Harris and McCaffer (2005), it comprised:

- **Initiation**- identification of product or service

- **Preliminary**- feasibility studies, strategic and finance planning, preliminary estimation
- **Evaluation of project brief**- engineering/construction technology and costing, approximate quantities method-estimation
- **Design management**- detailed drawings and cost planning (cost allocation and target)
- **Contracts and procurement**-contractor selection (bid invitation and evaluation)
- **Manufacture and construction**- installation and construction (Actualization of plan)
- **Commissioning**- handing over and commissioning
- **Facility management**- operation and maintenance

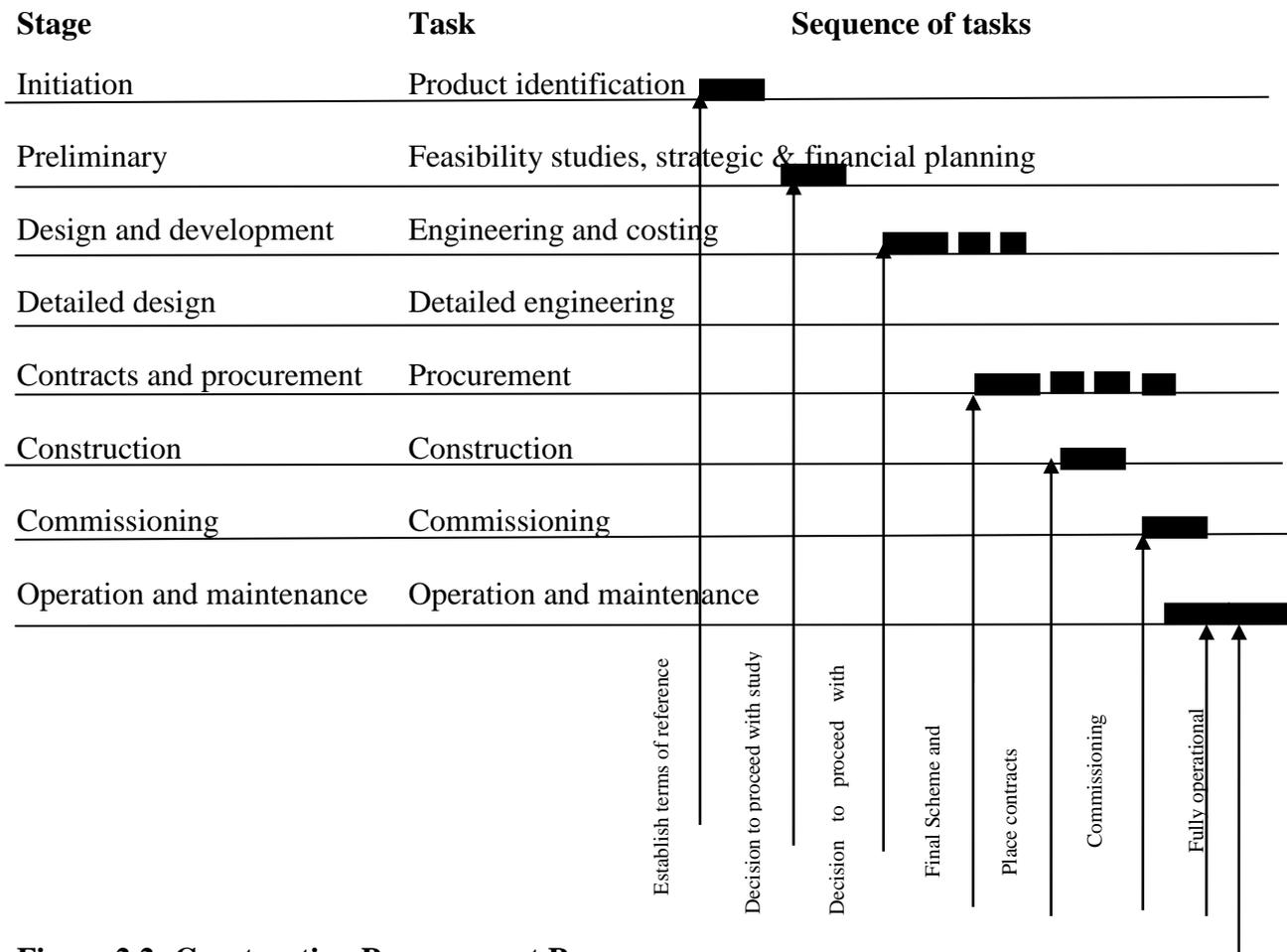
The procurement phases shown in figure 2.2 depicts the process in construction procurement and it shows the stages, operations or task and sequence of task to be undertaking by the key players (clients, consultants and contractors) in building project procurement systems.

The contractor's role in a procurement system defines his contractual obligation and this role may include the following stages in the procurement process:

- i. **Initiation-to-commissioning**: here the contractor is involved in management contracting (MC);
- ii. **Design and development-to-commissioning**: here the contractor is contracted to design and build (DB);

- iii. **Integrated design development-to-commissioning:** here the contractor complements his design with other designs and developed, refers to as design and construct (DC);
- iv. **Manufacture and construction-to-commissioning:** here the contractor is only involved in the construction of the facility; the designed is done separately by a consultant and this is refers to as design-bid-build (DBB) and;
- v. **Initiation-to-operation and maintenance** (All-in-contract: Turnkey): here the contractor is responsible for financing, design, construction and commissioning and, in some cases is also responsible for facility management (maintenance).

The role of the contractor in the construction procurement process is determined by the procurement system adopted by the client. Therefore, the role defined to the contractor by the adopted procurement system constitutes the contractor's scope of operational planning.



**Figure 2.2: Construction Procurement Process**

**Source:** Harris and McCaffer (2005)

### 2.5.2 Construction Procurement Systems

The term construction procurement systems according to Ibrahim (2008), is synonymous with the terms: procurement methods, procurement routes, contractual arrangement, procurement strategy, and project delivery systems. Construction procurement system is an organizational system that assigns specific responsibilities and authorities to people and organizations, and defines the relationships of the various elements in the construction of a project (Love *et al.*, 1998 cited in Ibrahim, 2008). Construction project procurement systems according to Oyegoke (2006),

establishes the contractual framework that determines the nature of the relationship between the project team within the duration of their interaction.

For the organization of building projects, different project procurement systems exist (Gollenbeck, 2008) and are available for meeting different clients' needs and projects specifics (Babatunde, *et al.*, 2010). Construction project procurement systems are broadly categorized into two: traditional and non-traditional system (Harris & McCaffer, 2005; Babatunde, *et al.*, 2010; Mathonsi & Thwala, 2012).

### **Traditional Procurement Systems**

Traditional Procurement System is also referred to as separated contract, fragmented contracts, or design-bid-build (DBB) (Oyegoke, 2006; Harris and McCaffer, 2005). The name 'traditional' according to Mathonsi and Thwala (2012), is due to the system existence for a long time and has been the only choice available for most clients of the construction industry for many years. The system imposes a contractual and organizational separation between design and construction (Dada, 2012). At the design stage consultants' (Architects; Engineers; Quantity Surveyors; etc.) are responsible for all the tasks required (Babatunde, *et al.*, 2010; Ojo, *et al.*, 2006), while at the construction stage the contractor is responsible for the construction of the facility as designed and specified by the consultants (Ojo *et al.* , 2006; Babatunde, *et al.*, 2010). In essence (Mathonsi & Thwala, 2012), the client is under two contractual obligations: consultants and the contractor. There are different types of separated contracts: lump sum; bill of quantities; schedule of rates; fixed or percentage fee; cost reimbursement; target cost; and direct labour (Harris and McCaffer, 2005; Bennett, 2003).

## **Non-Traditional Procurement Systems**

According to Mathonsi and Thwala (2012), non-traditional is a generic term used to refer to all emerging or contemporary procurement systems of the construction industry other than the traditional procurement system. Under this system falls the management oriented approach, integrated approach, and special task organization (discretionary contract). What informs the emergence of this system is considered in twofold:

firstly, the shortcomings of the separated contract due to the fragmentation of building projects into two mutually exclusive entities (design and construction) and, subsequently, creating room for ineffective communication and coordination, which often results in conflict between the designers and the contractors, and often affects the quality of a project by not taking into consideration buildability/constructability and life-cycle costing (Ojo *et al.* 2007; Oyegoke, 2006).

Secondly, the increased size and complexity of construction projects, financial challenges, political and social consideration, and information technology (Mathonsi & Thwala, 2012). The ultimate reason for the introduction of non-traditional project procurement system is to achieve more efficient and speedier project delivery systems and better project performance (Babatunde, *et al.*, 2010; Rashid *et al.*, 2006).

### **2.6 Contractors' Role in Procurement Systems**

Both traditional and the non-traditional project procurement systems have the client, contractor and the consultant (designer) as the major players, and other individuals as part of the project team (Rashid, *et al.*, 2006; Bennett, 2003). The relationships of the

project team members vary according to different systems and ownership (Bennett, 2003). These differences in systems and ownership brought changes to the process and procedure of project delivery and to the management and organization of a project (Rashid *et al.* 2006; Bennett, 2003).

The different systems also prescribe the variation of the organizational structure of the project teams in terms of role, responsibility and authority (Rashid *et al.*, 2006; Bennett, 2003). This implies that the role of a contractor keeps changing with different procurement systems allocating different roles to contractors and other stakeholders (Rashid, *et al.* 2006). Hence, in each of the building procurement systems, contractors play different roles according to different procurement systems. It is therefore imperative for the contractors to note that successful execution of their building project, undertaken within the scope of any type of procurement system, depends on the understanding of their role, and limitation, the role of other parties, as well as how they interrelate to define their contractual relationship (Gollenbeck, 2008).

### **2.6.1 The DBB Systems**

According to Babatunde *et al.*, (2010) the design-bid-build (DBB) system is a project procurement system where the three sequential phases of design, bid and build are identified as separate tasks. Under this system, the responsibilities of designing and construction of the project are separated and are carried out by different independent organizations namely: the consultants are responsible for the projects designs as well the organization and overseeing of the bidding process, while the contractors' role is primarily to construct the facility based on the drawings and specification prepared

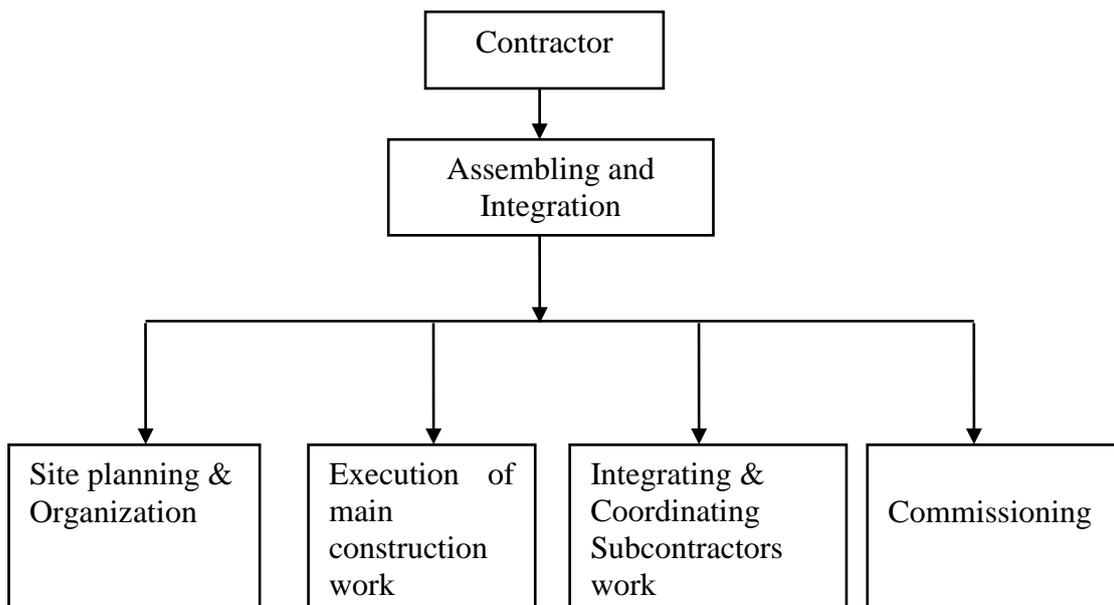
by the client's consultants (Harris & McCaffer, 2005). In executing the construction works, the contractor is responsible for: the detailed activity definition, the activity sequencing, the activity duration estimation, and the resources requirements (schedule development) (Oyegoke, 2006).

The contractor can as well sub-contract some or most of his work to specialist firms but he remains liable. In addition, the contractor is also responsible for attending and integrating the sub-contractors work with his own (Oyegoke, 2006; Rashid *et al*, 2006). The main contractor's responsibilities ends at the construction stage and do not cover facility/maintenance management (Oyegoke, 2006).

The contractor should always remember that meeting the needs and values of the clients as dictated by the terms of the contract is of paramount importance for meeting the contract objectives (Holder & Coffey, 1997). As a guide to the contract and a representative of the clients, the lead consultants (architect/engineer/project manager), though not in contract with the contractor, are mandated at the construction stage for supervision of the construction works, issuance of variation order, sanction payments, claims negotiation` and settling matters of disagreement arising with the parties to the contract (Harris & McCaffer, 2005).

The main sub-classification (variants) of DBB procurement system as identified by Babatunde *et al.*, (2010) and, Harris and McCaffer, (2005) are: bills of firm quantities; bills of approximate quantities; drawings and specification; schedule of rates; cost reimbursement; fixed or percentage fee; and target cost and direct labour. All the options maintain the separation of design and construction, the variants in the

DBB system determines the basis of contractors tender and how the contractors cost of construction is arrived at (Harris & McCaffer, 2005). The



**Figure 2.3: Contractor’s operation in DBB system**

**Source:** Author (2013)

Figure 2.3 depicts the operations of a contractor in the DBB system. The overall responsibility of the contractor in the DBB systems is to manufacture a building in accordance with the building design and specification, as well as the integration of the subcontractors work. Hence his operations include: site planning and organization, execution of the main construction work, integrating and coordinating subcontractors work, and commissioning (Figure 2.3).

### **2.6.2 Management Oriented Contracts**

According to Rashid *et al.* (2006), management oriented contract is a system that gives greater emphasis to the management and integration of the design and

construction of projects. According to Rashid *et al.* (2006), this procurement approach was introduced based on the conception that a contractor has more expertise to manage the design and construction of a project. As management consultant, the appointed contractor does not carry out the design or construction of the project. His main responsibility is to manage the design and construction of the design, the consultants, and the many specialist contractors respectively (Oyegoke, 2006; Harris & McCaffer, 2005).

According to Harris and McCaffer (2005) the construction manager or managing contractor joins the professional team at the earliest possible time prior to construction, and on equal terms to other consultants. The responsibilities of the contractor include preparing the overall construction programme and work packages, steering these through the design stage, recommending/appointing the works (sub) contractors and securing their smooth integration (Harris & McCaffer, 2005).

The well-established traditional forms of agreement generally apply to the management contract with contracts between client and designer, client and contractor, contractor and sub-contractors (Harris & McCaffer, 2005). Management oriented contracts are sub-classified as (Rashid *et al.*, 2006; Oyegoke, 2006; Harris and McCaffer, 2005): management contract/ At-risk construction management; construction management contract/Agency construction management and; design and management contract.

### **The Construction Management Contract (CM)**

The construction management contract also referred to as agency construction management (CM), is a fee-based arrangement in which the construction manager is

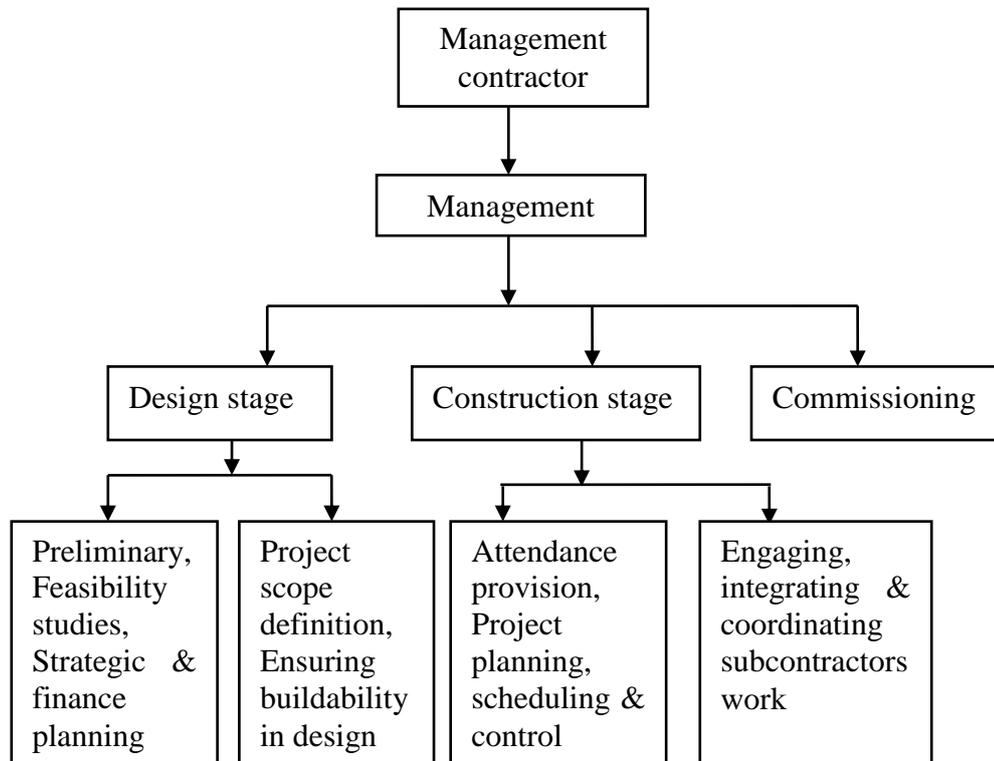
responsible exclusively to the owner and acts in the owner's interest at every stage of the project (Oyegoke, 2006). In agency CM system, the client initiates the project and involves a construction manager at the onset (Oyegoke, 2006). The contractor (construction manager) is appointed early according to Harris and McCaffer (2005), to plan, manage and co-ordinate the project.

According to Harris and McCaffer (2005) the construction management contractor is not allowed to carry out any construction itself; the actual construction works are contracted out to many package or specialist contractors (Rashid *et al.*, 2006). The client has a direct contract with each individual works contractor (sub-contractors) and since all the actual orders with the various works contractors are with the client, the construction manager carries virtually no risks (Harris & McCaffer, 2005).

The contractor (construction manager) offers advice on (Oyegoke, 2006): the optimum use of the available funds, control of the scope of work, project scheduling, avoidance of delays, changes and disputes, enhancing project design and construction qualities, and optimum flexibilities in contracting and procurement. The construction manager is involved in comprehensive management in every stage of the project, beginning with scope planning, in the form of a written scope statement, which outlines the project objectives, the agreement between the client and the project team, and the major project deliverables.

The construction manager is also involved in the project scope definition by subdividing the major projects into smaller deliverables by trade. The construction manager co-ordinates and monitors the various trade contractors, who become direct

(prime) contractors to the owner (Oyegoke, 2006). The construction management firm according to Harris and McCaffer (2005) takes responsibility for advising the designer on buildability, including drawing up suitable work package contracts, arranging procurement contracts and managing the bidding phases of the works contracts. Though, the services of the construction manager (agency) do not extend to facility/maintenance management (Oyegoke, 2006). The duties and services provided by the construction management firm (contractor) are akin to those of a project manager (Harris & McCaffer, 2005). In addition, contractors who specialize in programming with solid management skills stand a better chance in delivering construction management contracts successfully (Harris & McCaffer, 2005). Figure 2.4 shows the scope of construction management operations.



**Figure 2.4: Management/construction management contractors' operations**

**Source:** Author (2013)

### **The Management Contract**

The management contract is one where a main contractor is appointed (Seeley, 1986) either by negotiation or in competition, and works closely with the employer's professional advisor (s). The contractor is engaged early to provide planning, management and co-ordination of construction, and then sub-contracts the work (Harris & McCaffer, 2005).

All physical construction is undertaken by sub-contractors (Seeley, 1986), the main contractor is barred from carrying out any construction work itself as in construction management (Harris & McCaffer, 2005). According to Seeley (1986) the works are divided into packages agreed to by the employer's professional advisor (s) and the

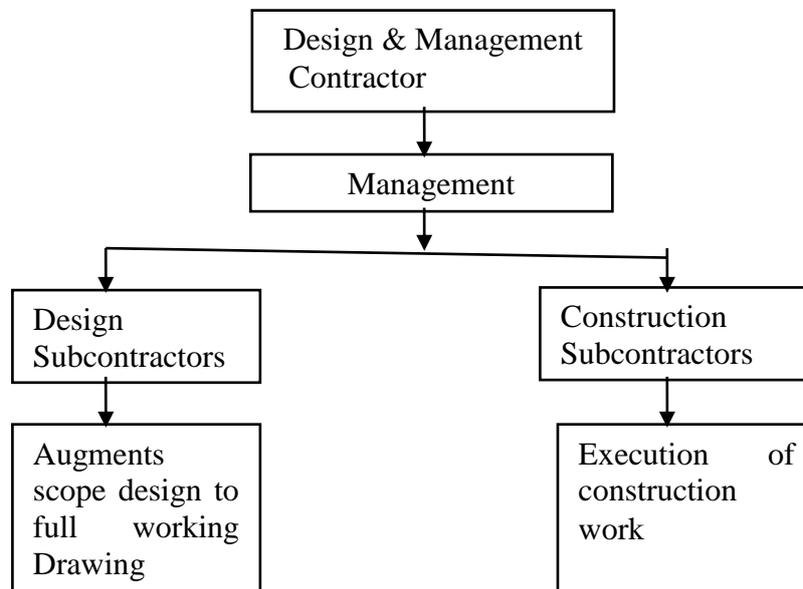
management contractor as the most appropriate for the particular project. Although on some projects the contractor provides common items for sub-contractors like (Harris & McCaffer, 2005): scaffolds, tower crane and access road. According to Seeley (1986), the management contractor provides common services to the sub-contractors such as welfare facilities, and plant and equipment that are not confined to one sub-contractor, and sufficient management both on and off the site to undertake the planning and management, co-ordination and control of the project. The management contractor performs similar duties to the construction manager, but carries more risk (Rashid *et al.*, 2006). Figure 2.4 also portrays the scope of management contractors operations.

According to Rashid *et al.* (2006) the main difference between management contract and construction management contracting is that in the former, the package contractors (sub-contractors) have a contract with the management contractor. In the latter, the package contractors (specialist sub-contractors) are in contract with the client or building owner. The management contractor's role is primarily that of a planner, manager and organizer (Seeley, 1986). The services of the management contractor do not extend to facility/maintenance management (Oyegoke, 2006).

### **Design and Management Contract**

Under the design and management system, a single organization or firm is commissioned to be responsible for designing the project and managing its construction (Rashid *et al.*, 2006; Harris & McCaffer, 2005). The initial scope design is often executed by the clients own staff or an independent design firm, and forms the basis for inviting tenders (Harris & McCaffer, 2005). Subsequently, a design and

management firm or company is engaged as a consultant for the client and become a member of the project team (Rashid *et al.*, 2006). The firm does not carry out the work itself (Rashid *et al.*, 2006), both design and construction are entirely sub-let by the design and management contractor to subcontractors and suppliers (Harris & McCaffer, 2005), who enter into contract with the client (Rashid *et al.*, 2006; Rashid *et al.*, 2006). Figure 2.5 is a diagrammatical representation of design and management contractors' scope of operations.



**Figure 2.5: Design and management contractor operations**

**Source:** Author (2013)

### 2.6.3 Integrated Contracts

This system, as the name implies, integrates or combines the responsibilities of design and construction of the project, and both responsibilities are contracted out to a single contracting organization (Rashid *et al.*, 2006). According to Harris and McCaffer (2005) the contractual arrangement in the integrated contract is a single point responsibility and accountability of the contractor to the client for execution of

both the design and construction facets. The contractor for the job will be selected on the basis of a project brief and client's requirements, prepared by the client together with his consultants (Rashid *et al.*, 2006). Very often the successful contractor will enter into a contract based on a lump sum price and a fixed duration (Rashid *et al.*, 2006).

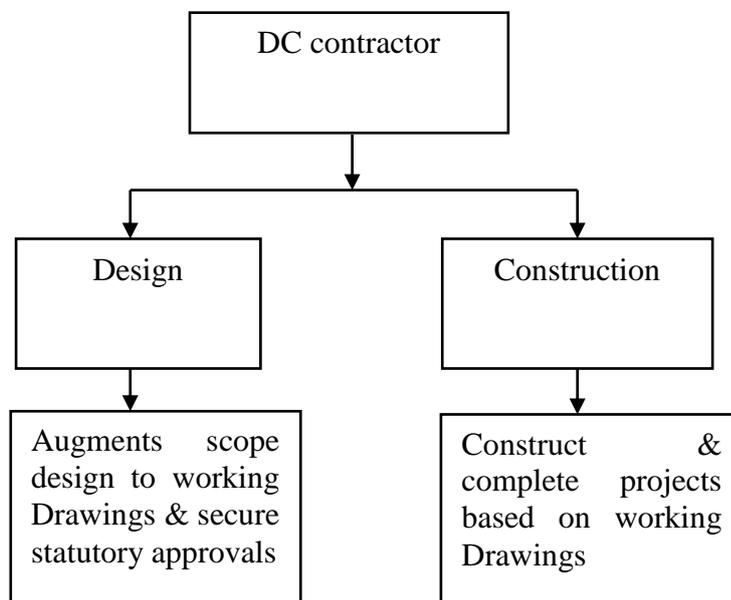
The client in the integrated contract relinquishes control to some degree over the design; although, an advisor might be appointed but usually only to monitor the various aspects of the work and provide commercial management, should the client feel the need to engage this kind of service when lacking in-house expertise (Harris & McCaffer, 2005). Types of integrated contract include (Rashid *et al.*, 2006; Harris & McCaffer, 2005): design and construct; design and build contract; all-in (Turnkey/package deal) contract; and private finance initiative (PFI).

### **Design and Construct Contract (DC)**

This system is also referred to as develop and construct (Rashid *et al.*, 2006). In this system the contractor is given the responsibility to design and construct (Rashid *et al.*, 2006), but his design responsibility is shared with the client consultant. According to Harris and McCaffer (2005) the client separately engages an architect in the case of a building work to produce a scope drawings generally relating to specific functional or essential aesthetic details, and specification fully describing the design.

The contractor thereafter augments (integrate) the Drawing with their own working Drawings and secures all statutory approvals including those needed from the

consultant (advisor) (Harris & McCaffer, 2005), or the contractor may re-employ the original designers to complete the design (Babatunde, *et al.*, 2010). Subsequently, the contractor then constructs and complete the project based on what it has developed (or adopted) and produced (Rashid *et al.*, 2006). Figure 2.6 is a diagrammatical representation of design and constructs contractors’ scope of operations.



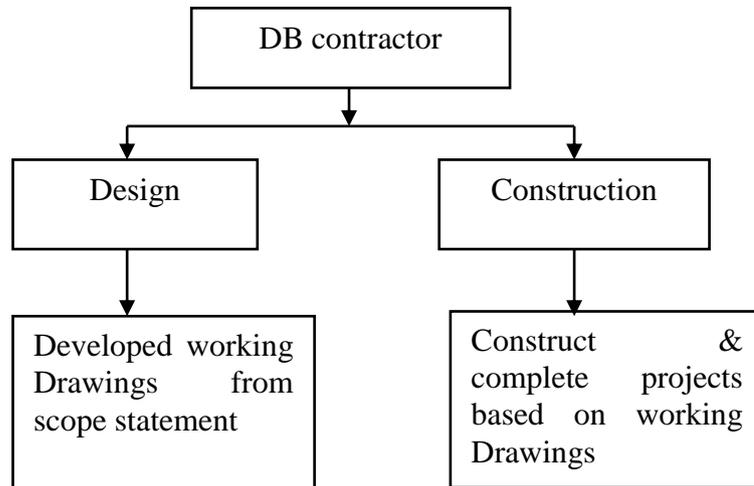
**Figure: 2.6: Design and construct contractor operations**

**Source:** Author (2013)

### **Design and Build Contract (DB)**

In a typical Design and Build (DB) contract, the owner initiates the project and produces a written scope statement in terms of performance parameters. The DB contractor defines the scope definition by subdividing the major project into smaller deliverables (Oyegoke, 2006). The contractor is responsible for construction and the full design, embracing the production of aesthetics and working drawings, as well as obtaining statutory approvals (Bennett, 2003). Hence, there is no sharing of design

responsibility at all (Harris & McCaffer, 2005). Figure 2.7 depicts the scope of contractors operations in DB system.



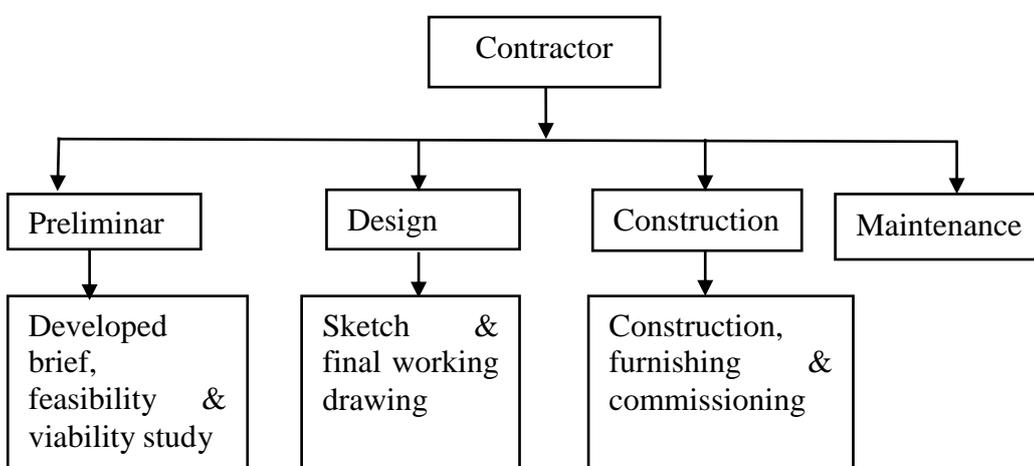
**Figure 2.7: Design and Build contractor operations**

**Source:** Author (2013)

### **All-in Contract**

Under the all-in contract system, a contractor provides an ‘off the- shelf building’. The building type is often modular so that its size can be adjusted (Babatunde, *et al.*, 2010). The client, according to Seeley (1986), uses a broad outline requirement prepared by an architect/engineer on his behalf to engage a contractor. All-in contract are sometimes referred to as package deals and, in practice, the arrangements may range from projects where the contractor uses his own professional design staff and undertakes complete design and construction, to projects where the contractor specializes in a particular form of construction and, offers to provide a full service based on preliminary sketch plans provided by the client architect/engineer (Seeley, 1986). The client may require the contractor to finance the project until it is revenue producing, in which case it is often referred to as a turnkey contract (Seeley, 1986).

According to Rashid *et al.* (2006), under this system, the services of the contractor will include the preparation of project brief, sketch and final working drawings, getting all the approval from authorities, project financing, construction, furnishing and commissioning of all equipment and accessories, handing over the project to the client, and probably maintenance of the works for a limited period (Seeley, 1986).



**Figure 2.8: Contractor’s operations in All-in-contract**

**Source:** Author (2013)

## **2.7 Application and Performances of Building Project Procurement**

### **Systems in Nigeria**

Several studies have shown that both traditional and non-traditional procurement systems are currently embraced in Nigeria (Ikediashi *et al.* 2012; Idoro, 2012b; Mbamali & Okotie, 2012; Babatunde *et al.* 2010; Ibrahim, 2008; Ojo, *et al.*, 2006). According to Ojo *et al.* (2006) direct labour, which is a traditional system, was mainly used during the colonial era all through the 1960s in the execution of construction projects in Nigeria and to date (Ibrahim, 2008), direct labour is still minimally used across the three tiers of government (Federal, States and Local

government), primarily for maintenance and new works of minor nature. However, direct labour projects are said to be ineffectively managed resulting in cost and time overruns (Mbamali & Okotie, 2012).

The oil boom in Nigeria and the need for reconstruction and rehabilitation works to mend the havoc resulting from the Nigerian civil war that ended in 1970, ushered in the use of the design-bid-build (DBB) procurement system (traditional) into the NCI (Mbamali & Okotie, 2012; Ojo *et al.* 2006). This system was also used by the National Housing Policy (NHP); a policy enacted into law in 1991 by the Nigerian Government to provide decent housing accommodation at affordable cost for the country, in adherence to the campaign launched by the United Nation (UN) tagged 'Housing for All by the year 2000'. Though, the DBB method was later discovered to bring long delays in project conception and delivery, leading to high project cost (Mbamali & Okotie, 2012; Ojo *et al.* 2006 citing Osemenam, 1992).

Despite the criticism of the performance of DBB system in Nigeria, the system is still used by government establishments and some uninformed private clients (Ojo *et al.*, 2006). The shortcomings of the traditional systems (Direct labour and DBB) in Nigeria brought about the emergence of the non-traditional procurement systems amongst which is the design and build (DB) method (Mbamali & Okotie, 2012; Ikediashi, *et al.*, 2012 cited in Ikediashi, *et al.* 2010). The DB option, according to Babatunde *et al.* (2010), is one of the procurement systems that have gained prominence in the NCI. However, its application in Nigeria records high time and cost overruns (Idoro, 2012b).

The use of management contracting (MC) in Nigeria, span back to the era of the defunct Petroleum (Special) Trust Fund (PTF) mass rehabilitation of key public infrastructure across the country in 1994-1999 (Hassan, 2004 in Ibrahim, 2008). Babatunde, *et al.* (2010) also reported that management oriented contracts and PPP/PFI are among the methods used in the execution of construction projects in metropolitan Lagos, although not as much as the DBB method. According to Ibrahim and Musa-Haddary (2010) the immediate past (1999-2008) and present governments (2008 to date) at various levels/tiers in Nigeria, encouraged the introduction of public-private partnerships (PPP) as a way of promoting active private sector involvement in the provision of public infrastructure and services, in an attempt to contain the infrastructure deficits in the country.

According to Mbamali and Okotie (2012), partnering, which is a discretionary procurement system has also evolved in Nigeria, though its application seems to be negligible due to management incapacity and poor client understanding of it. Despite the NCI experiences in the application of both the traditional and non-traditional procurement systems, the industry has not really achieved the comparative advantages of using those procurement methods in Nigeria. This according to Idoro (2012b), and Aniekwu and Audu (2010), could be attributed to weak institutions, poor practices and policies, and ineffective and inefficient planning, among other things. Idoro (2012b) stressed that several studies reveal that planning has a considerable effect on the outcome of projects. All the studies reviewed elicited vital information on the application of procurement systems and their performances in the

NCI, yet, none of the studies focused entirely on NICs involvement and performances in construction procurement systems in the NCI.

## **2.8 Construction Project Planning Techniques**

Eigege (2005, p.11) defines planning as a systematic devise to develop, on a continuing basis, specific courses of action towards a desired objective or goal in the most effective, efficient and economic manner. Planning as a process involves essentially answering the following questions in accomplishing any task: What are we going to do? Why are we doing it? When do we do it? How do we do it? How much will it cost to do it? Where do we do it and who does it? (Eigege, 2005, p.12) In this light, planning has four goals in any proposed task: to offset uncertainty and change, to focus attention on objectives, to make economic operations possible, and to assist managers in control (Krishnamurthy & Ravindra, 2010, p.2).

There are two main levels of planning associated with construction projects: strategic and operational (Seeley, 1986; Gahlot & Dhir, 1992; Harris & McCaffer, 2005; Bamisile, 2008). This study is delimited to contractors' operational planning at the post-contract stage of a building project. Operations here, refers to any activities or tasks a contractor is expected to accomplish in his contractual obligation using any type of construction procurement system. Projects operations, according to Gupta (2010), involve a large number of activities, and their constraints and resources cannot be visualized easily. Hence, it calls for project planning if success is to be attained (Gupta, 2010). Contractors' operational planning involves establishing a method statement for each activity which allows a detailed look at the project's

resource requirements, which are not obvious at the strategic level (Harris & McCaffer, 2005).

In addition, a contractor's operational plan incorporates a construction programme of works (Harris & McCaffer, 2005; Gahlot & Dhir, 1992). A programme of works primarily presents the sequence in which the various activities should occur with their associated durations and resource requirements (Harris & McCaffer, 2005, p.73). The contractor's development of his programme of work is a requirement stipulated in most conditions of contract used for building projects (Federal Ministry of Housing and Urban Development (FMHUD), 2006; JCT, 2005a; JCT, 2005b). Though, according to Scott (1995), the contractor's programme of work is not a contract document and as such, neither the contractor nor the client is bound by it. The contractor's programme of work is a document that conveys the contractor's intention on how he will execute his work. To arrive at an effective and efficient method statement and programme of work in construction, project planning techniques are used (Roberts & Wallace, 2004; Scott, 1995).

However, inadequate technical and managerial know-how of the NICs and their inability to utilize the appropriate project planning techniques has resulted in projects failure in Nigeria (Mbamali & Okotie, 2012; Aniekwu & Audu, 2010; Muazu & Bustani, 2004). Moreover (Scott, 1995), the conditions of contracts for building projects do not specify to contractors' what type of planning technique to use for their master programme (FMHUD. 2006; JCT, 2005a; JCT, 2005b).

There are many types of project planning techniques; understanding how they work and their inherent advantage is of paramount importance to contractors. The common project planning techniques are: bar charts and linked bar charts, line of balance, and the network method (Bhavikatti, 2012; Chitkara, 2012; Baily *et al.* 2008; Harris & McCaffer, 2005; Seeley, 1986).

### **2.8.1 Bar Charts and Linked Bar Charts**

The Bar chart also referred to as Gantt chart, was developed by Henry Gantt in 1900 originally for industrial production management and has since been widely used in construction management (Bhavikatti, 2012; Abubakar, *et al.*, 2008). The bar chart is a pictorial device that consist of two co-ordinate axes, one showing the time and the other showing project operations or activities, and each operation (activity) is shown by a bar (Bhavikatti, 2012; Krishnamurthy & Ravindra, 2010; Gahlot & Dhir, 1992) . The duration of the activity is indicated by the length of the bar; the left end of the bar shows the starting time, the right end shows the ending time (Figure 2.3) (Bhavikatti, 2012; Krishnamurthy & Ravindra, 2010).

The simplicity and visual clarity of the Bar chart makes it a very valuable medium for displaying job schedule information (Krishnamurthy & Ravindra, 2010; Bhavikatti, 2012;Passenheim, 2009). It is immediately intelligible to people who have no knowledge of network diagrams (Bhavikatti, 2012; Krishnamurthy & Ravindra, 2010). It provides an easy and convenient way to monitor job progress, schedule equipment and crews, and record project advancement (Bhavikatti, 2012; Krishnamurthy & Ravindra, 2010; Passenheim, 2009).

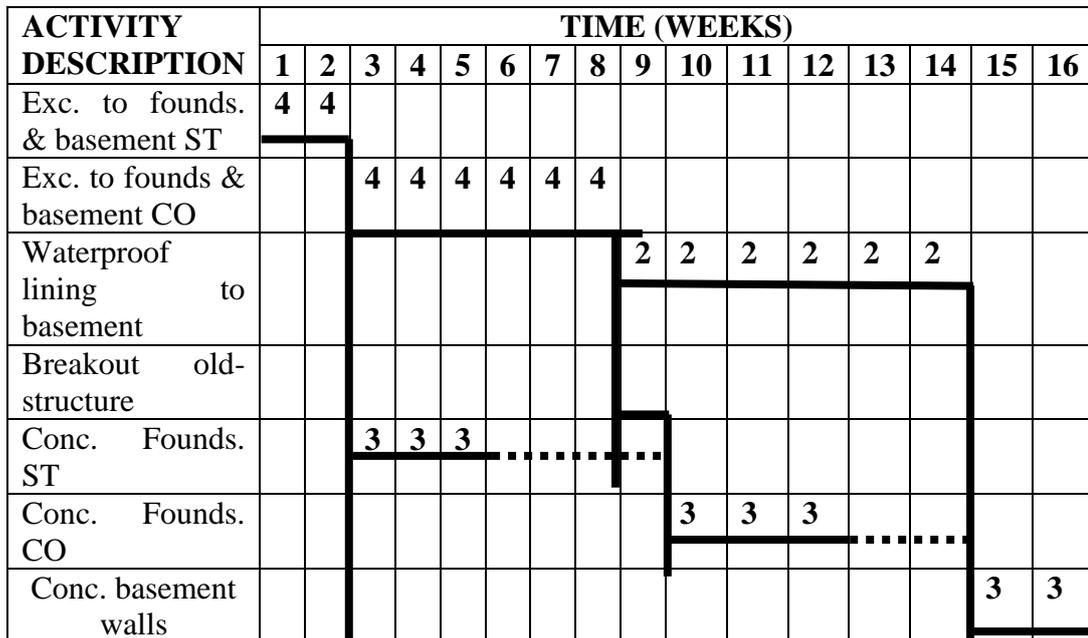
ACTIVITY	TIME IN MONTHS											
	1	2	3	4	5	6	7	8	9	10	11	12
1.Mobilisation	■											
2.Site clearance & excavation		■	■									
3.Foundation & backfilling			■	■								
4.Plinth				■	■	■	■					
5.Brickwork				■	■	■	■	■	■			
6.RCC roof								■	■			
7.Internal services									■	■		
8.Internal plaster										■	■	■
9.Steel & wood works											■	■
10.External plaster										■	■	■
11.Flooring											■	■
12.External services												■
13.Painting											■	■
14.Miscellaneous works											■	■
15.Commissioning												■

**Figure 2.9: Bar chart for a building work**

**Source:** Krishnamurthy and Ravindra (2010)

Nonetheless, bar charts have several limitations that make them ineffective for the planning and controlling of construction projects (Krishnamurthy & Ravindra, 2010; Abubakar, *et al.* 2008). Its shortcomings are: it does not indicate the interrelationship among the various activities, hence, the effect of delay of an activity on other activities cannot be seen easily; it does not indicate which activity is critical and which spare is available, consequently it does not convey to managers and workers what consideration must be given to the prerequisite activities; it does not reflect the exact progress of the work on the day of review and; its management does not work effectively where there are uncertainties in the expected time for an activity (Bhavikatti, 2012; Krishnamurthy & Ravindra, 2010; Abubakar, *et al.* 2008).

According to Chitkara (2012), bar chart is most useful for presentation of schedules, but not as a planning technique. It is often used for reporting and communication project schedule status (Roberts & Wallace, 2004). Passenheim (2009, p.64) reported that bar chart serves as a control chart for tracking and trending schedule performance. Their easy-to-understand visual format, according to Passenheim (2009, p.64), makes them the favoured tools for communicating schedule. Hence, the bar chart is mostly used to complement other techniques, especially the critical path method, and as a rough preliminary plan (Abubakar, *et al.* 2008; Bailey, *et al.* 2008; Roberts & Wallace, 2004). In an attempt to curtail the shortcomings of the bar charts, linked bar charts was introduced. Figure 2.4 shows a linked bar chart.



**Figure 2.10: A linked bar-chart**

**Source:** Harris and McCaffer (2005)

Linked bar charts retain the visual benefits of bar charts with increased emphasis on dependencies (Seeley, 1986, p.107); vertical lines indicate dependency between

activities; and broken lines indicate float (Harris & McCaffer, 2005). It takes the form of vertical links between the completion of one activity and the start of another, and emphasizes the coordination and construction sequence (figure 2.4) (Seeley, 1986, p.107). This according to Seeley (1986), allows the technique to be used for large complex projects. However, the float concept is generally missing and there is a limit to the amount of linking that is possible (Seeley, 1986, p.107), consequently, linked bar charts does not show all the interdependencies between activities in a project (Scott, 1995). Hence, the linked bar chart is not an appropriate planning technique for modern construction projects.

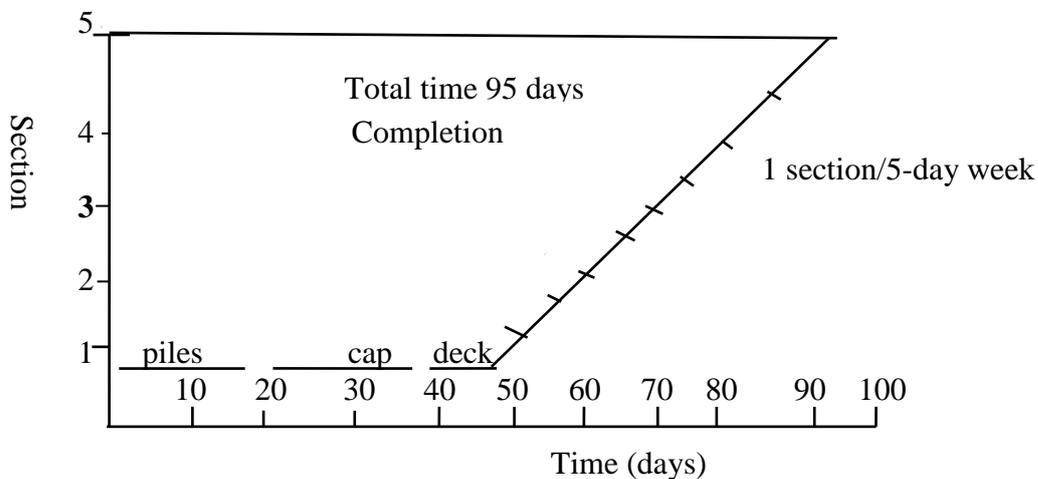
### **2.8.2 Line of Balance**

Line of balance (LOB) also referred to as elemental trend analysis is a project planning technique used for planning and controlling of repetitive or one-off projects (Kraemer, *et al.*, 2014; Harris & McCaffer, 2005; Seeley, 1986). LOB was derived from the manufacturing industry and was introduced in the construction industry by Nation Building Agency (UK) for repetitive housing projects (Arditi & Tokdemir, 2003 cited in Kraemer, *et al.*, 2014). LOB proposed planning activities in accordance to production capacity and as such, it is concerned with how many units a crew can produce in a certain time (Kraemer, *et al.*, 2014).

According to Seeley (1986, p.103), the use of LOB in planning and controlling construction works highlights the importance of activity completion, production rates, and the relationship between selected activities. The LOB is presented in graph format with axes of units of work against time (figure 2.10) (Kraemer, *et al.*, 2014; Seeley, 1986). From the graph according to Kraemer, *et al.* (2014), it is easy to

interpret the progress of each activity and it gives real information for decision making along the process.

However, Seeley (1986, p.103) argues that the LOB technique is not so readily understood as the bar chart. Figure 2.10 shows the operational planning for construction of a jetty. It involves the following operations: Drive piles construct pile cap, and fix deck.



**Figure 2.11: Line of balance**

**Source:** Harris and McCaffer (2005)

The LOB technique has a horizontal timescale and calendar, with cumulative output shown vertically (Harris & McCaffer, 2005; Seeley, 1986). Bar lines representing the various operations are inclined at different slopes to indicate the rate of working (Harris & McCaffer, 2005; Seeley, 1986). According to Harris and McCaffer (2005) and Seeley (1986) the LOB planning technique is suitable for repetitive work and strict operational sequencing and permits a high degree of control.

However, the LOB planning technique has some limitations due to being originally designed for simple repetitive production processes (Kraemer *et al.*, 2014). Firstly, it

shows only a limited amount of information and a limited degree of complexity (Kraemer *et al.*, 2014). Secondly, LOB can only identify a delay in one unit, or other changes in activities, but it cannot preview any accompanying delay in the total project completion (Suhail & Neale, 1994 in Kraemer *et al.*, 2014). Contemporary construction projects according to Chitkara (2012) and Hughes (2012), are complex, less repetitive and with a lot of systems. Hence, the LOB technique cannot adequately address the contemporary construction projects planning and controlling requirements, consequently LOB is not an appropriate project planning technique for modern construction projects.

### **2.8.3 Network Method**

According to Bhavikatti (2012, p.344) the network method is a project planning technique that involves representing graphically and in the form of a network all steps of a project. It is simply a precedence diagram with activity durations added to it (Roberts & Wallace, 2004). There are two major network systems (Bhavikatti, 2012): program evaluation and review technique (PERT), and critical path method (CPM).

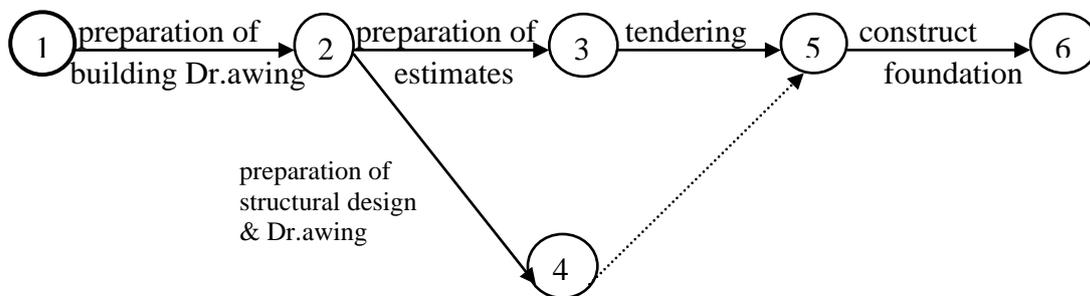
#### **Program Evaluation and Review Technique (PERT)**

PERT was developed by the US Navy in 1958 for planning and scheduling of the *Polaris Weapon System* (Krishnamurthy & Ravindra, 2010). According to Bhavikatti (2012), PERT is suitable for projects that are non-repetitive in nature, in which there is no precise idea about the time required for various activities. In construction (Bhavikatti, 2012), however, determining the time for various activities is not a problem, as a lot of previous data and experience are available. Hence, PERT

according to Bhavikatti (2012), is not a preferred technique in planning and scheduling construction works.

### **Critical Path Method (CPM)**

The CPM was developed in 1956 in the USA, by engineers' working for the DuPont Corporation in order to allow the programming of maintenance work during a chemical plant shut down (Krishnamurthy & Ravindra, 2010; Abubakar, *et al.*, 2008). CPM is a deterministic approach to project planning that uses estimates activity durations that are known (reasonably accurately) (Roberts & Wallace, 2004). CPM calculates the minimum completion time for a project, along with the possible start and finish times for the project activities (Bhavikatti, 2012; Roberts & Wallace, 2004).



**Figure: 2.12: A Typical CPM Network**

Source: Bhavikatti (2012)

CPM offers the following advantages when used in construction project management (Bhavikatti, 2012; Chitkara, 2012; Krishnamurthy & Ravindra, 2010; Kerzner, 2000): it identifies critical activities, so that management can concentrate on these activities to maintain the construction schedule; helps in crashing the project completion period by identifying activities to be crashed; identifies the most

economical construction period and resource scheduling may be prepared to suit that; resource mobilization can be planned well in advance; if some thing goes wrong, the activities to speed up can be identified and necessary action initiated; it helps in identifying the best combination of equipment and labour; it helps in identifying slack times for various activities, which helps in distributing labour; it rationalizes construction, costing and financing, and it provides the basic structure for reporting information.

Nonetheless, the CPM technique is criticised because (Kerzner, 2000): time, labour, and intensive effort is required to use them, and the ability of upper-level management to contribute to decision making have been reduced. In spite of its short comings, the CPM according to Olatunji (2010), has the capacity to identify key construction activities of a project, and this quality enables it to positively impact on project delivery. In addition, the CPM is argued by many to be the most preferable planning technique for construction project, due to its suitability for construction projects planning and scheduling (Bhavikatti, 2012; Krishnamurthy & Ravindra, 2010; Passenheim, 2009; Bailey, *et al.*, 2008; Abubakar, *et al.*, 2008; Roberts & Wallace, 2004; Scott, 1995).

#### **2.8.4 ICT Application in Project Planning**

The application of the appropriate project planning technique in modern day construction project management without the adoption of Information and Communication Technology (ICT), will not ensure successful project planning (Inuwa, *et al.*, 2013; Roberts & Wallace, 2004; Kerzner, 2000), because the planning and management of construction project involves and generates a lot of information

that needs speedy processing and accuracy in its output, that will be used in guiding the project manager's decisions (Khatri, 2000 cited in Inuwa *et al.*, 2012; Oladapo, 2006; Rashid, *et al.*, 2006; Harris & McCaffer, 2005).

ICT is a general expression covering the use and integration of computers, telecommunications and electronics (Browning, 1990 cited in Inuwa, 2006). The Computer has promised to be a reliable tool in all spheres of human endeavour (Oyediran & Odusami, 2005 cited in Inuwa, 2006). Its emergence, according to Kerzner (2000), has aided companies to implement project management very fast through computer based software for project planning, estimating, scheduling, and control. Project planning software packages have made it much easier to update and reschedule project plans, and they provide the information in the form of both bar charts and network diagrams (Roberts and Wallace, 2004, p.5/35). Roberts and Wallace (2004, p.5/35) emphasized that the combination of bar charts and network diagram will effectively communicate the project plan.

The industrialized countries like the US, UK, Canada, Sweden, Denmark, Finland and New Zealand, among others, have for long embraced the use of ICT for their construction projects operations and they have benefited from this, unlike developing countries, like Nigeria, where very few achievements in terms of computer usage in indigenous firms operations are recorded (Mbamali & Okotie, 2012; Inuwa, 2006; Muazu & Bustani, 2004). Hence, the adoption of ICT by the NICs in project planning and management is recognized as a very important factor that enhances project management performance and facilitates attainment of construction best practice (Mbamali & Okotie, 2012; Oladapo, 2006).

## **2.9 The NICs Project Planning Challenges**

The major blame for poor project performance of a structure, according to Idoro and Akande-Subar (2008), should be borne by contractors because they are directly responsible for its production. However, this is not always so; other factors hinder the performance of indigenous contractors in Nigeria (Aniekwu & Audu, 2010; Bala *et al.* 2009; Achuenu, *et al.* 2000; Adams, 1997). According to Adams (1997) challenges on contractors' performance emanates from the business environment, the client, or his representatives, and from contractors deficiencies. Within these three sub-classifications, Adams (1997) identified 26 factors, amongst which are: uncertainties in supplies and prices of materials, obtaining interim payments, access to capital, access to plant and equipment, company organization, shortage of skilled labour, incomplete contract documentation, inadequate communication with client and representatives, design changes, inadequate project planning and site management, contract disputes, inadequate technical know-how, poor meeting of contract deadlines, and corruption.

Bala *et al.* (2009) categorized challenges faced by NICs into government and firm-related ones. Government-related challenges, are problems created either directly or indirectly by the government and this has a significant impact on the development of the industry. The most severe of these problems are: an unfavorable business environment, a weak economy, corruption, lack of government patronage and patronage of foreign firms (Bala *et al.* 2009).

Firm-related challenges are problems internal to the firm and within the firm's control. These problems Bala *et al.*, stressed, can inhibit the firms from developing

core-capabilities from firm-specific resources. The most severe are: lack of vision, lack of entrepreneurial skills, limited technical expertise, limited plant and equipment, limited managerial expertise, limited trained manpower and inadequacy of local materials, among other problems (Bala *et al.* 2009).

Other challenges that contractors face in project planning are: non-availability of materials due to shortage or late delivery; plant, equipment and machine breakdown; change in demand, designs and rush orders; absenteeism of workers; and lack of communication between various functional areas of business (Teslang, 2004 cited in Ubani, *et al.* 2010). The fast changing environment, according to Chitkara (2012), also impose numerous time, cost and financial, legal, ethical, environmental, and logical constraints to projects.

Moreover, inferences from other studies acknowledged by Aniekwu and Audu (2010, p.1) reveal that the NCI is plagued by inefficient policies and practices, weak institutions and an adverse business environment, complicated by complex social and cultural practices, which make it difficult for indigenous contractors to perform efficiently. Such problems obviously affect the performance of the contractors' project planning in project execution. Consequent to these problems, the NICs are unable to contribute considerably, relative to their foreign counterparts in the country's construction industry (Bala, *et al.* 2009; Adams, 1997); which accounts for a substantial percentage of Nigeria's Gross National Product (GNP) as well as half of the government spending (Aniekwu & Audu, 2010).

## **2.10 Influencing Factors for NICs Project Planning**

The underperformance of the NICs due to management and project planning incapacity requires urgent attention to: avoid wastage, to ensure economic growth of the country, and expedite the NCI to meet construction best practice. To this end, Aniekwu and Audu (2010) discovered that a substantial part of the NICs performance problems can be addressed through training, pre-construction planning and the application of modern construction techniques and most importantly, through the understanding and application of project management techniques (Ekundayo, *et al.*, 2013; Gollenbeck, 2008).

Moreover, project management benefits contractors in accomplishing their work in construction that involves multiple priorities, complex and numerous tasks, datelines, constant communication across organization boundaries, limited resources with little precedence and guidelines (Weiss & Wysocki, 1992). The advantage of project management to the contractor according to Kerzner (2000, p.), is that its organizational structure allows the arrangement of work flow and project coordination vertically and horizontally across the various functional groups. This arrangement generates productivity, efficiency, and effectiveness. This also results in improved coordination and communication among employees and managers (Kerzner (2000, p.). Gollenbeck (2008) and Kerzner (2000) admitted that the contractors' project managers and their firms must have project management capability for them to succeed in contemporary construction business. Yimam (2011) also argued that contractors' successful delivery of a project depends on their project management capability.

Client demands for contemporary procurement systems pose a challenge to contractors (Harris & McCaffer, 2005; Bennett, 2003). Hence, for the contractors to be relevant, they need technical skills, management and entrepreneurial skills, good knowledge of the markets, adequacy of plants and equipment, and continuous improvement of business knowledge (Mbamali & Okotie, 2012; Aniekwu & Audu, 2010; Phaladi & Thwala, 2008; Harris & McCaffer, 2005; Muazu & Bustani, 2004; Saleh, 2004). The variances in modern construction procurement systems impose different roles on contractors (Oyegoke, 2006; Rashid *et al.* 2006; Harris & McCaffer, 2005). This calls for the contractors to understand their expected roles in any type of procurement systems because their roles in relation to other parties can invariably affect the performance of any type of procurement systems (Rashid *et al.* 2006; Anyadike, 2000).

Construction according to Khatri (2000) cited in Inuwa *et al.* (2012) is a multi-organizational process that is heavily dependent on the exchange of large and complex data. Successful completion of a project depends on the accuracy, effectiveness and timely communication and exchange of critical information and data between the project teams (Khatri, 2000 in Inuwa *et al.* 2012). Managing of modern construction information which basically deals with design and project management requires the application of ICT (Inuwa, *et al.*, 2013; Roberts & Wallace, 2004). The advent of ICT has revolutionized the construction industry through more accurate data processing systems in design development and project management (Roberts & Wallace, 2004). Construction contracting also deals with a lot of design and management information (Oladapo, 2006; Rashid, *et al.*, 2006; Harris &

McCaffer, 2005). Hence, a contractor requires the application of ICT to be able to accomplish their tasks; especially in project planning (Roberts & Wallace, 2004).

The issue of sustainability in the construction industry has been of concern to stakeholders in recent times (Jatau & Wescott, 2011; Nwokoro & Onukwube, 2011). The industry's approach towards addressing this issue is through sustainable construction (Jatau & Wescott, 2011). Sustainable construction has emerged as a guiding paradigm to create a new kind of construction environment; one that meets the needs of humans in the present without limiting the ability of future generations to meet their own needs (Ofori, 2001 cited in Nwokoro & Onukwube, 2011). Construction is a major and primary sector of Nigerian economy and its consideration of the issues of sustainability covers a huge spectrum of the sector (Nwafor, 2006 cited in Nwokoro & Onukwube, 2011). The contractors understanding, application and adherence to a country's environmental laws in relation to sustainable construction will assist his/her project planning consideration and inputs. This also encompasses social progress, which includes health and safety, employee interest, learning and development, and community involvement in project execution (Jatau & Wescott, 2011).

The late honoring of interim payments to the contractors by clients in Nigeria as acknowledged by Bala *et al.* (2009), Ogunsemi and Saka (2006), and Adams (1997), is an impediment to contractors' project planning capability and performance. Most indigenous contractors' have no access to capitals (Bala *et al.* 2009; Phaladi & Thwala, 2008; Adams, 1997). Where they are able to access capital-loans from the banks, they access it at higher interest rates and if interim payments are delayed it

attracts more interest. Thus, prompt honoring of contractors interim payments can have a significant influence on their project planning. Furthermore, the prevalence of corruption in the NCI is an issue that needs to be addressed as it negatively affects projects performance (Adebanjo, 2012; Owoyebi, *et al.*, 2011). The industry's business culture needs to be free of corruption for all parties to effectively and efficiently attain their aims.

Another factor that can play a significant influence on contractors' project planning is the adherence to the concept of buildability/constructability (Aina & Wahab, 2011). According to Aina and Wahab (2011) buildability is increasingly becoming a major requirement in building practice. Buildability is the extent to which the design of a building facilitates ease of construction, subject to the overall requirements for the completed building (CIRIA, 1983 in Aina & Wahab, 2011). Buildability is often described as integrating construction knowledge, resources, technology and experience into the engineering and design of a project (Aina & Wahab, 2011). The aforementioned factors has significant influence on contractors' project planning capability, hence play a vital role in determining contractors project planning effectiveness for attaining project success.

### **2.11 Contractors' Project Planning Success Indicators**

According to Bennett (2003), to achieve success in project planning there must be: a clear understanding of the project's objectives, purposes, scope and nature by both the client/owner and the organization responsible for carrying out the work and a relationship between the client/owner; establishment of the project delivery organization, with clearly defined roles and responsibilities. Without this, the client

or the consultant will negatively affect the contractor's project planning. This therefore requires a good working relationship and sound communication network between the client/owner and the project delivery organization. The issue of attaining project planning success in developed countries is no longer a problem as they have embraced project management methodology, and consequently reaps its benefits (Ekundayo, *et al.*, 2013; Harris & McCaffer, 2005; Kerzner, 2000).

In developing countries like Nigeria however, indigenous contractors' construction project planning is very poor due to non-adoption of project management techniques, management incapacity and the inability to plan projects adequately according to contractual requirements (Oladimeji & Ojo, 2012; Aniekwu & Audu, 2010; Idrus & Sodangi, 2010; Muazu & Bustani, 2004; Achuenu, *et al.* 2000; Saleh, 2004). This problem can be addressed if indigenous contractors understand the indicators of project planning success and apply the knowledge of this understanding to planning their projects (Muazu & Bustani, 2004; Saleh, 2004; Achuenu, *et al.* 2000; Scott, 1995).

According to Oxford Dictionary of English (2000), success is the accomplishment of an aim or purpose, while an indicator is a thing that indicates the state or level of something. Therefore, success indicators can be construed as signals or signs that inform that an event, operation or activity has accomplished its intended purpose. A success indicator confirms a state of prosperity in an operation, or the attainment of success in an endeavour. In this context, any factor that signifies the attainment of the benefits of contractors' construction works operational planning, the curbing of

wastage, and curtailing risks and accidents, constitutes an operational planning success indicator.

An operational plan should include sufficient details to enable proper consideration to be given to the timing and duration of operations, type and quantity of materials and equipment's, delivery dates and manpower requirements (Chitkara, 2012; Gupta, 2010; Krishnamurthy & Ravindra, 2010; Harris & McCaffer, 2005; Gahlot & Dhir, 1992). For contractors' operational plan to attain this feat, according to Gahlot and Dhir (1992), it must satisfy the essential characteristics of a good operational plan (programme), and this include:

- It must be suitable for use as a control tool against which progress can be measured
- It must be sufficiently accurate to enable its use for forecasting requirements of materials, manpower, machinery and money
- It must provide for difficulties likely to be encountered in future in respect of quality, scope, processes and for taking remedial measures.

These characteristics by implication can be used by contractors to gauge their operational plan performance and can subsequently be used as indicators for attaining project operational planning success. Looking at the abovementioned characteristics in succession, the following can be deduced as project planning success indicators: plan's provision for facilitating project monitoring and control, ability of plan in facilitating project resource organization and, plan's flexibility. In addition (Scott, 1995; Seeley, 1986), the contractors' operational plan should be use as the agreed plan against which the effects of delays to the project will be

determined and as such, can be used as an indicator for contractors' project planning success through its (plan's) ability to facilitates claim assessment for delay.

Scott (1995) identified factors that ensures contractors' project operational plan effectiveness and efficiency as defined by construction projects supervisors (architects/engineers/projects manager). These factors are (Scott, 1995):

- The durations of activities defined by the contractor should be sensible
- Any specific restrictions stated in the contract should be complied with: targets dates, staged completion, completion of the whole work.
- A proper logical sequence had been adopted
- Identified major tasks in the project, ensure activities size were reasonable and ensures adequate accommodation of contractor's, subcontractors' and public utilities works had been considered.

Thus, success indicators in consideration of the aforementioned requirements includes: plan's adherence to time, cost estimate, and to quality, adequacy of plan in determining suppliers' delivery dates, plan's capability to accommodate contractors' work, plan's provision of basis for preparing schedules and, plan's efficiency in integrating the sub-contractors' work.

Furthermore, the breakdown of activities in a contractors' operational plan according to Scott (1995), must be such that all operations that might be affected by work changes and delays should be identified individually and as such, contractors' agent should have a good working knowledge of the project operational plan (programme). Trade heads need to be able to read the project schedules, tasks involved and specification, according to Passenheim (2009), to assist them in knowing what to do

next. To achieve this, the contractors' project operational plan should be comprehensible. Hence, as a success indicator, the plan should be clear in communication and also comprehensible among trade heads.

A good contractor's operational plan according to Scott (1995), should be able to meet his job technical requirements including: appropriate time for striking formwork, ensuring correct sequences, having proper allowance for weather susceptible operations, etc. Hence, a contractor's project operational plan should be realistic and should properly predict what may happen to the project (Chitkara, 2012; Gupta, 2010; Scott, 1995; Seeley, 1986). Project planning success indicators construed from the abovementioned factors include: plan's adherence to project technical requirements, plan's efficiency in identifying accident-prone areas and, plan's ability to curb re-work.

## **2.12 Research on Construction Procurement and Contractors**

There is a lot of research across the globe on construction procurements amongst which are: Dada (2012); Idoro (2012a); Idoro (2012b); Ikediashi, *et al.* (2012); Mathonsi and Thwala (2012); Babatunde *et al* (2010); Ibrahim (2008); Ojo *et al.* (2006); Oyegoke (2006); Rashid *et al.* (2006); Love (2002); Alarcon *et al.*(1999); Love *et al.* (1998). The significance of construction procurement according to Idoro (2012a), stems from two reasons: firstly, it involves a series of interrelated and sequential processes and the effectiveness and efficiency of these processes have a considerable impact on the success or failure of a project; secondly, there are several procurement methods available for a developer to adopt when procuring a project.

Alarcon *et al.* (1999) developed a methodology to diagnose and evaluate the procurement process for investment projects for continuous improvement in Chile. Applying the methodology on selected projects, they discovered the main problem of procurement to be schedule delays and lack of specified quality for a project and these they said can be averted through dedicating important resources (money, personnel, time, etc.) to monitor and control the process. On another set of projects they discovered that the main sources of waste were from engineering the system itself, the suppliers, and the policies. They recommended that improvement can be attained through electronic mails, electronic data interchange (EDI), bar codes, and other policies as applied to the procurement process. In Finland, Oyegoke (2006) used four project management areas of scope, time, and cost as a framework of reference in studying how to manage clients' expectations in project delivery. His findings exposed the weakness of the prevalent routes in managing these key management variables and revealed that the discretionary contract approach supports a better management system.

In Australia, Love *et al.* (1998) indicated that a single set of criteria is generally adequate and sufficient for procurement path selection. However, similar clients do not have similar procurement needs but only one procurement method. Love (2002) discovered that direct and indirect consequences of rework do not differ relative to project type or procurement methods in Australia. He found rework to be 52% of the cause of project cost growth which brought about 26% of the variance in cost growth. To improve project performance, he recommends knowing rework: magnitude, causes, and effective prevention strategies. In Malaysia, Rashid *et al.*

(2006) reveals that different procurement systems differ from each other in terms of allocation of responsibilities, activities sequencing, process and procedures and organizational approach in project delivery, which invariably affect the project performance of time, cost and quality.

In South Africa, Mathonsi and Thwala (2012) quantitatively classified factors influencing the selection of procurement systems into internal and external ones. The internal factors were broadly divided into client's and project characteristics. The client's characteristics are: client's level of knowledge and control; funding arrangements; political and social consideration; familiarity of procurement systems; competition; government/risks allocation, whereas, project characteristics are: size and technical complexity of project; influence of project life cycle; expedited project delivery time; quality and price certainty. While, market competition, information technology, regulatory environment, natural causes and globalization constitute the external factors. Using qualitative approach (literature search) they discovered five new factors: socio-economic consideration; client requirements; capital cost/cash flow; procurement policy and project characteristics.

Dada (2012); Idoro (2012a); Idoro (2012b); Ikediashi, *et al.* (2012); Babatunde *et al.* (2010); Ibrahim, (2008); and Ojo, *et al.* (2006), all studied different areas in construction procurement in Nigeria. Ojo *et al.* (2006) discovered that projects category of 1-5, 5-10, over 10 million Naira (₦) (US\$1 = ₦160) showed a time overrun of 18.98%, 99.64 % and 34.55 % respectively for housing projects procured through traditional contract. They concluded that the 1-5 million Naira cost category is suitable for traditional contract procurement on housing projects in Nigeria.

Babatunde, *et al.* (2010) discovers that variants of traditional method of procurement is the most adopted in project execution in Nigeria. They also reveal that project completion at estimated time is the highest factor considered for traditional method, while quality assurance is the highest with the non-conventional method, though their study was delimited to Lagos.

Dada (2012) using a logistic regression analysis developed a model with the procurement method as the dependent variable and several other variables as the independent variables for predicting procurement selection. Idoro (2012b) reveals that the use of project documents during each project stage and the overall procurement phase in projects procured by the traditional contract method must be improved, as it will enhance the outcome of the projects. In another study, Idoro (2012b) discovered that at inception, design, tendering and construction stages, plans are not prepared in many of the projects procured through Design-Build (DB) in Nigeria, and concludes that the level of use of project plans can be used to reduce the high time and cost overruns recorded in DB projects. He suggested that stakeholders should ensure that the required project plans are prepared when projects are procured by DB.

Ikediashi, *et al.* (2012) identified: job cost reporting, time performance, quality of work, Health and Safety, and Cost per Unit, as the most important amongst eight Key Performance Indicators for DB projects in Nigeria. They advocated fundamental changes to reduce the high cost overruns associated with DB projects. Ibrahim(2008) runs a critique on the professional philosophy and mechanism of the public procurement Act's 2007, focusing on the construction industry and highlighted

shortcomings related to the Act operational philosophy and mechanism, both at the central coordinating level and at the completion level of the Act vis-a-vis their regulatory, certification, monitoring, training and advisory functions. Although all the research efforts reviewed highlighted essential information concerning construction procurements, none of the research investigated contractors' projects planning in construction procurement systems.

A further review of literature on contractors in Malaysia (Judi & Rashid, 2010), Indonesia (Mangitung, 2010), UAE (Nasser, 2009), Pakistan (Masood & Chouldhry, 2010), Palestine (Enshassi & Shaat, 2007; Enshassi, *et al.*, 2006), Botswana (Freeman, 2011), South Africa (Ian, 2008; Phaladi & Thwala, 2008;), Ghana (Peter, *et al.*, 2012; Laryea, 2010; Laryea & Mensah, 2010) and Nigeria (Inuwa *et al.*, 2013; Iro, *et al.*, 2013; Ujene, *et al.*, 2013; Odediran, *et al.*, 2012; Tunji-Olayeni & Omuh, 2012; Usman, *et al.*, 2012; IDr.us & Sodangi, 2010; Fagbenle, *et al.*, 2011; Idoro, 2011a; Aniekwu & Audu, 2010; Bala *et al.*, 2009; Idoro & Akande-Subar, 2008; Hamilton, 2006; Uduak, 2006; Muazu & Bustani, 2004; Saleh, 2004; Ameh & Odusami, 2002; Achuenu, *et al.*, 2000; Adams, 1997) revealed that none of the research centered on NICs: involvements and performance, planning tools application, planning challenges, planning influencing factors; and contractor's project planning success indicators in building procurement systems in Nigeria. Therefore, there is a need to investigate NICs project planning in building project procurement systems due to their inability to effectively and efficiently manage and plan their contractual obligation, which is negatively impacting the growth of the NCI and the Nigerian economy at large.

### **2.13 Theoretical Framework**

This study is modelled on the theory of project management. Construction, according to Ireland (2006), may have been the seed for developing project management. Artifacts dating back nearly 5000 years reveals the application of project management in the delivering of great construction works of history (Chitkara, 2012; Ireland, 2006; Roberts & Wallace, 2004): pyramids, Great Wall of China, and Roman roads and aqueducts. Project management as a discipline according to Chitkara (2012, p.39), originated with the development of CPM/PERT planning techniques in the early sixties, when the volume and complexity of tasks increased, especially in construction, aerospace and defense projects.

Kerzner (2000) affirmed that the understanding of project management begins with the recognition of what a project is. A project according to Kerzner (2000), is an endeavor that has a definable objective, consumes resources, and operates under time, cost, and quality constraints. A project he affirms, comes with a challenge in managing activities that have never been attempted in the past and may never be repeated in the future. With the understanding of project in mind, Kerzner (2000) defined project management as the planning, scheduling, and controlling of a series of integrated tasks such that the objectives of a project are achieved successfully and in the best interest of the project stakeholders. John and Herman (2008) cited in Abdulrazaq and Ahmad (2011, p.2) described project management as a composition of organization, structure, information processing, practice and procedure that permit integration of all project element-tasks, resources, information, stakeholders, etc.

Gupta (2010), and Weiss and Wysocki (1992), reported that the development of project management theory bears its origin from the principles of general management. Though in prior literature according to Koskela and Howell (2002a, p.), it has been acknowledged that there is no explicit theory of project management. However, Koskela and Howell (2002a) argued that it is possible to precisely point out the underlying theoretical foundation of project management as advocated in the Project Management Body of Knowledge (PMBOK) by the Project Management Institute (PMI) and that is mostly applied in practice. This foundation according to Koskela and Howell (2002a), can be divided into a theory of project and a theory of management (Table 2.1).

**Table 2.1: Theoretical Foundation of Project Management**

<b>Subject of Theory</b>		<b>Relevant Theory</b>
<b>1. Project</b>		Transformation Flow Value generation
<b>2. Management</b>	Planning	Management-as-planning Management-as-organizing
	Execution	Classical communication theory Language/action perspective
	Control	Thermostat model Scientific experimentation model

**Source:** Koskela and Howell (2002b)

### 2.13.1 The Theory of Project

The theory of project is modelled from the theory of production derived from the manufacturing industry and it is built on three concepts (Kraemer, *et al.*, 2014; Rooke, *et al.*, 2012): transformation, flow, and value. The theory modelled the project realization process as a conversion (transformation) process that passes through a flow (waste elimination and efficiency improvement), and value matching to

customer requirements (customer requirements integration) (Rooke, *et al.*, 2012). Consequently (Kraemer, *et al.*, 2014; Rooke, *et al.*, 2012), it is referred to as the transformation-flow-value (TFV) theory.

**Transformation-** According to Koskela and Howell (2002a) the end product of a project passes through a transformation of inputs to outputs in its production operations. This transformation (Knoepfel, 1992), produces an end product that is a new system or a new state of an existing system, which is more satisfying than the initial preproject situation. The total transformation path of a project can be decomposed into manageable and well-understood sub-transformations and tasks (Koskela & Howell, 2002b). Hence, a project can be realized in an optimal manner and the tasks in optimal sequence (Koskela & Howell, 2002b). The correlation here, according to Koskela and Howell (2002b), is that project performance can be enhanced by improving the tasks and its sequence. The assumptions behind the concept of transformation path of a project is that (Koskela & Howell, 2002b):

- i. Tasks are independent, except sequential relationships
- ii. Tasks are discrete and bounded
- iii. Uncertainty as to requirements and tasks are low
- iv. All work is captured by top-down decomposition of the total transformation; work breakdown structure (WBS)
- v. Requirements exist at the outset and they can be decomposed along with work.

Knoepfel (1992) described project transformation as a structure of systems, composed of subsystems and components that have attributes and that may be

related to each other and to systems, subsystems and components in the environment of the systems, through certain attributes. According to Knoepfel (1992), a project structure operates in a defined way to achieve its objectives. These objectives can be interrelated, and their value depends on the attributes of the systems. In construction projects management (Knoepfel, 1992), projects systems, subsystems and components are identified in several levels. This allows the project management to concentrate its attention on certain system, subsystems or components for a limited time to bring it to a certain state of study, investigation, design, realization or operation. These help to supervise operation concepts and the layout of existing and new parts of facilities, to manage the overall configuration of the systems and to control the interfaces. By comprehending the operational structure of a project, project management provides the technical basis for answers to economic, time-scheduling, quality, quantity and organization questions (Knoepfel, 1992).

**Flow-** The concept of flow according to Kraemer, *et al.* (2014), viewed production path of a project as a flow composed of value adding activities (transformation) and non-value adding activities (waiting, inspection and moving). The main objective of the flow concept is to eliminate or minimize the share of non value adding activities through the improvement of project lead time, variability reduction, flexibility, and transparency (Koskela cited in Kraemer, *et al.*, 2014). The flow concept in construction is conceptualized within four contexts (Kraemer, *et al.*, 2014): Adding and non-value adding activities, even flow, variability and, preconditions to work tasks in construction.

- i. **Adding and non value adding activities:** Adding and non-value adding activities view flow as a value adding activities (transformation) and non value adding activities (Kraemer, *et al.*, 2014). Its concept is about improving efficiency through doing things better and reducing waste. It is a concept adopted from Henry Ford's proposal of continuous motion, that suggests that everything should be kept in motion (Kraemer, *et al.*, 2014). It requires tasks (operations) to be taken to the operatives and not the other way round (Ford & Crowther, 1998 cited in Kraemer, *et al.*, 2014). Though, this proposal contradicts the production process in construction, where the building is stationary and is built through different phases of assembly (Kraemer, *et al.*, 2014).

Nonetheless, Ford's proposal advocated for efficiency improvement and waste elimination in production, and these reasons makes it important to project management in construction. Adding and non-value adding concepts see idleness as a waste (Kraemer, *et al.*, 2014). Waste might emanate from an operative waiting for a material or assistance, or a machine breakdown with no replacement waiting for repairs (Kraemer, *et al.*, 2014). Adding and non-value adding activities of flow, are continuous process aimed at identifying and eliminating all waste that adds cost and do not add value (Liker, 2004 cited in Kraemer, *et al.*, 2014). Therefore, the ultimate aim of adding and non-value adding concepts of flow according to Kraemer, *et al.* (2014), is to reduce or eliminate waste.

- ii. **Even flow:** This means leveling production rates of each task against their required resources and crews along the transformation path while aiming at a continuous production process (Kraemer, *et al.*, 2014). Even flow aims at leveling production rates to generate a smooth and continuous construction process (Kraemer, *et al.*, 2014).
  
- iii. **Variability:** This in a project production transformation flow is concerned with how variability influences the input and output activities from one workstation to another, considering delays that will increase the project lead time (Kraemer, *et al.*, 2014). Variability is the quality of non-uniformity of a class of entities (Hopp & Spearman, 2001 cited in Kraemer, *et al.*, 2014). Variability is experienced in all construction production processes and have a great impact on performance (Kraemer, *et al.*, 2014).

Hence, it is important for contractors to understand and manage variability to achieve an effective production (Hopp & Spearman, 2001 cited in Kraemer, *et al.*, 2014). Variability is divided into two: process time variability and flow variability (Hopp & Spearman, 2001 cited in Kraemer, *et al.*, 2014). Process time variability according to Hopp and Spearman (2001) cited in Kraemer, *et al.* (2014), refers to the job at an individual workstation, and it causes are natural (ie minor fluctuation in process time due to differences in operators, equipment and materials), random outages, and setup and workers availability. The delay resulting from a workstation due to process time variability can influence the next workstation in line, thus resulting in flow variability (Kraemer, *et al.*, 2014).

Flow variability in construction production according to Kraemer, *et al.* (2014), refers to variability caused by continuous process fed diverse activities with different inputs (specialty unit workers) in different locations (floors). Consequences of variability in construction can be (Kraemer, *et al.*, 2014): time overrun and high levels of work-in-progress, wasted capacity, or lost output, and cost overrun. Variability can occur in any activity along the transformation path (Kraemer, *et al.*, 2014). However, variability occurring in the initial activities in the construction process is more disruptive than in the final activities (Koskela, 2000 cited in Kraemer, *et al.*, 2014). The goal of flow variability is to eliminate or reduce variability from the construction process (Kraemer, *et al.*, 2014).

- iv. **Preconditions to work tasks in construction:** According to Lindhard and Wandahl (2012), before an activity can be conducted, a number of preconditions first have to be fulfilled; the idea of preconditions to work tasks is to itemized the pre-requirements to start any activity in construction (Koskela, 2004). A fault in any of these preconditions according to Koskela (2004), result in a 'making-do-waste'. Koskela (2004) described 'making-do-waste' as a situation where a task is started without all its standard inputs, or the execution of a task is continued although at least one standard input is lacking.

The consequences of 'making-do-waste' are (Koskela, 2004): rework, increase of variability, poor quality, and cost and time overruns. The essence of the

precondition is to avoid waste emanating from ‘making-do-waste’ (Kraemer, *et al.*, 2014; Koskela, 2004). Kraemer, *et al.* (2014) and, Lindhard and Wandahl (2012) itemized the following as the preconditions to work tasks in construction: construction design and management (information), components and materials are present, workers are present, equipment and machinery are present, sufficient space so that the tasks can be executed, connecting works (previous activities must be completed), climate conditions have to be acceptable, safe working conditions in relation to national laws have to be present and, known working conditions.

However, Kraemer, *et al.* (2014), and Lindhard and Wandahl (2012) preconditions to work tasks seem to be centred on the DBB system alone and as such, do not consider other preconditions where the contractor task involves: design (integrated contracts and DM), planning, management and coordination (management contracts). Thus, clients brief (business case), programme and project management organizational chart are also considered as additional preconditions that will accommodate the pre-requirements for the commencement of activities in integrated and management oriented contracts (Passenheim, 2009, p.16; Harris & McCaffer, 2005).

**Value-** The value concepts focuses on how best to match customer requirement (design and production) (Kraemer, *et al.*, 2014). It is expected that the design and specifications of a project capture and integrate the customer requirements. Hence, value is centred from the point of view of the customer (Kraemer, *et al.*, 2014). The concept of value in the transformation of a project, therefore, requires a contractor in

planning his project tasks to always take into consideration the customer's optimum requirements in the project inputs, tasks, and sequence of operations throughout the transformation path.

Kraemer, *et al.* (2014) asserted that the TFV theory is needed in understanding the nature and requirements along the project conversion (transformation) path and, for the TFV theory to be effective and efficient, it must be used at the same time in a complementary way. The most important contribution of the TFV theory according to Kraemer, *et al.* (2014), is in bringing interest to modelling, structuring, controlling and improving production from all these three points of view and adding a new insight showing that these are three fundamental phenomena in production, which should be simultaneously managed.

### **2.13.2 Management Theory of Project Management**

Management theory of project management is founded on three theories (Koskela & Howell, 2002b): planning, execution and control (Table 2.1).

**Theory of Planning-** The theory of planning interpreted management as planning and organizing (Koskela & Howell, 2002a). Thus, it is subdivided into: management-as-planning and management-as-organizing (Table 2.1) (Koskela & Howell, 2002b). In management-as-planning; management at the operations level consists of creation, revision and implementation of plans (Koskela & Howell, 2002a). Management-as-planning, conceptualized that in planning a project, there is a managerial part and an effector part (Koskela & Howell, 2002a); The primary function of the managerial

part is planning, and the primary function of the effector part is to translate the resultant plan into action.

On the other hand, management-as-organizing requires the assembly of the necessary resources (inputs: manpower, materials, time and money) for carrying out the work defined in the plan (Kraemer, *et al.*, 2014; Weiss & Wysocki, 1992). Management-as-organizing in construction project management entails tailoring the requirements of the specific project (Knoepfel, 1992). To organize in construction project management according to Knoepfel (1992), means to define the work tasks with the responsibilities, to allocate them to positions, to design the procedures in the organization, and to select adequate performers for the positions. Management-as-organizing is optimally aimed at assembling necessary resources into a cohesive structure in accordance with the project plan requirements (Weiss & Wysocki, 1992).

**Theory of Execution**-The theory of execution is viewed within the context of dispatching model and the language/action perspective. The dispatching model conceptualized that, managerially, execution is about dispatching tasks to work stations and, this is regarded as the classical communication theory (Koskela & Howell, 2002b). However, for execution to be effective, the classical communication theory must be complemented with the language/action perspective (Winograd and Flores, 1986 cited in Koskela & Howell, 2002b); this emphasizes two-way communication and commitment, instead of the mere one-way communication according to the classical communication theory. Thus, the vice used in communicating the tasks dispatched to work stations must be completely comprehensive to the operatives. They should be feedback mechanisms that will

convey the operatives understanding of the instruction passed to him and as such, enable tasks to be executed as it is envisaged in the plan.

**Theory of Control-** The theory of control consist of two models: themostat model and the scientific experimentation model (Koskela & Howell, 2002a). The themostat model conceptualized that in the production process, there is a process to control, a unit for performance measurement, a standard of performance, and a controlling unit, while the scientific experimental model of control as advocated by Shewhart and Deming (1983) cited in Koskela and Howell (2002b) focuses on finding causes of deviations and acting on those causes, instead of only changing the performance level for achieving predetermined goals in the case of deviation. The scientific experimentation model adds the aspect of learning to control (Koskela & Howell, 2002a). Thus, project control involves gauging performance, identifying deviation and learning what are the causes of deviations, their effects and the best means of countering them. The learning process is an avenue that can be used by contractors to improve on their project management potentials.

### **2.13.3 Implication of Project Management Theory to the Study Objectives**

The variables for this study are argued as independent variables to contractors' operational planning within the context of project management theory. The variables are: frequency of NICs involvement in building projects procurement systems (experience), NICs time and cost performance in building projects procurement systems, influencing factors for NICs project planning, NICs application of project planning techniques, NICs project planning challenges, and contractors' project planning success indicators.

- i. **NICs Involvement in Procurement Systems:** The frequency of the NICs involvement in building procurement systems is an independent variable that can affect the outcome of the contractor's project operational planning within the context of the theory of project. The contractors' involvement in the various types of building projects procurement systems will enable them appreciate the project conversion (transformation) path (TFV) and how it relates to project planning and organization.

The contractors' understanding of the TFV theory and its application significantly contributes to construction projects planning, organizing, controlling and improving (Kraemer, *et al.*, 2014). NICs frequent involvement will enable them acknowledged how a project, depending on the type of procurement system, can be decomposed into manageable and well-understood sub-transformation and tasks within the context TFV and as such, enables a contractor to realize project operational plan in an optimal manner (Koskela & Howell, 2002a). Comprehending the operations of a project TFV levels will provide contractors the technical basis for answers to economic, time-scheduling, quality, quantity and organization questions in relation to their project operational plan (Knoepfel, 1992).

Moreover, understanding how a project transformation is developed from inputs to outputs (conversion); the tasks required and their sequential relationship, taking into consideration flow and value, provides a better guide to the contractors on how to develop a project operational plan that will be

effective and efficient towards achieving project management success (Koskela & Howell, 2002b).

- ii. **NICs Time and Cost Performance:** Contractors time and cost performance in building project procurement systems is an independent variable that can influence contractors' project operational planning and this can be argued using the project management theory of control. A review of several studies revealed that contractors underperformed in terms of cost and time in the NCI (Idoro, 2012b; Mbamali & Okotie, 2012; Babatunde, *et al.*, 2010 Ikediashi, *et al.*, 2012).

The adherence to the project management concept of control through the thermostat model and the scientific experimentation model can facilitate the performance of contractor's project operational planning. Since the thermostat model is conceptualized for controlling a process which is guided by an operational plan (Koskela & Howell, 2002a). The scientific experimentation model can be used as a learning process to study the causes of deviations resulting in time and cost overruns in the project management process (Shewhart and Deming, 1983 cited in Koskela & Howell, 2002b), thus adding to the contractor's knowledge of the causes of time and cost overruns. This, is eventually used as additional knowledge in putting measures to counter causes of time and cost overruns in project operational planning (Knoepfel, 1992).

- iii. **Application of Project Planning Technique:** The other complement of the concept of management-as-planning conceptualized that there is an affector part to planning, whose primary function is to translate the resultant plan into action (Koskela & Howell, 2002a). Therefore, in addition to the management function of project planning, the contractors management within the context of project management, is required to translate its resultant operational plan into action (Koskela & Howell, 2002b). The tools required to accomplish this task are the use of project planning technique, however, this is subject to the use of an appropriate planning technique (Bhavikatti, 2012; Roberts & Wallace, 2004; Scott, 1995). Hence, NICs application of an appropriate project planning techniques is an independent variable that can affect the performance of operational planning.
- iv. **NICs Project Planning Challenges:** Project planning forms the basis for project control (Krishnamurthy & Ravindr.a, 2010; Bamisile, 2008; Eigege, 2005). The scientific experimentation model of control is concerned with studying the causes of deviations in the whole process of project planning with the sole aim of identifying causes of deviations (challenges) and how the challenges can be addressed in light of attaining a successful project operational plan (Shewhart & Deming, 1983 cited in Koskela & Howell, 2002b). Hence, identifying contractors project planning challenges and learning how to counter their effects will result in efficient and effective projects operational planning.

- v. **Project Planning Influencing Factors:** Factors that can significantly influence NICs project planning in building projects procurement systems is a variable for contractors' project operational planning that might emanate from other parties besides the contractors'. However, it is the responsibility of the contractor's management as conceptualized by the theory of planning at the operations level, to create, revise, and implement operational plans (Koskela & Howell, 2002a).

Hence, it is their responsibility to identify and adhere to measures that will influence their ability to create an operational plan that can be easily revised and operationally implemented. This is according to the concept of management-as-planning. It is, conceptualized that in planning a project, there is a managerial role, which functions primarily as planning (Koskela & Howell, 2002a).

Therefore, the contractors' organization through its project manager, has a managerial responsibility for planning their projects. This places a responsibility to the contractors to acquire and adhere to factors that can influence their project planning so as to be able to create, revise and implement their project operational plan (Koskela & Howell, 2002a). Hence, acquiring and adhering to these factors can significantly influence the NICs project planning and it is a variable that can affect the effectiveness and efficiency of project operational plans.

- vi. **Contractors' Project Planning Success Indicators:** Thermostat model of the theory of control conceptualized projects planning implementation as a process that is subject to control, which has a unit for performance measurement, a standard of performance and a controlling unit. Thus, a contractor's project planning success indicators can be used as a standard performance measure in contractors' project operational planning, and also serve as contractors' project operational planning controlling unit.

Hence, contractors' project operational planning success indicators are variables that can affect contractors' project operational planning. The implication of the project management theory to the study objectives are represented in the relationship between the study's theoretical and conceptual framework in Table 2.2.

**Table 2.2: Theoretical and Conceptual Framework Relationship**

Theoretical Framework		Conceptual Framework
<b>Project management theory</b>		<b>Research objectives</b>
<b>The Theory of project (TFV)</b>		I. NICs involvement in building procurement systems
<b>Management Theory</b>	Theory of control (thermostat & scientific experimentation model)	II. NICs time and cost performance in projects procurement systems
	Theory of planning (management-as-planning; <b>effector</b> )	III. NICs application of project planning techniques
	Theory of control (scientific experimentation model)	IV. NICs project planning challenges
	Theory of planning (management-as-planning; <b>managerial</b> )	V. Factors for influencing NICs projects planning
	Theory of control (thermostat model)	VI. Contractor's project planning success indicators

**Source:** Author (2013)

#### 2.13.4 Advantages of Project Management over Traditonal Management

In the NCI, poor project planning resulting in poor project delivery has been attributed to the adoption of the traditional management approach (Ekundayo, *et al.*, 2013). In the traditional management approach, the project coordinator, usually an architect or an engineer, performs the role of a project manager but in limited capacity as the overall responsibility and management rest with the client (Ekundayo, *et al.*, 2013). This arrangement gives the project coordinator little authority in decision making as he is only concerned with the communication and coordination of the construction aspect of the project (Ekundayo, *et al.*, 2013; Kerzner, 2000). Under

the traditional management approach, work flow according to Kerzner (2000) is arranged vertically, and it becomes difficult for extensive planning and coordination to take place. This arrangement gives little opportunity to workers to work with other functional areas (Kerzner, 2000). However, the edge the project management approach has over the traditional management approach, is the arrangement of work flow and project coordination horizontally and vertically, thus resulting in extensive planning and coordination (Kerzner, 2000).

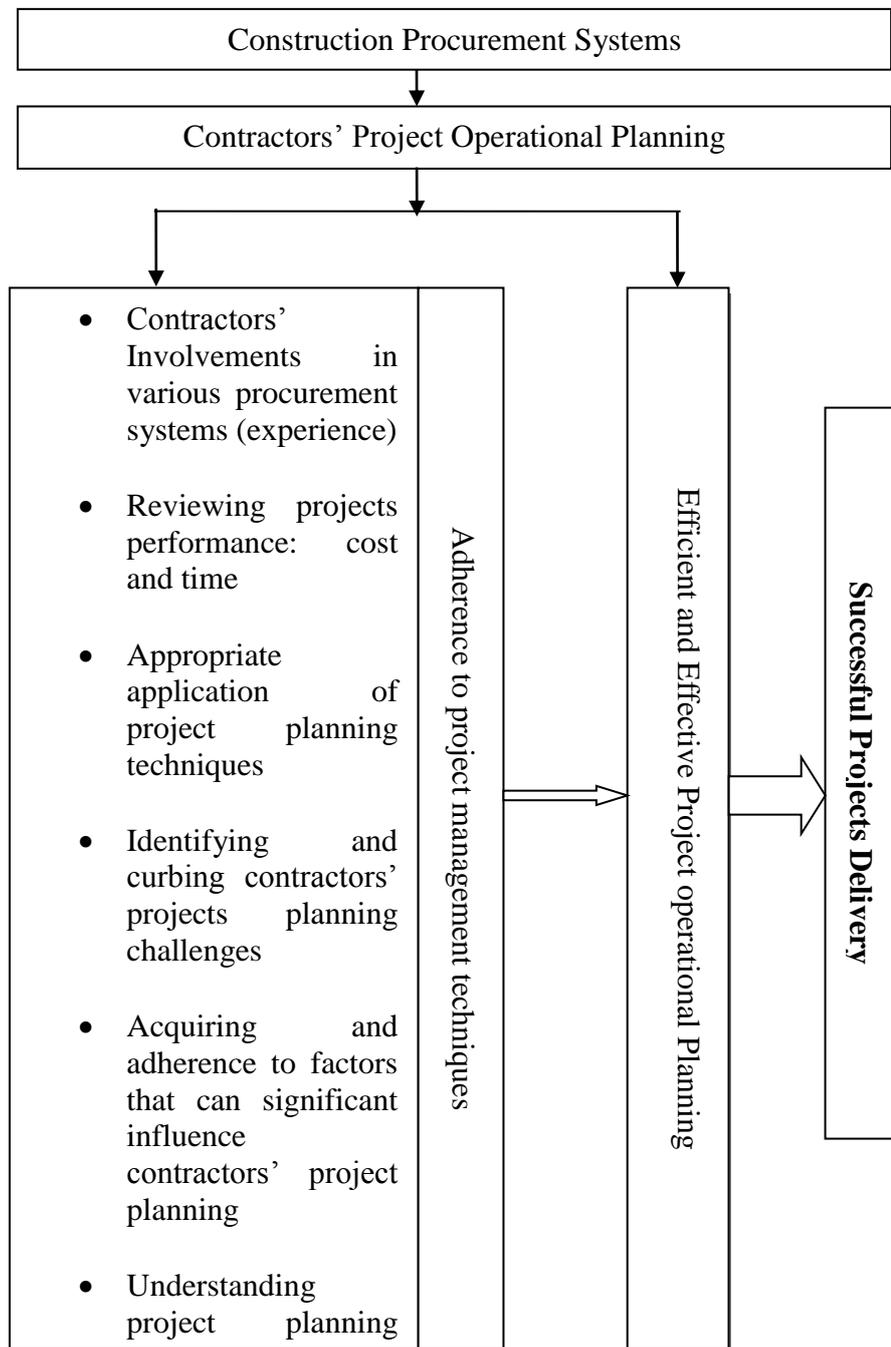
In addition, the horizontal management arrangement in the project management approach, enables work to be organized across the various functional groups that work with each other (Kerzner, 2000). This according to Kerzner (2000) results in improved coordination and communication among employees and managers. The horizontal work flow of the project management approach generates productivity, efficiency, and effectiveness (Kerzner, 2000).

The NICs are subjected to the traditional management approach, because of the country's non-adoption of the project management approach, and this has resulted in project failures (Ekundayo, *et al.*, 2013). The adoption of the traditional management approach, influences contractors' to organize their projects along the vertical pattern and this leads to poor project planning (Ekundayo, *et al.*, 2013; Kerzner, 2000).

## **2.14 Conceptual Framework**

This study derived its conceptual framework from the project management theory (Table 2.2). Project planning forms the basis of the conceptual framework (Table

2.12). The study variables explained within the context of project management theory constitute the independent variables, while an effective and efficient contractor project operational planning in building procurement systems is the dependent variable according to this study's conceptual framework (Figure 2.13).



**Figure 2.13: Conceptual Framework**

**Source:** Adapted from Weiss and Wysocki (1992)

## **2.15 Discussion**

The chapter begins by given a global overview of the construction industry with emphasis on: the industry's as the origin of project management, its strategic importance to any nation due to the role it plays in the economy and its level of investment globally. The chapter also reviews: the origin of the NCI and the trends of its economic contribution to Nigeria; it successes and failures. The project management performance of the NICs was reviewed in comparison with their foreign counterparts. The shortcoming of the NICs project planning in relation to their project management performance was identified to be: incompetence, inexperience and the, adoption of traditional management.

The chapter explained the concept of construction project procurement and highlighted the need for adequate project planning because of the complexity of construction project procurement. It also reviewed and identified the roles of contractors in construction project procurement systems. The chapter also reviewed literatures in relation to its objectives, which include: the NICs involvement and performance (cost and time) in the application of the traditional and non-traditional procurement systems; overview of project planning techniques and application; identification of NICs project planning challenges; identification of influencing factors for NICs project planning; and identification of contractors project planning success indicators. The last part of the chapter explained this study's theoretical and conceptual framework. The theoretical framework is modeled from the project management theory. The study objectives were explained in the context of the theoretical framework, and their relationship within the context of project

management theory was established, and this was used as a basis for this study conceptual framework.

## **CHAPTER THREE**

### **3.0 RESEARCH METHODOLOGY**

#### **3.1 Introduction**

In this chapter the methodology and general procedures used in this study are explained. This includes research design, and which basically covers schemes, outlines or plans that are used to generate answers to research problems. It includes a description of the research methodology adopted, description of survey area, population, sample and sampling procedures, questionnaire design and pre-testing of research instruments, and data collection and analysis techniques.

This study follows a philosophical orientation founded on ontology and epistemology, both of which are concerned with knowledge and the way scientist develop knowledge (Steup, 2014). According to McNabb (2009, p. 13) ontology deals with what we can learn; what is out there that can be known. Ontology has to do with what is the nature of the world we experience. In this context this study's statement of the problem is being guided by the philosophy of ontology. This enables this study to use literature in justifying the existence of a problem, worthy to be studied within the context of the experiences in the NCI.

On the other hand, this study used the epistemological philosophy in adopting a research design. Epistemology is concerned with questions about the way we can learn; the approaches used by scientist to gain knowledge. It is concerned with the validity of knowledge; it deals with the questions about how we can know anything, and how we can be certain what we know is true (Steup, 2014; McNabb, 2009). In

adherence to the epistemological philosophical requirements on how to obtain knowledge, this study used a research design that enables it spells out a logical structure suitable for gathering data that are sufficient and appropriate for answering the research questions completely and unambiguously, and enables it ascertain the authenticity of the data obtain in answering the questions (de Vaus, 2001 cited in McNabb, 2009, p.96).

### **3.2 Research Design**

The objectives of this research is to ascertain the level of contractors' participation and performance in the different types of construction procurement systems and to understand, the factors surrounding indigenous contractors' project operational planning in procurement systems: planning performance, projects planning influencing factors (requirements); use and method of planning tools application; challenges encountered by indigenous contractors in project planning; and indicators of success in project planning. The objectives also aimed at systematically describing the: situation; problem; phenomenon; service and describe an attitude towards NICs planning (McNabb, 2009; Maina, 2012). According to McNabb (2009) and Wanyona (2005), the objectives of a research determine the research design to be adopted.

Considering the aforementioned demands of the research objectives, the research approached its design in three stages: conducted an initial inquiry to gain insights and ideas about the research problems and the variables and issues associated with the problems through an extensive literature search and a pilot interview (explorative design) (McNabb, 2009); afterwards carefully mapped out a circumstance, situation, or set of events to describe what is happening or what has happened, mainly through

the benefits of questionnaire techniques (descriptive method) (McNabb, 2009; Rosenthal and Rosnow, 1991 cited in McNabb, 2009; Buys, 2004) and; finally, followed up questionnaire (contractors) responses by searching written records and accounts of past happenings and events in contractors business dealings (contract execution), using historical data (documentation) (Buys, 2004).

The research design adopted (explorative, descriptive and explanatory) fall under the two broad classification of research design (McNabb, 2009): quantitative design (exploratory and descriptive); and qualitative design (explanatory). In this light therefore, the research uses both qualitative and quantitative research design respectively.

### **3.2.1 Research Strategy**

A preliminary research approach comprising of a qualitative method of data production used a thorough literature review and semi-structure pilot interviews of a convenience sample comprising: 4 indigenous contractors (medium and large), 4 construction consultants (Architects, Builders, Engineers, and Quantity Surveyors) and 2 public building professionals in the Northern geo-political zones of Nigeria.

The interviews aimed at acquiring more information concerning contractors' operational planning when involved in project procurement with emphasis on indigenous contractor': involvement and performance in building projects procurement systems, use and method of applying projects planning tools, projects planning challenges, projects planning influencing factors, and projects planning success indicators. Information from the literature review and the outcomes of the

interviews were used as a basis for developing the research questionnaires. Afterward, questionnaires were pre-tested before being used to obtain quantitative data from respondents (contractors, consultants and public building professionals).

Questionnaire results according to Guthrie (2010) might be misleading in some cases and this might be true were a study is investigating the performance of contractor because, according to Adams (1997), to get an objective opinion on contractors' performance rest on three parties: contractors, consultants and other clients representatives (PBPs). However, some of the critical questions in the questionnaire targeting contractors' performance in which consultants and PBPs might not be competent enough to respond to, were subjected to further probe.

Consequently, a collective case study approach through a documentary analysis (historic data) was used to follow up the questionnaire responses to ascertain whether the involvement and performance of indigenous contractors in construction procurement systems, and their application of project planning techniques followed the same pattern in Northern Nigeria (McNabb, 2009). This method allows for more extensive probe on specific issues identified in the main questionnaire responses (Guthrie, 2010; McNabb, 2009). Moreover, according to Buys (2004) historic data are primary data that contain facts about individuals, organizational behaviours written in records, or accounts of past happenings and events.

A stratified random sampling technique was used on the returned questionnaires to select fifteen (15) contractors from the study area. The sub-study areas of Abuja, Bauchi/Gombe, and Kano formed the strata used for the stratified sampling. The

sampled contractors completed project files in the custody of clients were obtained, and was used as a case study to conduct a document analysis. This is in line with previous researches in the construction industry (Laryea, 2010; Olatunji, 2010; Musa, *et al.*, 2011), who had used historic approach methodology through document analysis on completed projects files as a case study to achieve their research aims'.

### **3.2.2 Area of the Study**

The study was conducted in the northern geo-political zones of Nigeria. The northern geo-political zones constitute slightly more than half of Nigeria's 36 States and its Capital (19 states and Abuja). It has a land size of 744,249.08 sq. km representing almost 80% of Nigeria's total land size of 937,052.16 sq. km and a population size of over 75 million people, representing 54% of Nigeria's total population (NPC, 2010). The northern geo-political zones constitute 3 of the 6 geo-political zones of Nigeria: north-central, north-eastern and, north-western geo-political zones respectively (see appendix 5).

The study area was further divided into three sub-study areas; with Bauchi and Gombe merged as a sub-study area from the north-eastern geo-political zone; while Kano state and Abuja (Federal Capital Territory- The Capital City of Nigeria) were selected as sub-study areas from the north-western and north-central geo-political zones respectively. These sub-study areas are referred to in this study as: Bauchi/Gombe; Kano and; Abuja.

Besides Bauchi State having the highest population size in the north-eastern zone (NPC, 2010), Bauchi and Gombe States were selected for two reasons: firstly, their

high concentration of construction activities in the north-eastern zone (Usman *et al.*, 2012) and; secondly, they are relatively peaceful from Boko Haram (a terrorist organization operating in Northern Nigeria) insurgency compared to other States in the zone. These States are 2 of the 3 states out of the 6 states in the north-eastern zone not affected by Nigerian Government recent declaration of a state of emergency (Punch Newspaper, 2013; Daily Trust Newspaper, 2013).

Kano State was selected from the north-western zone because of its population size (the largest in Nigeria), with over 9 million people. Kano State also has the highest and largest commercial activities in the whole of the northern zones, second only to Lagos State in the country (Kano State Government, 2013; NPC, 2010). Kano State has the highest concentration of construction activities in the north western zone (Ameh & Odusami, 2010). Abuja was selected from the north-central zone due to its status of being the Seat of Government; the Capital of Nigeria and having the highest concentration of construction activities in the country (Typad, 2013; Ameh & Odusami, 2010; Oladapo, 2006).

### **3.2.3 Study Population**

The target population for the research comprises mainly of medium and large indigenous contractors registered within categories B, C and D in Nigeria. However, according to Adams (1997), the best way to obtain information free of bias and with increased accuracy concerning domestic contractors is from contractors themselves, independent consultants who work in the industry and, clients' supervisory staff (who in this study are referred to as public building professionals), who work closely with the contractors.

Therefore construction consultants (Architects, Builders, Engineers and, quantity surveyors) and public building professionals (building professionals working for government establishments) were also involved in the research as part of the population. Adams (1997) emphasized that the last group (consultants and clients' supervisory staff) will probably be more objective in judging contractors performance. Furthermore, public building professionals serve as government (client) supervisory staff in Nigeria. Since Nigeria is a developing economy, the government is the major client of the industry with a construction share of about 75% (Iro, *et al.*, 2013).

Obtaining a reliable population size for the study is not achievable. The only literature available that gave a population size for Nigerian contractors was from Adeyemi (2006) cited in Fagbenle *et al.*, (2011), who reported that there are 105 contractors registered with the Federation of Construction Industry (FOCI). However, this figure (105) is contradicted by Adams (1997) in a previous study on contractors' development in Nigeria; Adams study concentrated on domestic (Indigenous) contractors in the south-western geo-political zone of Nigeria and distributed 200 questionnaires to contractors. Adams (1997) contractors' sample size exceeded the population reported by Adeyemi (2006). Moreover, the FOCI figure quoted by Adeyemi (2006) is in conflict with Achuenu, *et al.* (2000) acknowledgement that the number of contractors has been increasing since independence (1960), hence, the FOCI figure is unreliable.

Moreover, Idoro (2011a); Idoro and Akande-Subar (2008); Jinadu (2007); Muazu and Bustani (2004); Achuenu, *et al.* (2000) and; Adams (1997) all acknowledge that,

target population size for active contractors in Nigeria cannot be authoritatively ascertained as the industry is full of marginal indigenous contractors using addresses that could not be traced in the field. Many of these contractors are non-professionals who venture into construction to make easy money using their political influence to source for contracts which they eventually sell to active contractors to execute (Idoro, 2014; Jinadu, 2007; Muazu and Bustani, 2004; Achuenu, *et al.*, 2000). This has resulted in an unreliable number (size) of active registered indigenous contractors in Nigeria. Nonetheless, a population size of 500 is used for the study and this comprises of 250 contractors, 125 consultants and 125 Public building professionals respectively.

### 3.3 Sample

The target population of 500 was divided into 250, 125, and 125 among the three categories of contractors, consultants and public building professionals respectively. The study then uses the formula for determining the sample size of unlimited population by Ayoub and McCuen (2000) cited in Enshassi, *et al.*, 2006) in order to ensure that the chosen sample fully represents the target population.

$$SS = \frac{Z^2 * P (1-P)}{C^2} =$$

Where;

SS = Sample Size

Z = Z value (e.g. 1.96 for 95% confidence level)

P = Percentage picking a choice, expressed as decimal (0.5 used for sample size needed)

C = Confidence interval (0.5)

$$SS = \frac{1.96^2 \times 0.5 (1 - 0.5)}{0.5^2} = 384$$

Therefore, going by Ayoub and McCuen (2000) formula cited in Enshassi, *et al.* (2006), correction for finite population will be:

$$\text{New SS} = \frac{SS}{1 + \frac{SS-1}{\text{Pop}}} = 282.50$$

Where;

New SS= New sample size

SS= sample size= 384

Pop = population size = 500

However, in order to maximize the amount of the study responses because of the poor response rate usually recorded in the construction industry studies (Ibrahim, 2011; Crafford, 2007), and in accordance with Sambo's (2008) and Guthrie's (2010) recommendation that the bigger the sample size the better its ability to represent the population, the sample size was increased to 300.

### 3.3.1 Sample Size

A total of 300 questionnaires were distributed among the respondents in the ratio of 2:1:1 resulting in the questionnaire being distributed in the order of: 150; 75; and 75; to contractors, consultants and public building professionals respectively, in the entire study area. Therefore, in each sub-study area a total of 100 questionnaires were distributed in the following order: 50 (contractors); 25 (consultants) and; 25 (PBPs).

The sample size (300) used for this study is higher than the samples of 20, 140, 43, 108 and 50 used by Odediran, *et al.* (2012); Fagbenle *et al.* (2011); Idoro and Akande-Subar, (2008); Muazu and Bustani (2004); and Achueny, *et al.* (2000) respectively in previous studies targeting contractors in Nigeria.

### **3.3.2 Sampling Technique**

The study adopted two different types of sampling techniques, one for the structured questionnaires, and the other for case study.

#### **Sampling Technique for Questionnaire Survey**

Due to the presence of marginal and inactive indigenous contractors in the NCI, this resulted in non-availability of an authoritative active indigenous contractors' population frame (Idoro and Akande-Subar, 2008; Muazu and Bustani, 2004; Achueny, *et al.* 2000; Adams, 1997). This study therefore, could not adopt a random sampling technique (a probabilistic technique), despite its statistical preference to any type of sampling; owing to its significance in producing samples that are free from bias (Sambo, 2008). Though, Sambo (2008) also acknowledged that other sampling procedures apart from random sampling can be employed when a population has some definite characteristics that need to be reflected in the sample. According to Mugenda and Mugenda (2003) when a study is targeting some characteristics from a sample like specific: age group; profession or trade; religious sect; or educational level, purposive sampling is preferred.

This study targeted medium and large, active indigenous contractors in northern Nigeria, of which their actual population size cannot be ascertained from an

authoritative population frame. In this light, the study therefore employed a non-probabilistic sampling technique of purposive sampling. The choice of purposive sampling technique was hinged on the fact that the study is directed towards a defined group of respondents who are best able to respond to the research issues (Ibrahim, 2011). This technique enables the study to target and administer questionnaires to medium and large active indigenous contractors, so as to obtain reliable information that enhances and facilitates the reliability of the study. The adoption of purposive sampling technique benefitted the study with the following advantages (Maina, 2012, p. 44-45):

- The people who do not fit the requirements are eliminated;
- The sample is an accurate or near to accurate representation of the population;
- The results are expected to be more accurate;
- It is less time consuming and;
- It is less expensive as it involves lesser search costs.

### **Case Study Sample Size and Sampling Technique**

According to Guthrie (2010) a case study can be used to generalize on a study population if the sample of the cases is systematically chosen. This Guthrie (2010) emphasized, will provide a high probability for the outcome of a case study to exemplify its population pattern. The sample size for the case study therefore, was systematically obtained through a stratified random sampling technique on the contractors questionnaires that were responded to, in order to enable its generalization on the study population. A total of fifteen (15) contractors were

selected; five (5) from each sub-study area (Abuja, Bauchi/Gombe, and Kano). The selected contractors' completed projects files were subsequently obtained from clients organizations and these files (document; archival) were used for the case study.

### **3.3.3 Method of Questionnaire Administration**

The postal method of questionnaire administration is said to be cheaper than other methods (Christianson & Tortora, 1996 cited in Oladapo, 2006). However, the inefficiency and unreliability of the Nigerian postal system, coupled with the poor response rate in the administration of questionnaires through internet (emails) and post office in Nigeria (Oladapo, 2006), necessitated a hand-to-hand administration of the questionnaires. Prior to the distribution of the questionnaires the three research assistants were briefed on the research and were meant to comprehend the content of the questionnaires and what they were expected to achieve.

### **3.4 Method of Data Collection**

The method of data collection was determined by the methods adopted for the research; explorative (literature search), descriptive and explanatory (collective case study). For explorative method, data were collected through an intensive and extensive literature search, for descriptive methods; data were collected through interviews and questionnaires which according to McNabb (2009), are the most appropriate means to obtain data (information) for descriptive methods; and data for explanatory method (collective case study) were obtained through documentary analysis of completed building projects files, which according to Guthrie (2010) and

Buy's (2004), contain most facts about the object of the study (project planning) and is considered a primary data.

The research data were collected through primary and secondary sources. Primary data were collected through interviews, the use of questionnaires and case studies (documentation), while secondary data were collected through a critical review of literature from the following sources: Conference, Workshop and Journal papers, Newspapers, Forms of contract, Text books, Theses, and the internet.

### **3.4.1 Questionnaire Design**

Consequent to a thorough literature search, the research conducted interviews of contractors, consultants and public building professionals (PBPs) on contractors' project planning in construction project procurement systems. The interviews aimed at:

- Acquiring more information concerning Nigerian indigenous contractors' application of project planning techniques (tools) in project execution in Nigeria to enrich the questionnaire;
- Discovering additional challenges that indigenous contractors' encounter in executing their project planning in construction procurement system in Nigeria for inclusion in the questionnaire;
- Uncovering additional significant influencing factors for contractors projects planning in procurement systems for inclusion in the questionnaire and;
- Identifying additional success indicators for contractor's operational planning for inclusion in the questionnaire.

A total of 10 interviewees' comprising contractors (4), consultants (4) and PBPs (2) practicing in Northern Nigeria were interviewed.

### **Research Questionnaires**

The questionnaires were designed to elicit information from the study respondents that leads to the attainment of the study objectives. The questionnaires capture all the relevant data that were acknowledged during the literature review and the interview stages. Three sets of questionnaires were designed: **one set** each for indigenous contractors, consultants and PBPs.

The **indigenous contractors' questionnaire** consists of four sections. Section one consists of **closed categorical questions** about respondents' demographic information and information on respondents' involvement, time and cost performance in projects procurement systems in the last five years (2008-2013).

Section 2 has 2 sub-sections: the first consists of open and close-ended questions to obtain information on the use of operational planning techniques; while the second sub-section listed challenges of NICs in project planning in project procurement systems, with a 5 point severity index Likert rank scale, from **1-least severe** to **5-extremely severe**.

Section 3 listed significant influencing factors for contractors' project planning with a five point importance index rank Likert scale; from **1-not important** to **5-very important**. Section 4 has 2 sub-section: the first listed contractors' project planning success indicators with a 5 point importance index rank Likert scale, from **1-not important** to **5-extremely important**; while the second is an open-ended question

requesting respondents' to proffer measures that will enhance contractor's project planning for any type of construction project procurement systems in Nigeria Appendix 2).

The **construction consultants' questionnaire** (Appendix 3) and that of **PBPs** (Appendix 4) **are** virtually the same; with differences only in their section 1 (demographic data). The questionnaire consists of 4 sections. Section 1 consists of closed categorical questions about respondents' demographic information. Section 2 is a duplication of contractors' questionnaire second subsection two. Section 3 is a duplication of the contractors' questionnaire section 3, while section 4 is a duplication of contractors' questionnaires' section .4

#### **3.4.2 Pre-testing of questionnaire**

Once a questionnaire is finalized, it should be tried out in the field for pre-testing (Buys, 2004; Mugenda & Mugenda, 2003). Pre-testing is the surest means for a questionnaire to be comprehensible and error free (Buys, 2004). In this light, this research used a convenience sample of 10 people in Bauchi State-Nigeria to conduct a pilot survey on the respondents to pre-test the questionnaires. Among the respondents' were three academic staff who major in risk, procurement and management in the construction industry respectively; they comprised of a professor, an Associate Professor and a Senior Lecturer. All the experts have more than 15 years of experience in the industry. The other respondents comprised of 5 indigenous contractors and 2 PBPs, all having more than 15 years' experience in the NCI.

Questions were asked about the questionnaires in order to get responses. These responses were acted upon to ensure comprehensibility and an error-free questionnaire. The responses obtained led to the following changes on the draft questionnaires:

- Inclusion of the university's logo on the questionnaire cover letter
- Re-aligning of the school address on the questionnaire cover letter from left to center and rephrasing of the research title
- Inclusion of the word **area** as the last word in the first sentence of the first paragraph of the questionnaires' cover letter
- Interchange of the second and third sentence in the first paragraph of the questionnaires' cover letter
- Deletion of the second sentence in the second paragraph from the questionnaire cover letter
- Inclusions of the alphabet **d** to the word 'use' and, a definite article **the** before the word **utmost** in the fourth paragraph of the questionnaire cover letter
- Inclusion of candidate's school registration number and contact details (email address and phone number) on the questionnaire cover letter
- Replacing the word **right** with the word **selected** in the instruction of section one (demographic data) in all the respondents' questionnaire
- Inclusion of the phrase **operational headquarter** at the end of question 1 in Section 1(demographic data) in all the respondents' questionnaire
- Replacing the phrase **to what form of business registration your firm belongs** with **your type of firm** in third question of section one for contractors' and consultants'

- Inclusion of **PhD** as part of the category options in question 2 of Section B in the contractors' questionnaire
- Inclusion of the word **within** before the phrase, **the last five (5) years**, in the instruction of Section C of the contractors' questionnaire
- Editing of words, inclusion of the Nigerian currency sign (Naira-~~N~~) and replacing of the words **Initial duration** and **final duration** with **Initial contract periods (months)** and **Final completion period (months)** in the table provided in Section C of the contractors' questionnaire
- Inclusion of the phrase **at completion** to the title of the last column in the table provided in Section C of the contractors' questionnaire
- Replacing the word **Less** on all the Likert scale with the word **Least**
- Rephrasing tenses, correcting spellings and punctuations on the headings and itemizing factors to be ranked in all the respondents questionnaires'

All the respondents used in the pre-testing exercise agreed that the questionnaires were easy to comprehend and that each could be completed within 25-30 minutes.

### **3.4.3 Questionnaire Survey Validity and Reliability Test**

This study conducted validity and reliability test on the data obtained in the questionnaire and on the questionnaire construct respectively.

#### **Validity Test**

This research satisfies both the content and construct validity test. The content validity test refers to the adequacy with which a measure or scale has sampled from the intended universe or domain of content. This research used purposive sampling technique to sample from the intended universe. The adequacy of the sampling

emanates from the facts that the research is directed towards a defined group of respondents who are best able to respond to the research issues (Maina, 2012; Ibrahim, 2011; Mugenda & Mugenda, 2003). The construct validity test is concerned with a variable measurement instrument measuring particularly that which it is intended to measure. This condition was also attained by this study questionnaire; the questionnaires were able to measure all it intended to measure. Consequently, this enabled the study to test all its hypotheses and answer its objectives.

### **Reliability Test**

This study used the internal consistency test to test its questionnaire reliability. According to Field (2006) Cronbach's alpha ( $\alpha$ ) is used to measure questionnaire reliability index. Technically, Cronbach's  $\alpha$  is not a statistical test (Ibrahim, 2011); it is a coefficient of reliability (or consistency). It measures the consistency of a questionnaire's construct (items) and indicates how a scale is free from random error (Ibrahim, 2011; Pallant, 2001). This study therefore used Cronbach's alpha ( $\alpha$ ) to test its questionnaire construct consistency and level of random error.

The use of Cronbach's  $\alpha$ , allows negative construct to be detected and positive to be accepted ranging from a scale of 0 to 1.0 (Ogwueleka, 2011). The minimum acceptable value for Cronbach's alpha is from 0.5 to 0.6 (Ogwueleka, 2011; Olatunji, 2010). The cut-off value for this study therefore is 0.70; in essence, for items to be used together as a scale in this study, the items must be above the cut-off value. Table 3.1 shows the Cronbach's  $\alpha$  values interpretation within a scale of 0-1.

**Table 3.1: Cronbach's  $\alpha$  Values Interpretation**

Reliability Values	Reliability Status
< 0.5	Poor
0.5-0.7	Sufficient
> 0.7	Good

**Source:** Olatunji (2010)

Using the Cronbach's  $\alpha$  scale as a measure, this study measured questionnaires construct consistency (reliability) and level of random error. The questionnaires were constructed basically to capture two broad constructs (demographic profiles and study objectives). These constructs cover: demographic profiles, NICs projects procurement involvement, NICs project performance (time and cost), NICs projects planning, NICs projects planning challenges, factors influencing NICs project planning, and contractors' project planning success indicators. Table 3.2 shows each of the questionnaire constructs' (items) Cronbach's  $\alpha$  measure.

**Table 3.2: Questionnaire Factor Categories Cronbach's  $\alpha$  Scores**

S/N	Factor category	No. of		Reliability
		Items	Cronbach's $\alpha$	Status
1	Demographic data	9	0.85	Good
2	NICs involvement	6	0.83	Good
3	NICs performance	10	0.92	Good
4	NICs project planning	7	0.91	Good
5	NICs Planning challenges	23	0.89	Good
6	Factors influencing NICs projects planning	16	0.81	Good
7	Contractors planning success indicators	17	0.75	Good

**Source:** Author (2013)

The Cronbach's  $\alpha$  measure recorded for this study revealed that the reliability of the questionnaires' constructs are very high, all exceeding the cut off score of 0.7. This indicates that the questionnaires are highly reliable (consistent) and free from random error.

#### **3.4.4 Method Adopted for Case Study**

A case study is a process or record of research into the development of a particular person, group, or situation over a period of time (Oxford Dictionary of English, 2000). According to McNabb (2009) many definitions for case studies in research have been proposed and one of such definitions is from Yeager (1989) cited in McNabb (2009, p.358) as a description of a management situation based on interview, archival, naturalistic observation, and other data, constructed to be sensitive to the context in which management behavior takes place and to its temporal restraints. These characteristics Yeager stressed are shared by all cases.

In the views of Lang and Heiss (1990); Arenson (1993) cited in McNabb (2009, p.358), case studies are often intensive studies of one or a few exemplary individuals, families, events, time periods, decisions or set of decisions, processes, programs, institutions, organizations, groups, or even entire community. Case studies are associated with qualitative research but, they can also illuminate quantitative findings and can incorporate quantitative data (Guthrie, 2010).

According to McNabb (2009) a subject is selected for case study either because it points out some underlying problems, or because it represents a successful solution

to a problem. Stakes (2000) in McNabb (2009) classified case studies into three types: instrumental, intrinsic, and collective.

This study adopted the collective case study approach. This approach is also referred to as multiple-case, cross-case, or multisite qualitative research. The design is one of the major research approaches taken in comparative studies. The approach looks at a group of similar cases to study a particular phenomenon, and it is also used to suggest whether characteristics might be common to larger population of similar cases. According to McNabb (2009) the cases selected may be chosen because they are similar or they are different, and because the researcher believes that understanding what is going on in those cases will result in better understanding about a larger population.

This study thus used the multisite qualitative research (collective) case study approach in studying NICs projects operational planning in Nigeria, in order to ascertain whether the activities and actions of indigenous contractors in projects planning followed the same pattern in Nigeria. In addition, this method allows this study to follow up contractors' responses in the questionnaire, and as such allows for a more extensive probe on specific issues identified in the main investigation (questionnaire survey) (Guthrie, 2010).

### **3.5 Method of Data Analysis**

This study used both structured questionnaires and a multisite (collective) case study approach to generate quantitative and qualitative data from respondents. The method of data analysis was conducted using statistical package for social sciences (SPSS)

and Bloom's taxonomy hierarchy (Guthrie, 2010) for the data's obtained from structured questionnaires and case studies respectively.

### **3.5.1 Method of Data Analysis for Questionnaires Survey**

Statistical package for social sciences (SPSS) for Windows, Version 17.0 (SPSS, 2008) was used for the statistical analyses of the data generated from the questionnaire survey. The analyses undertaken include: agreement test (association), and test of significance and descriptive statistics. SPSS (version 17) offers the study a package of programmes for manipulating, analyzing, and presenting data (Field, 2006; Landau & Everitt, 2003). This makes it easier for the study to file, edit, view, input, transform and, analyze data for the agreement test, test of significance and descriptive statistics. In addition to SPSS being interactive (user friendly), it also allows the presentation of research results with tables, charts and graphs in a simple and comprehensive manner (Field, 2006; Landau & Everitt, 2004).

### **Descriptive Statistics**

Descriptive statistics, according to Sambo (2008), is a numerical index that describes or summarizes certain characteristics of a distribution. This study therefore used descriptive statistics for the tasks of describing the sample size, providing a quantitative summary of the research variables, summarizing the data sets, and for inferential purposes (McNabb, 2009).

This study used the four categories of descriptive statistics of measures of central tendency; measures of variability (dispersion); measures of relative position; and measures of correlation to analyze its data. These four types of measurements enable

the study to reduce its large data set to a smaller amount of meaningful numbers that everyone can understand (McNabb, 2009). Unless otherwise necessary, the study selected and used in each category of the descriptive statistics the best that satisfies the characteristics of good descriptive statistics; it should be: singled-value, algebraically tractable, consider every observed value, and consider the frequency of every observed value (Frank & Althoen, 1994 cited in Sambo, 2008, p.58).

This study accordingly used the following descriptive statistics: percentages/frequencies, arithmetic means, standard deviations, Spearman's rank correlation coefficient ( $\rho$ ), chi-square ( $\chi^2$ ) and, Kruskal-Wallis H-Test. These descriptive statistics were used because this study's data were basically in nominal and ordinal measurement scales (Guthrie, 2010; McNabb, 2009; Sambo, 2008).

Ranking of the level of importance and severity index used in the questionnaires were based on arithmetic mean value scores, using Likert scales of 1-5. For interpretation purposes, the mean score of 1 indicates 'not important/severe', 2 'least important/severe', 3 'moderately important/severe', 4 'important/severe' and 5 'very important/extremely severe'. Lower mean value indicates a lower level of importance or severity (Ibrahim, 2011). Although the use of arithmetic means suggests treating Likert scale-based data at an interval level of measurement (Ibrahim, 2011, p. 9), the mean scores should not be deemed as 'quantities' to show how much more important one factor is than the other, but as 'indicators' to establish a rank order of importance or severity for the factor (Idrus and Newman, 2002 cited in Ibrahim, 2011, p. 9). For instance, if the mean score of a particular importance/severity index is 3.2, then it could be interpreted that the

importance/severity index is perceived to be between ‘moderately important/moderately severe’ and ‘important/severe’ but leans more towards being “moderately important/moderately severe” (Ibrahim, 2011).

### **Hypotheses Testing**

According to McNabb (2009) there are three main types of hypothesis: predictive, comparative, and associative. All of these experimental hypotheses can be connected to a single problem (McNabb, 2009). In sequence with this study’s objectives, this study used comparative hypotheses for hypothesis 1, predictive hypothesis for hypothesis 2 and 3, and associative hypotheses for hypothesis 4, 5 and 6 respectively. The following non-parametric statistics hypothesis testing techniques were used to test the research hypotheses:

- In hypothesis 1 Chi-square test
- In hypothesis 2 Chi-square test
- In hypothesis 3 Chi-square test
- In hypothesis 4 Kruskal-Wallis Analyses-of-Variance Test
- In hypothesis 5 Kruskal-Wallis Analyses-of-Variance Test
- In hypothesis 6 Kruskal-Wallis Analyses-of-Variance Test

### **3.5.2 Method of Data Analysis for Case Study**

The case study (historic method) applied for this study extracted its data exclusively from completed building projects files obtained from the project clients' offices. The study covers projects executed between 2003-2013. The study sort and recorded information that include the following:

- Project type: residential, commercial, institutional, or recreational.

- Type of procurement systems adopted
- Type of client: private or public
- Date of contract award
- Type of condition of contract adopted
- Contract sum and duration of contract
- Time and cost overrun
- Causes of time and cost overrun
- Variation and reason for variation
- Type of planning tool/tools used
- ICT compliance in project planning

The data extracted from the project files were presented using Bloom's taxonomy hierarchy (Guthrie, 2010): first, describe; then analyze (classify); and Draw conclusions or interpret. In describing the data, the study writes out the facts as they are, in clear descriptive reporting, free of adjectival colour and filters out those which are not relevant to the research problem (Guthrie, 2010). The study then classifies the data to identify similarities and differences, before interpreting them in readiness for the research findings, conclusion and recommendation.

### **3.5.3 Case Study Validity and Reliability Test**

This study used the external and internal criticism technique to test the case study data validity and reliability respectively.

### **External Criticism**

The external criticism technique is a validity test applied on historic data (documents) (Guthrie, 2010). It is concerned with ascertaining the genuineness of a data from a source. This was applied on the historic data used for this research case study. To ensure the genuineness of the data obtained from the clients' custody, all the materials used as a source of data for the research case study bears (Guthrie, 2010): letter heads, titles, file numbers, official stamps, dates, and official signatures.

### **Internal Criticism**

The internal criticism technique is a reliability test conducted on historic data (document). It is concerned with the meaning of a data; whether it presents the full picture and whether there is a balanced view (Guthrie, 2010). This test was satisfied by this study. All the files used for the study were project files in the custody of the clients representing all correspondence of the parties involved during the execution of the building contracts.

### **3.6 Ethical Consideration**

In recognition of ethical requirements in research, which emphasized on exhibiting high standard of professionalism (Guthrie, 2010). This study was guided by research ethics in the planning, conducting, and reporting the results of the research (McNabb, 2009). To ensure that the research ethics are properly adheres to, this study follows the four ethical principles in research: truthfulness, thoroughness, objectivity, and relevance. All the respondents engaged in the study are assured of confidentiality, and none were coerced, or unduly engaged in the study.

## **CHAPTER FOUR**

### **4.0 DATA ANALYSIS**

#### **4.1 Introduction**

This chapter presents analyses and interpretation of data collected. The analysis used literature review, questionnaire survey and case study. Literature review was used to identify: NICs project planning challenges, significant influencing factors for NICs project planning and, contractors' project planning success indicators. The questionnaire survey section covers information concerning: responses to questionnaires, demographic profiles of respondents', agreement analysis (test of association), hypotheses testing, data presentation, analyses and interpretation. The case study section carries information concerning: data presentation, data analysis, and interpretation.

#### **4.2 Response to Questionnaires**

This study administered three (3) sets of questionnaires to contractors, consultants, and PBPs in the Northern geo-political zones of Nigeria. The distribution and responses are shown in the sub-section below.

##### **4.2.1 Respondents' Response Rates**

Table 4.1 is the representation of the response rates among the three categories of respondents': contractors, consultants and PBPs respectively in the study area, while Table 4.2 is the representation of the response rate according to all respondents.

**Table 4.1: Respondents' Response Rate**

<b>Contractors'</b>			
<b>Location</b>	<b>Distribution (No)</b>	<b>Returned (No)</b>	<b>% Response Rate</b>
Abuja	50	20	40.00
Bauchi/Gombe	50	30	60.00
Kano	50	19	38.00
<b>Consultants</b>			
<b>Location</b>	<b>Distribution (No)</b>	<b>Returned (No)</b>	<b>% Response Rate</b>
Abuja	25	18	72.00
Bauchi/Gombe	25	16	64.00
Kano	25	10	40.00
<b>Public Building Professionals (PBPs)</b>			
<b>Location</b>	<b>Distribution (No)</b>	<b>Returned (No)</b>	<b>% Response Rate</b>
Abuja	25	20	80.00
Bauchi/Gombe	25	25	100.00
Kano	25	19	76.00

**Source:** Author (2013)

Table 4.1 shows that 50 questionnaires were distributed to contractors in the study area and this yielded a response rates of 40%, 60% and 38% from Abuja, Bauchi/Gombe and, Kano respectively. Table 4.1 also depicts the distribution and response rates of the consultants' questionnaire in the study area. A distribution of 25 questionnaires in each of the sub-study areas recorded response rates of 72%, 64% and 40% from Abuja, Bauchi/Gombe and, Kano respectively, while a distribution of 25 questionnaires in each of the sub-study areas to PBPs recorded the following response rates: 80%; 100% and; 76% from Abuja, Bauchi/Gombe and, Kano respectively.

Table 4.2 illustrates the distribution and the response rates according to all respondents' in the study area. A total of 300 questionnaires were distributed

according to the ratio of 2:1:1 to contractors (150), consultants (75) and, public building professionals (PBP) (75). The distribution received the following response rates: 38.98%, 24.86% and, 36.16% from contractors, consultants and PBPs respectively. Using the formula for computing questionnaires success rate (Olatunji, 2010):

$$\text{Questionnaire success rate} = \frac{(\text{Questionnaires received} \times 100)}{(\text{Questionnaires administered})}$$

The study therefore recorded an overall questionnaire response rate of 59%.

**Table 4.2: Response Rate According to Category of Respondents**

<b>Respondents'</b>	<b>Distribution (No)</b>	<b>Response (No)</b>	<b>% Response Rate</b>
<b>Contractors</b>	150	69	38.98
<b>Consultants</b>	75	44	24.86
<b>PBPs</b>	75	64	36.16
<b>TOTAL</b>	<b>300</b>	<b>177</b>	<b>100</b>

**Source:** Author (2013)

A total of 177 questionnaires were returned; representing a 59% response rate and this was used for the study analysis. This response rate for this type of survey is higher than other studies carried out in the construction industry. For instance, Usman, *et al.* (2012) recorded a response rate of 55.25%, Iro, *et al.* (2013) received a 55.25% response rate, Ibrahim (2011) recorded a 47% response rate, Emuze (2011) recorded a 25.4% response rate, Olatunji (2010) obtained a 33.5% response rate, Crafford (2007) received a response rate of 22.8%, Buys (2004) received a 32.2% response rate and Adams (1997) obtained 35% response rate.

This study owes much of its high questionnaire response rates to the following measures:

- The cover letter humbly solicited for respondents' contribution to the development of Nigeria's economy by responding to the questionnaires
- The respondents were assured of utmost confidentiality.
- The wording questions were (Guthrie, 2010, p.134): short, simple, specific, unambiguous, and neutral.
- The responses expected from respondents were constructively guided to be short and precise.
- The questionnaires were kept to a minimum length for a study of this size.
- Phone calls and physical follow-up were made a week after sending the questionnaires, and subsequently every two weeks, for a period of three months to remind respondents who had not responded to do.

#### **4.2.2 Missing Values**

The responses in the questionnaires show that questions were answered adequately and as such recorded nearly zero missing values. Though, Crafford (2007), acknowledged that missing values in a questionnaire are sometimes inevitable, as some respondents might not be experienced or knowledgeable in some areas. In recognition of the possibility of missing values, this study therefore targeted and engaged respondents that have a wealth of experience and are knowledgeable in the field of construction contracting and management. For contractors, their project managers were engaged, while for consultants and PBPs mostly experienced

management personnel were targeted. This resulted in curtailing the number of missing values to a minimum level in the responded questionnaires.

### **4.3 Demographic Profiles of Respondents**

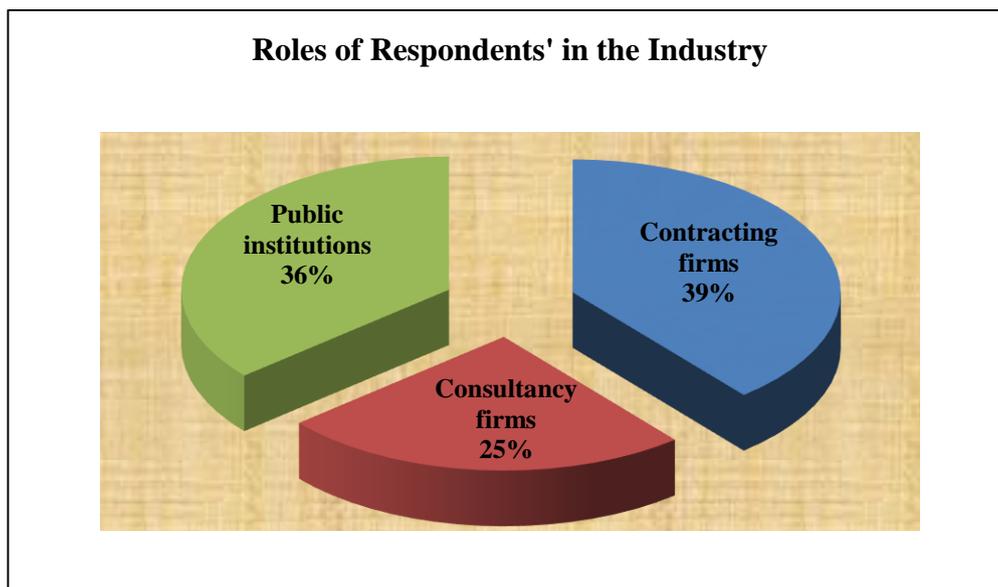
According to Buys (2004, p.87) an analysis of the demographic data assists the researcher to ensure that all the variables that may have an influence on the correctness of the data have been analysed. By implication, this ensures that the respondents used for a study are appropriate sample for the intended universe or domain of content (Pallant, 2001). In view of the above, this section conveyed information concerning the demographic profiles of research respondents and this covers: types of respondents' organization in the construction industry, contracting firms (company and construction/project managers), consultants, and PBPs.

#### **4.3.1 Respondents' Organization in the Construction Industry**

Figure 4.1 shows the percentage distribution of the respondents' organization in the NCI. Contracting firms have a representation of 39%; the largest, followed by public institutions (PBPs) with a representation of 36%, then consultancy firms with a share of 25%. PBPs represents Public institutions, and according to Iro, *et al.* (2013), public institutions have 75% of the total construction share in Nigeria, which make them a major client of the construction industry.

This representation therefore depicts the primary triads of parties involved in the management of construction projects: client, contractor and, consultant (Usman, *et al.* 2012; Bennett, 2003). These categories of organization can further be divided into public sector (public institutions-36%) and private sector comprising the contracting (39%) and the consultancy firms (25%) respectively (private sector-

64%). These revealed that the major players in the procurement and management of construction projects are involved in this study and the two major sections of the economy (public and private sectors) are represented, hence there is adequate representation and content validity of the data obtained from the respondents.

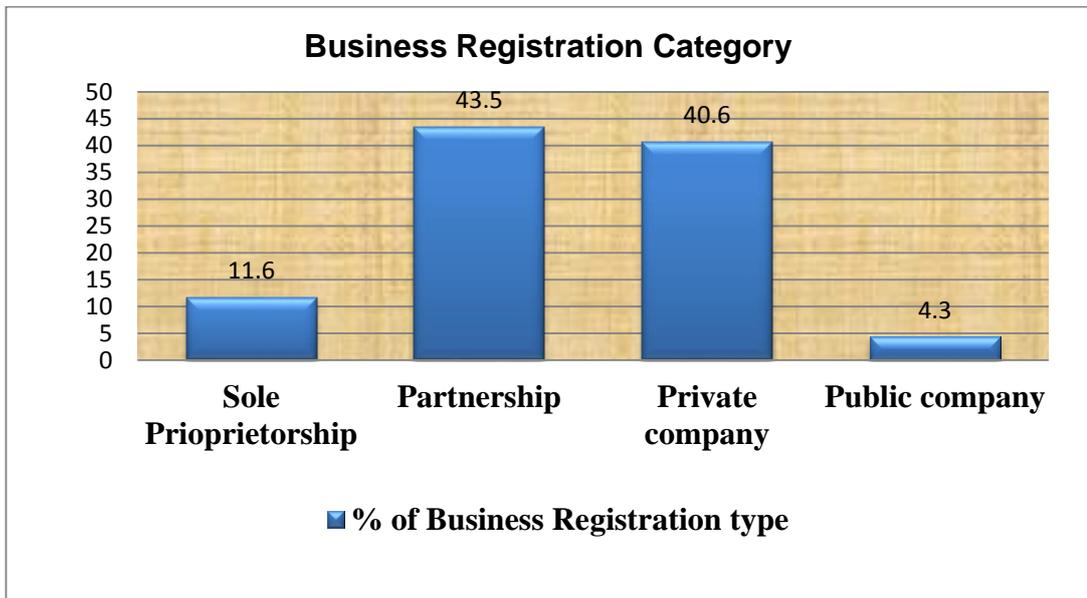


**Figure 4.1: Distribution of Respondents Organization in the NCI**

**Source:** Author (2013)

#### **4.3.2 Contractors' Demographic Profiles**

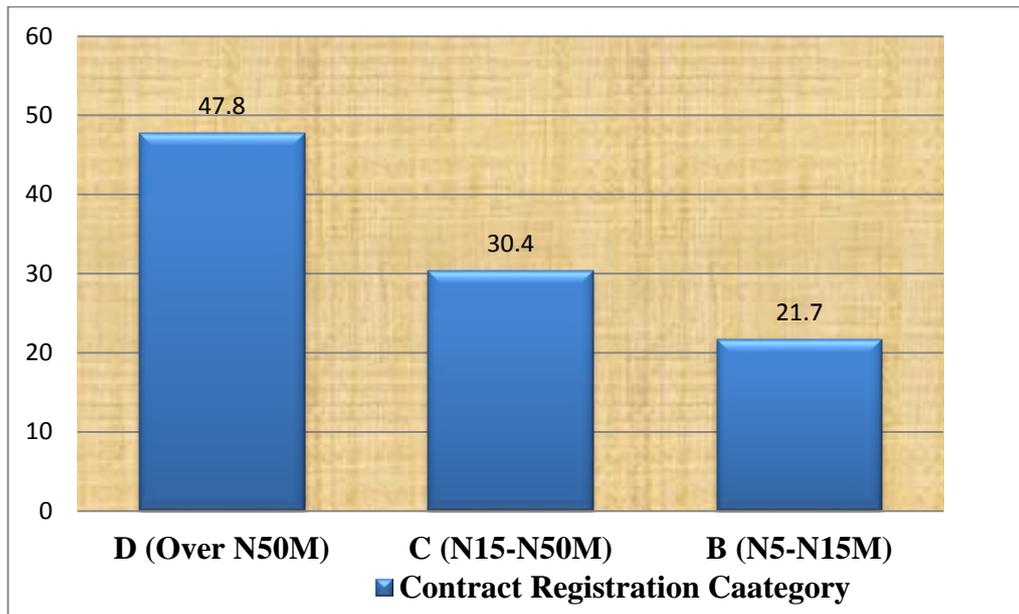
This section presented contractors demographic profiles. Figure 4.2 shows the distribution of contractors' business registration category. Almost 20% (11.6%) of the contractors are Sole proprietors, 43.5% are in partnerships, and 40.6% are private companies, while 4.3% are public companies.



**Figure 4.2: Contractors' Business Registration Category**

**Source:** Author (2013)

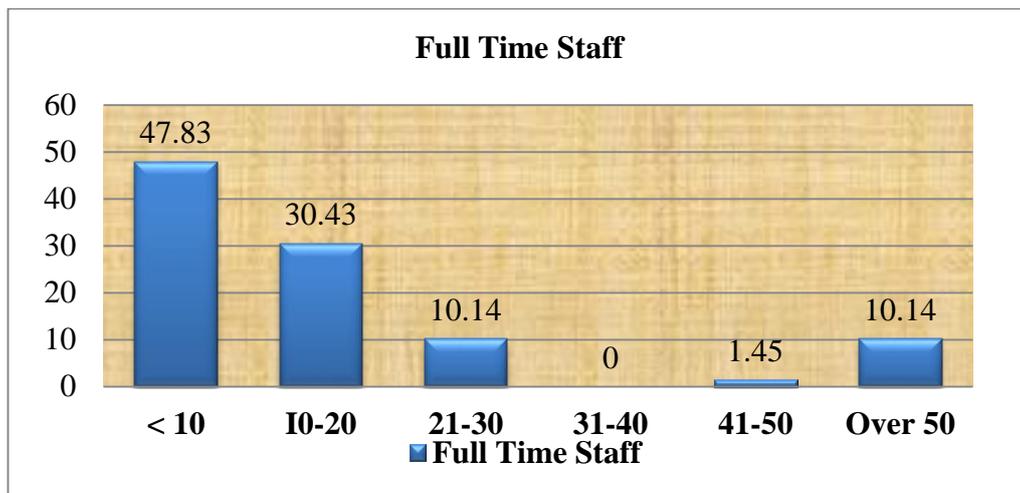
Figure 4.3 below shows the percentage distribution of contractors' contract registration category according to the Federal Government of Nigeria contractor's registration category. Virtually 48% of the contractors' registered as large contractors (Category D) handling projects that cost over ₦50 million, while the remaining 30.4% and 21.7% are medium size contractors (Category C and B) handling project costing between ₦15-₦50 million and between ₦5-₦15 million respectively (US\$1= ₦ 160). This result revealed that almost half (47.8%) of the contractors are large contractors and that the contractors handle large projects which involves project planning complexities and as such are more experienced to respond to this study enquiry.



**Figure 4.3: Distribution of Contractors Contract Registration Category**

**Source:** Author (2013)

Figure 4.4 shows the percentage distribution of full time staff of contractors. Almost 48% of the contractors employ less than 10 full time staff, 30.43% of the contractors employ 10-20 full time staff, 10.14% of the contractors employ 21-30 full time staff, none of the contractors employ 31-40 full time staffs, while 1.45% of the contractors employ 41-50 full time staffs and 10.14% employs over 50 full time staffs. These revealed that most of the contractor’s full time staff are not enough in the execution of contracts, as most building project contracts involve a large number of operatives (professionals, craftsmen, labourers, etc.). Hence, it is difficult for the contractors to build an efficient management system through training of its staff on project planning because, the contractors engaged contract staff that are not trained by them and consequently will be difficult to integrate in their management programme to ensure adequate project planning (Hamilton, 2006).



**Figure 4.4: Distribution of Contractors Full Time Staff**

**Source:** Author (2013)

Figure 4.5 shows the percentage distribution of the contractors' contract staff. Almost 40% of the contractors engage less than 25 contract staff, 28.99% of the contractors engage 25-50 contract staff, 10.14% of the contractors engage 50-75 contract staff, and 7.25% of the contractors engage 75-100 contract staff, while 14.5% of the contractors engage more than 100 contract staff. This result revealed that contractors' full time staff sizes are smaller than their contract staff size. This makes it difficult for the contractors to develop a project management culture that can address project planning. This is because most of the contract staff are not trained by the contractors and might not always be involved in the contractors' contract and this affects the contractors' operatives experience gained from consistency in developing a project management culture that can adequately address their project planning expectation (Hamilton, 2006).

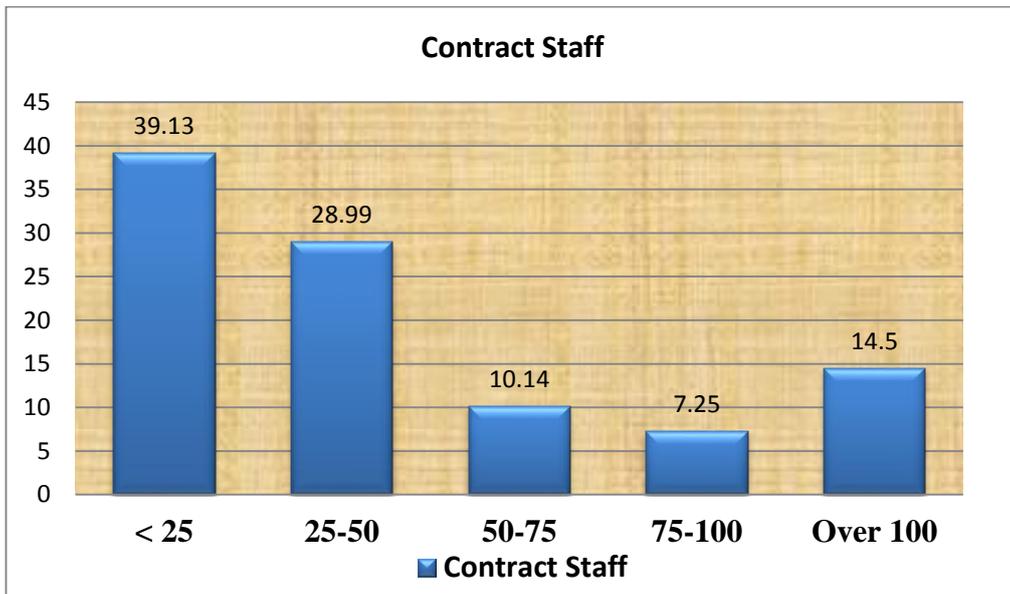


Figure 4.5: **Distribution of Contractors Contract Staff**

**Source:** Author (2013)

Figure 4.6 is a representation of the contractors' project managers' highest educational qualification. Virtually 85.5% hold Bachelor's degrees and Master's degrees while, 15% of the project managers hold higher diplomas as their highest educational qualification. This result revealed that most of the project managers are competent enough to manage contractors project contracts and knowledgeable to response to this research enquiry on contractors' project planning.

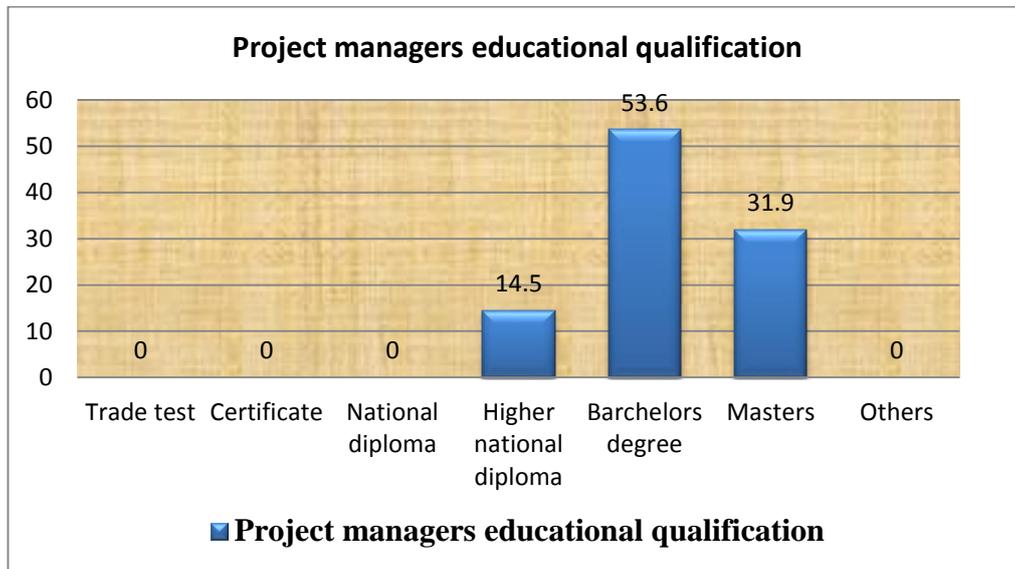


Figure 4.6: **Distribution of Contractors Project Managers' Educational Qualification**

Source: **Author (2013)**

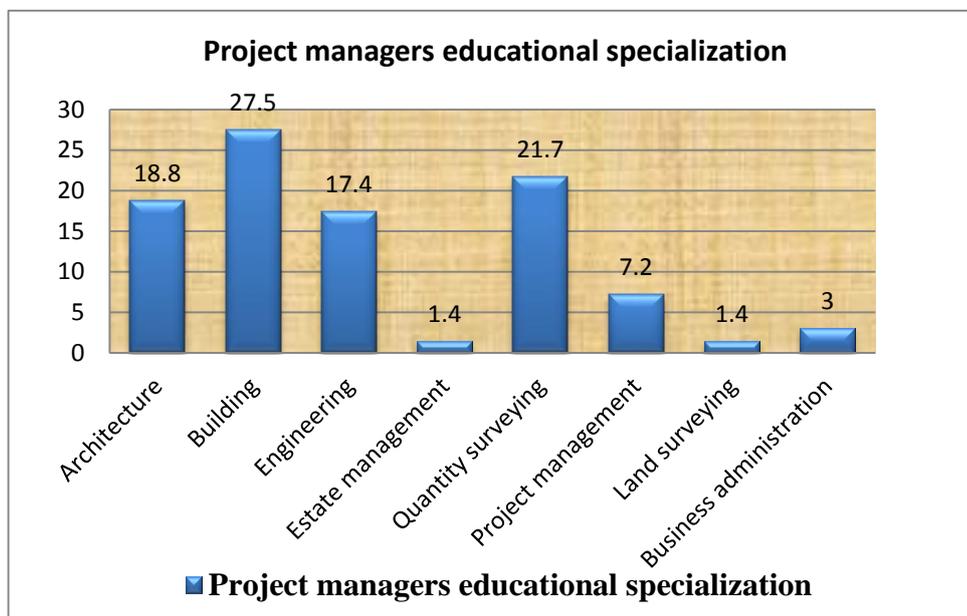
Table 4.3 depicts the contractors' project managers' years of experience. Almost half (46.4%) of the project managers have more than 10 years working experience in the construction industry and all have a 9.78 mean years of experience. These results revealed that the contractors' project managers are conversant with their organizations (contractors): project management techniques, involvement in procurement systems and project performance in time and cost, and are the best personnel within the contractors' organization to respond to this study enquiry on contractors project operational planning.

**Table 4.3: Contractors' Project Managers' Experience**

Experience (yrs.)	Mid value (X)	Frequency(F)	FX
≤ 5	2.5	8	20
<b>5-10</b>	7.5	29	217.5
<b>10-15</b>	12.5	17	212.5
≥ 15	15	15	225
<b>Total</b>		<b>69</b>	<b>675</b>

Mean years of experience =  $\frac{\sum FX}{\sum F} = 9.78$  years

Source: Author (2013)



**Figure 4.6: Distribution of Contractors Project Managers Educational Specialization**

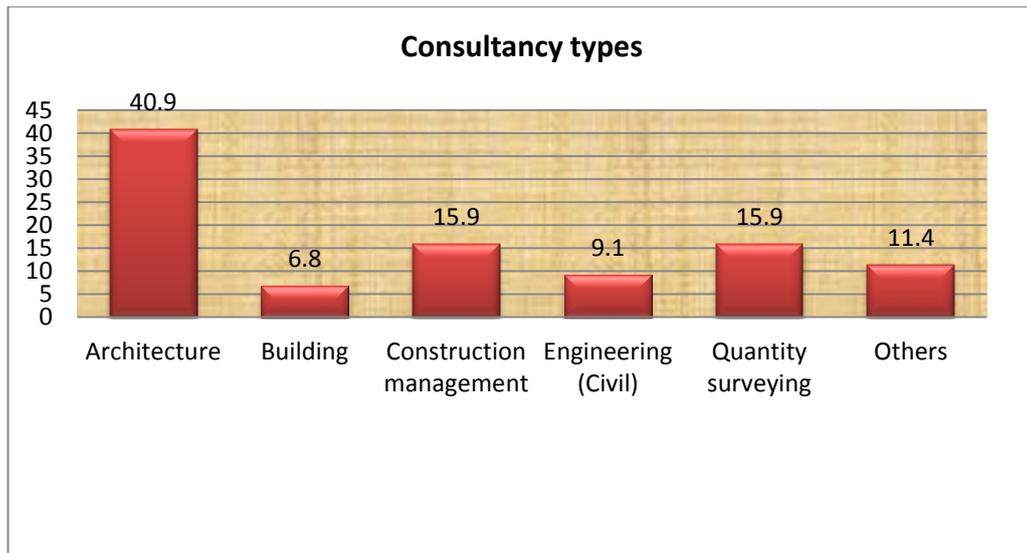
Source: Author (2013)

Figure 4.6 reveals that only few (5.8%) of the contractors project managers specialized in non-core building projects procurement specialization while the majority (94.2%) of the contractor's project managers specialized in core building projects procurement courses (Ameh & Odusami, 2010): Architecture, Building Technology, Quantity Surveying, and Construction/Project Management. This

revealed that virtually all the project managers are educated on operational planning and are involved/aware of contractors' project operational planning performance (Krishnamurthy & Ravindr.a, 2010). Thus, they are competent to respond to this study enquiry on contractors' project planning.

### 4.3.3 Consultants' Demographic Profiles

Figure 4.7 depicts the demographic profiles on the percentage distribution of firms' consultancy types.

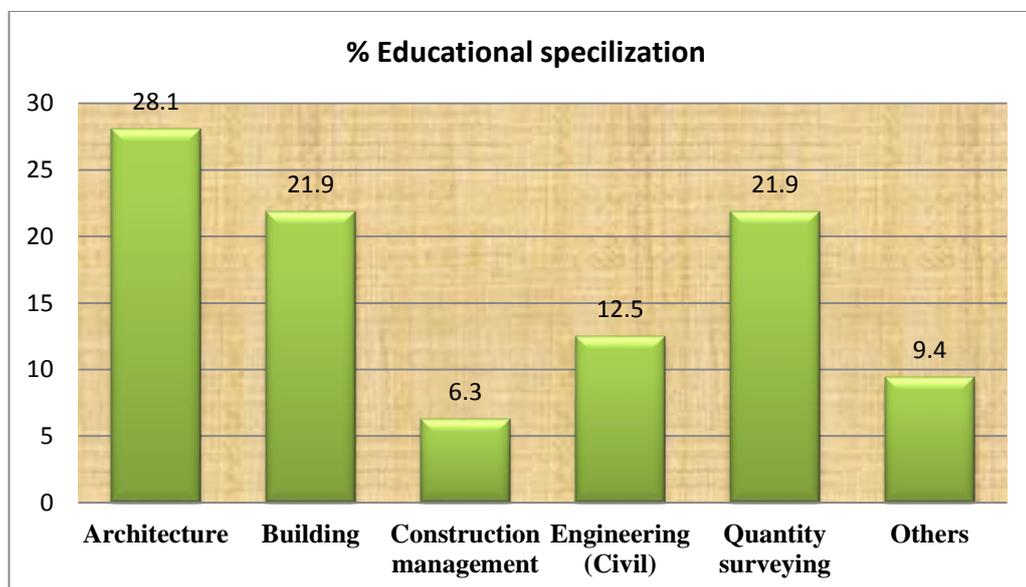


**Figure 4.7: Distribution of consultancy firms type**

Figure 4.7 reveals that a majority (88.6%) of the consultants used for this research run consultancy firms that renders services that are primarily concerned with building projects procurement (Ameh & Odusami, 2010). This result also revealed that a majority of the consultants are the class of consultants engaged by clients in building projects management and for the monitoring of the activities of contractors (Idoro, 2011b). Consultants according to Adams (1997), are considered to be the most objective in assessing contractors' project performance. Thus, this confirms that the consultancy firms used for this study are competent to respond to this research enquiry on contractors' project planning.

#### 4.3.4 PBPs Demographic Profiles

This section is concerned with depicting PBPs demographic profiles. This class of respondents includes building professionals who work for any public undertaking and are solely responsible for advising the government on building procurement and managing public projects procurement on behalf of the government, therefore are also referred to as in-sourced consultants (Idoro, 2011b).

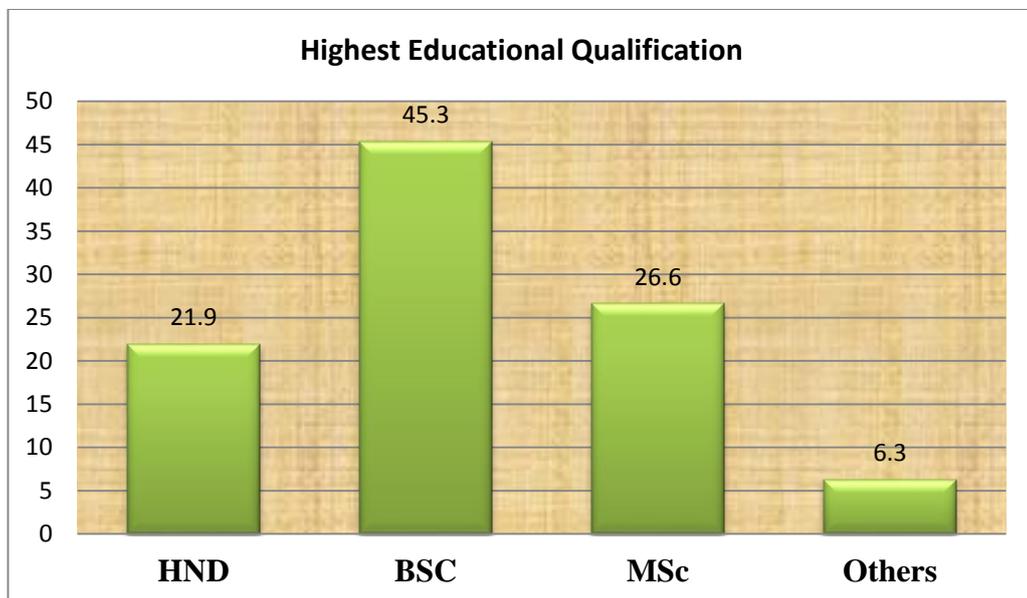


**Figure 4.8: Distribution of PBPs Educational Specializations**

**Source:** Author (2013)

Figure 4.8 shows percentage distribution of PBPs educational specialization. The figure reveals that virtually all the PBPs (90.6%) specialized in core building projects procurement disciplines (Ameh & Odusami, 2010): Architecture, Building Technology, Construction Management, Engineering (civil), and Quantity Surveying. These classes of respondents (in-sourced consultants), are on permanent employment of the public client and are responsible for developing the requirements of project clients, setting targets, deadlines and establishing standards for meeting

these requirements, preparing project documents that describe the targets, deadlines and standards set and sometimes monitoring the activities of contractors (Idoro, 2011b). PBPs are said to be objective in assessing contractors performance, as they are directly involved in monitoring the contractors performance on behalf of the clients (Adams, 1997). Hence, they are competent enough to respond on contractors project planning and this ensures the content validity of the data obtained.



**Figure 4.9: Distribution of PBPs Highest Educational Qualification**

**Source:** Author (2013)

Figure 4.9 shows PBPs highest educational qualification. The figure revealed that most of the PBPs (71.9%) have Bachelor's degrees and Master's degrees. This result reveals that almost 72% of the PBPs have Bachelor's and Master's degree as their highest educational qualification and as such are competent to respond to this study. This ensures content validity of the data collected.

Figure 4.10 presents the PBPs professional registration in Nigeria. The figure shows that almost 80% of the PBPs are registered with the professional bodies responsible for promoting the professions concerned with the core disciplines of building project procurement in Nigeria. The registration with these professional bodies is a pre-requisite to being licensed to practice their profession in Nigeria, and as such they are competent and experienced to respond to this study. This assists to improve this study's content validity.



**Figure 4.10: Distribution of BPs Professional Registration**

**Source:** Author (2013)

#### **4.3.5 Combined Respondents' Years of Experience**

Table 4.4 is a representation of all the respondents' years of experience in the construction industry. The table revealed that 64% of the respondents' have over 10 years' experience in the construction industry. The mean years of experience of all the respondents' were found to be 11.50 years. This shows that the respondents have

adequate experience to respond to the research enquiry, and consequently ensures the content validity of the data obtained from the respondents.

**Table 4.4: Combined Respondents' Years of Experience**

<b>Experience (yrs.)</b>	<b>Mid value (X)</b>	<b>Frequency(F)</b>	<b>% of F</b>	<b>FX</b>
<b>Less than 5</b>	2.5	10	5.65	25
<b>5-10</b>	7.5	53	29.94	397.5
<b>10-15</b>	12.5	36	20.34	450
<b>Over 15</b>	15.0	78	44.07	1170
<b>Total</b>		<b>177</b>	<b>100</b>	<b>2032.5</b>

**Mean Years of Experience =  $\sum FX / \sum F = 11.50$**

**Source:** Author (2013)

#### **4.4 Respondents' Test of Association**

This research used Spearman's rank correlation coefficient ( $\rho$ ) to test its respondents level of association (test of agreement) between the rank pairs of: contractors and consultants; consultants and PBPs, and contractors and PBPs. The spearman's rank correlation coefficient is used when two or more variables to be correlated are measured in the ordinal scale (Sambo, 2008). The variables measured are all in ordinal scales. These variables were the respondents' rankings of factors influencing contractors planning, challenges in executing contractors planning and contractors' project planning success indicators. The coefficient of correlation ( $\rho$ ) is defined as (Sambo, 2008):  $-1 \leq \rho \leq 1$ . The coefficients of correlation ( $\rho$ ) were computed using the formula (Sambo, 2008):

$$\rho = 1 - \frac{6 \sum D^2}{N(N^2 - 1)}$$

Where:

$\rho$  (rho); is the rank correlation coefficient,

D; is the rank difference in a particular pair and

N; the number of pairs

**Table 4.5: Respondents Agreement Analysis**

S/N	Attribute	Contractors & consultants	Consultants & PBPs	Contractors & PBPs	Agreements Status
1	Influencing factors	0.998	0.999	0.999	Very strong
2	Challenges	0.999	0.999	0.999	Very strong
3	Success indicators	0.990	0.997	0.993	Very strong

**Source:** Author (2013)

Table 4.5 shows the spearman’s rank correlation coefficient computed for the pairs of contractors and consultants, consultants and PBPs and, contractors and PBPs for factors influencing contractors project planning (0.998, 0.999 and, 0.999), for challenges in executing contractors project planning (0.999, 0.999, and 0.999) and for the contractors’ project planning success indicators (0.990, 0.997 and, 0.993) respectively. These results revealed that the degrees of association among the respondents are positive and very high. This implied that the respondents are in agreement (consistency) in their opinions about this study.

## 4.5 Hypotheses Testing

### 4.5.1 Hypothesis 1, 2, and 3

This research used the non-parametric one-sample chi-square test (goodness-of-fit test), to test hypothesis 1, 2 and 3, as they are all nominal data (McNabb, 2009). The

one-sample test is used when a study has questions about the distribution of responses in data taken from a sample (McNabb, 2009). The formula for computing the chi-square ( $\chi^2$ ) is given as (McNabb, 2009; Sambo, 2008):

$$\chi^2 = \frac{\sum (f_o - f_e)^2}{f_e}$$

Where;  $f_o$  = is observed frequency,  $f_e$  = is expected frequency.

The data used for testing the three hypotheses (1, 2 and 3) are responses from contractors' questionnaires section 1 subsection C and section 2 subsection 1. The data were grouped to form dichotomous variables labeled 1 and 2.

#### **Groupings for hypothesis 1;**

- Design-Bid-Build (A) are grouped as traditional procurement system-1
- Management contract (B), construction management contract (C), design and management contract (D), design and construct contract (E), and design and build (F) were grouped under non-traditional procurement system-2.

#### **Groupings for hypothesis 2;**

- Nil time and cost overruns were grouped together for all the procurement systems-1
- All range of time and cost overruns exceeding zero (0) were grouped together for all the procurement systems-2.

#### **Groupings for hypothesis 3;**

- Appropriate application of planning techniques for construction projects was labelled 1

- Inappropriate application of planning techniques for construction projects was labelled 2.

### **Hypothesis 1**

**H<sub>0</sub>:** There is no disproportionate distribution in the frequencies of responses among NICs to a question on their level of involvement in building procurement systems.

**H<sub>1</sub>:** There is disproportionate distribution in the frequencies of responses among NICs to a question on their level of involvement in building procurement systems.

**Decision rule:** According to McNabb (2009), decisions regarding the nonparametric hypothesis testing for one sample chi-square test, are made based on the size of the p-value. Accept null hypothesis if the computed p-value is greater than 0.05 confidence level for the test (McNabb, 2009; Pallant, 2001). Hence, the null hypothesis was accepted, since the computed p-value of 0.720 at 2 degree of freedom (DF) is greater than 0.05 confidence level. This result revealed that there is no disproportionate distribution in the frequencies of responses among NICs to a question on their level of involvement in building procurement systems, and implied that NICs are involved in both traditional and non-traditional building procurement systems.

### **Hypothesis 2**

**H<sub>0</sub>:** NICs underperformed in terms of cost and time in building project procurement systems.

**H<sub>1</sub>:** NICs performed in terms of cost and time in building project procurement systems.

**Decision rule:** Reject null hypothesis if the computed p-value is less than 0.05 confidence level for the test (McNabb, 2009; Pallant, 2001). Hence, the null hypothesis was rejected, since the computed p-value of 0.00 at 1 degree of freedom (df) is less than 0.05 confidence level. This result revealed that NICs underperformed in terms of cost and time in building projects procurement systems in Nigeria.

### **Hypothesis 3**

**H<sub>0</sub>:** The NICs inappropriately apply project planning tools for their contractual operations in project procurement systems.

**H<sub>1</sub>:** The NICs appropriately apply project planning tools for their contractual operations in project procurement systems.

**Decision rule:** Accept null hypothesis if the computed p-value is greater than 0.05 confidence level for the test (McNabb, 2009; Pallant, 2001)<sup>3</sup>. Hence, the null hypothesis was accepted, since the computed p-value of 0.41 at 2 degree of freedom is greater than 0.05 confidence level. This result revealed that the NICs inappropriately apply project planning tools for their contractual operations in project procurement systems. Table 4.6 shows details of chi-square ( $\chi^2$ ) tests for hypothesis 1, 2 and 3.

**Table 4.6: Details of  $\chi^2$  Tests**

Attribute	Confidence level	Computed p-value	DF	Significance	Decision
Procurement systems	0.05	0.72	2	Not Significant	Accepted
Time and cost overrun	0.05	0.00	1	Significant	Rejected
Project Planning	0.05	0.41	2	Not significant	Accepted

**Source:** Author (2013)

#### 4.5.2 Hypothesis 4, 5, and 6

This study used Kruskal-Wallis analysis-of-variance (Kruskal-Wallis H-test) for testing hypothesis 4, 5 and 6. The Kruskal-Wallis H test is used to test for differences in the way three or more independent groups or samples rank a variable in order to establish whether the independent groups or samples are from the same population (Seigel, 1956 cited in McNabb, 2009). The formula for computing Kruskal-Wallis H test is given as (Field, 2006; Buys, 2004):

$$H = \frac{12}{N(N+1)} \sum \{R_i^2/n_i - 3(N+1)\}$$

Where:

$R_i$  is sum of ranks for each group;

$N$  is total sample size and;

$n$  is the sample size of a particular group.

#### **Hypothesis 4**

**H<sub>0</sub>:** The distribution of rankings is not the same among the respondents on the challenges of NICs project planning in building procurement systems.

**H<sub>1</sub>:** The distribution of rankings is the same among the respondents on the challenges of NICs project planning in building procurement systems.

**Decision rule:** The decision rule according to McNabb (2009) and Pallant (2001), for Kruskal-Wallis H test hypotheses test, is that the null hypothesis should be rejected if the computed chi-square value is greater than the chi-square table value at 5% significance level, or reject if the computed p-value is less than the study p-value of 0.05. Hence, the null hypothesis was rejected, since both the computed chi-square value of 7.785 at 2 degree of freedom is greater than the chi-square table value of 5.991 at 5% significance level, and the computed p-value of 0.020 is less than the study p-value of 0.05. This result confirms that the distribution of rankings is the same among the respondents' on the challenges of NICs project planning in building procurement systems, despite their different background. This result revealed that all the respondents agree on the challenges of NICs project planning in building procurement systems.

### **Hypothesis 5**

**H<sub>0</sub>:** The distribution of rankings is not the same among respondents on the significant influencing factors for NICs project planning in building procurement systems.

**H<sub>1</sub>:** The distribution of rankings is the same among respondents on the significant influencing factors for NICs project planning in building procurement systems.

**Decision rule:** Reject null hypothesis if the computed chi-square value is greater than the chi-square table value at 5% significance level or reject if the computed p-value is less than the study p-value of 0.05 (McNabb, 2009; Pallant, 2001). Hence, the null hypothesis was rejected, since both the computed chi-square value of 9.304 at 2 degree of freedom is greater than the chi-square table value of 5.991 at 5%

significance level, and the computed p-value of 0.01 is less than the study p-value of 0.05. This result confirms that the distribution of rankings is the same among respondents' on the significant factors that can influence NICs project planning in building procurement systems, despite their different background. This implied that the respondents' are of the same opinion on factors that can influence NICs project planning in building procurement systems.

### **Hypothesis 6**

**H<sub>0</sub>:** The distribution of rankings is not the same among the respondents on contractors' project planning success indicators in building project procurement systems.

**H<sub>1</sub>:** The distribution of rankings is the same among the respondents on contractors' project planning success indicators in building project procurement systems.

**Decision rule:** Reject null hypothesis if the computed chi-square value is greater than the chi-square table value at a 5% significance level, or reject it if the computed p-value is less than the study p-value of 0.05 (McNabb, 2009; Pallant, 2001). Hence, the null hypothesis was rejected, since both the computed chi-square value of 6.326 at a 2 degree of freedom is greater than the chi-square table value of 5.991 at a 5% significance level, and the computed p-value of 0.042 is less than the study p-value of 0.05. This result confirms that the distribution of rankings is the same among the respondents' on contractors' project planning success indicators in building projects procurement systems. This revealed that the respondents' are in agreement on factors that constitutes contractors' project planning success indicators in building projects

procurement systems. Table 4.7 shows the details of the analysis of Kruskal-Wallis H test conducted for hypothesis 3, 5 and 6.

**Table 4.7: Details of Kruskal-Wallis H Tests**

<b>Attribute</b>	$\chi^2$ Computed	$\chi^2$ value at p= 0.05	<b>DF</b>	<b>Computed</b> p-value	<b>Significance</b>	<b>Decision</b>
Influencing factors	9.304	5.991	2	0.010	Significant	Rejected
Challenges	7.785	5.991	2	0.020	Significant	Rejected
Success indicators	6.326	5.991	2	0.042	Significant	Rejected

**Source:** Author (2013)

This study hypothesis testing confirms that NICs are involved in both traditional and non-traditional building project procurement systems, and they (NICs) underperformed in project time and cost. The test also confirmed that NICs inappropriately apply planning techniques in their projects operational planning. The hypothesis revealed that all the respondent agree on factors that constitute project planning challenges to NICs. The respondents' agrees that the identified factors for influencing NICs projects planning are indeed influencing factors that can influence NICs projects planning. Furthermore, the test revealed that the identified contractor's projects planning success indicators are indeed success indicators, and are important to the contractors in attaining project planning success.

## **4.6 Data Analyses for the Study Objectives**

### **4.6.1 Objective 1: Involvement in Construction Procurement Systems**

Objective one aimed at ascertaining NICs involvement in building projects procurement systems within the last five (5) years (2008-2013). Table 4.8 depicts

NICs building procurement systems involvement. Data were collected from a total of 184 building projects executed between 2008 and 2013.

Seventy five percent of the projects were procured by public clients, while 15% were procured by private clients. The frequency of the involvement of contractors in the various procurement systems by public clients were: 77.54% (DBB); 2.17% (MC); 10.14% (CMC); 6.52% (DMC); 2.17% (DCC); and 1.45% (DB). For private clients, their frequencies of involvement were: 21.74% (DBB); 19.57% (MC); 17.39% (CMC); 10.87% (DMC); 8.69% (DCC); and 21.74% (DB).

**Table 4.8: NICs Building Procurement Systems Involvement**  
**Involvement according to Client Types**

<b>Public Clients</b>								
<b>Contract Category</b>	<b>DBB</b>	<b>MC</b>	<b>CMC</b>	<b>DMC</b>	<b>DCC</b>	<b>DB</b>	<b>Total</b>	<b>%</b>
> ₦50M	59	2	4	7	2	1	75	54.35
₦15-₦50M	22	1	3	0	1	0	27	19.57
₦5-₦15M	26	0	7	2	0	1	36	26.08
<b>Total</b>	<b>107</b>	<b>3</b>	<b>14</b>	<b>9</b>	<b>3</b>	<b>2</b>	<b>138</b>	<b>100</b>
<b>% Total</b>	<b>77.54</b>	<b>2.17</b>	<b>10.14</b>	<b>6.52</b>	<b>2.17</b>	<b>1.45</b>	<b>100</b>	<b>100</b>
<b>Private Clients</b>								
<b>Contract Category</b>	<b>DBB</b>	<b>MC</b>	<b>CMC</b>	<b>DMC</b>	<b>DCC</b>	<b>DB</b>	<b>Total</b>	<b>%</b>
> ₦50M	4	4	2	2	2	7	21	45.65
₦15-₦50M	5	4	4	2	1	3	19	41.30
₦5-₦15M	1	1	2	1	1	0	6	13.04
<b>Total</b>	<b>10</b>	<b>9</b>	<b>8</b>	<b>5</b>	<b>4</b>	<b>10</b>	<b>46</b>	<b>100</b>
<b>% Total</b>	<b>21.74</b>	<b>19.57</b>	<b>17.39</b>	<b>10.87</b>	<b>8.69</b>	<b>21.74</b>	<b>100</b>	<b>100</b>

**Note:** DBB-design-bid-build; MC- management contract; CMC-construct & management contract; DMC-design & management contract; DCC-design-construct contract; DB-design-build; Nigerian currency-Naira: US\$1= ₦160

**Source:** Author (2013)

Almost 64% of the projects were procured through traditional procurement systems, while 36.41% were procured through the non-traditional procurement systems: MC, CMC, DMC, DCC, and DB. This result shows that NICs are involved in both traditional and non-traditional procurement systems.

Table 4.9 is a summary of the NICs Procurement Systems Involvements. The NICs major clients are the public client (75%), and a majority of the public client projects

(77.54%) were contracted through the traditional procurement system, while a majority of the private client projects (78.26%) were contracted through the non-traditional procurement systems.

**Table 4. 9: Summary of Contractors’Procurement Systems Involvement**

Contract Category	Frequency of Procurement Systems			% of contract category
	Traditional	Non-Traditional	Total (No)	
> ₦50M	63	33	96	52.17
₦15-₦50M	27	19	46	25.00
₦5-₦15M	27	15	42	22.83
<b>Total</b>	<b>117</b>	<b>67</b>	<b>184</b>	<b>100</b>
<b>%</b>	<b>63.59</b>	<b>36.41</b>	<b>100</b>	<b>100</b>

% NICs Procurement Involvements According to Clients Types				
	%	%	No.	Total %
Public	77.54	22.46	<b>138</b>	<b>100</b>
Private	21.74	78.26	<b>46</b>	<b>100</b>

**Source:** Author (2013)

A further breakdown of the NICs involvement revealed that contractors execute an average of 2 and 1 contracts in 5 years through traditional and non-traditional procurement systems respectively (Table 4.9). This result revealed that the NICs involvement in both traditional and non-traditional procurement systems by both the public and the private clients is very low and much lower in the non-traditional procurement systems.

#### **4.6.2 Objective 2: NICs Projects Time and Cost Performance**

Objective two aimed at ascertaining NICs projects performance in terms of time and cost in building projects procurement systems within the last 5 years (2008-2013).

Table 4.10 shows the NICs project performances percentage time overruns in the various building procurement systems. Data were collected from a total of 158 building projects executed between 2008 and 2013. The contractors recorded nil time overruns (TOs) in twenty of the projects (not shown in Table 4.11), while 138 of the projects record TOs in all the procurement systems ranging from  $\leq 25\%$  to  $\geq 100\%$ . The DMC system records the highest % means TOs' of 61.54%, and the least DBB records 34.09%.

Table 4.11 shows the NICs project performances percentage cost overruns (Cos) in the various procurement systems. Data were collected from a total of 164 building projects executed between 2008 and 2013. The contractors recorded no COs in 23 of the projects (not shown in Table 4.11), while 141 of the projects record COs in all the procurement systems ranging from  $\leq 25\%$  to  $\geq 100\%$ . The DBB system record the highest % mean COs' of 47.17%, followed by the DCC with a records of 42.50%, then the DMC records 40.83%, DMC followed with a record of 37.50%, next was CMC with a records of 32.35%, and the least was DB which records 31.25%.

**Table 4.10: NICs Projects Percentage Time Overruns (%TO)**

<b>DBB (%TO)</b>	<b>Mid value (X)</b>	<b>Frequency (F)</b>	<b>FX</b>	<b>Mean time overruns (<math>\Sigma FX/\Sigma F</math>)</b>
≤ 25	12.5	15	187.5	
25-50	37.5	15	562.5	
50-75	62.5	11	687.5	
75-100	87.5	5	437.5	
≥ 100	100	9	900	
<b>Total</b>		<b>55</b>	<b>1875</b>	<b>34.09</b>
<b>MC (% TO)</b>	<b>X</b>	<b>F</b>	<b>FX</b>	
≤ 25	12.5	7	87.5	
25-50	37.5	11	110	
50-75	62.5	5	312.5	
75-100	87.5	3	262.5	
≥ 100	100	9	900	
<b>Total</b>		<b>35</b>	<b>1672.5</b>	<b>45.12</b>
<b>CMC (% TO)</b>	<b>X</b>	<b>F</b>	<b>FX</b>	
≤ 25	12.5	7	87.5	
25-50	37.5	9	337.5	
50-75	62.5	2	125	
75-100	87.5	1	87.5	
≥ 100	100	4	400	
<b>Total</b>		<b>23</b>	<b>1037.5</b>	<b>47.79</b>
<b>DMC (% TO)</b>	<b>X</b>	<b>F</b>	<b>FX</b>	
≤ 25	12.5	1	12.5	
25-50	37.5	5	187.5	
50-75	62.5	2	125	
75-100	87.5	2	175	
≥ 100	100	3	300	
<b>Total</b>		<b>13</b>	<b>800</b>	<b>61.54</b>
<b>DCC (% TO)</b>	<b>X</b>	<b>F</b>	<b>FX</b>	
≤ 25	12.5	4	50	
25-50	37.5	-	-	
50-75	62.5	1	62.5	
75-100	87.5	-	-	
≥ 100	100	3	300	
<b>Total</b>		<b>8</b>	<b>412.5</b>	<b>51.56</b>
<b>DB (% TO)</b>	<b>X</b>	<b>F</b>	<b>FX</b>	
≤ 25	12.5	1	12.5	
25-50	37.5	2	75	
50-75	62.5	-	-	
75-100	87.5	-	-	
≥ 100	100	1	100	
<b>Total</b>		<b>4</b>	<b>187.5</b>	<b>46.88</b>

Source: Author (2013)

**Teable 4.11: NICs Projects Percentage Cost Overruns (%CO)**

<b>DBB CO)</b>	<b>(% Mid value (X)</b>	<b>Frequency (F)</b>	<b>FX</b>	<b>Mean cost overrun (<math>\Sigma FX/\Sigma F</math>)</b>
≤ 25	12.5	20	250	
25-50	37.5	10	375	
50-75	62.5	8	500	
75-100	87.5	10	875	
≥ 100	100	5	500	
<b>Total</b>		<b>53</b>	<b>2500</b>	<b>47.17</b>
<b>MC (% CO)</b>	<b>X</b>	<b>F</b>	<b>FX</b>	
≤ 25	12.5	15	187.5	
25-50	37.5	14	525	
50-75	62.5	3	187.5	
75-100	87.5	-	-	
≥ 100	100	2	200	
<b>Total</b>		<b>34</b>	<b>1100</b>	<b>32.35</b>
<b>CMC CO)</b>	<b>(% X</b>	<b>F</b>	<b>FX</b>	
≤ 25	12.5	9	112.5	
25-50	37.5	9	337.5	
50-75	62.5	2	125	
75-100	87.5	1	87.5	
≥ 100	100	2	200	
<b>Total</b>		<b>23</b>	<b>862.5</b>	<b>37.50</b>
<b>DMC CO)</b>	<b>(% X</b>	<b>F</b>	<b>FX</b>	
≤ 25	12.5	8	100	
25-50	37.5	2	75	
50-75	62.5	1	62.5	
75-100	87.5	2	175	
≥ 100	100	2	200	
<b>Total</b>		<b>15</b>	<b>612.5</b>	<b>40.83</b>
<b>DCC CO)</b>	<b>(% X</b>	<b>F</b>	<b>FX</b>	
≤ 25	12.5	3	37.5	
25-50	37.5	4	150	
50-75	62.5	1	62.5	
75-100	87.5	2	175	
≥ 100	100	-	-	
<b>Total</b>		<b>10</b>	<b>425</b>	<b>42.50</b>
<b>DB (% CO)</b>	<b>X</b>	<b>F</b>	<b>FX</b>	
≤ 25	12.5	2	25	
25-50	37.5	1	37.5	
50-75	62.5	1	62.5	
75-100	87.5	-	-	
≥ 100	100	-	-	
<b>Total</b>		<b>4</b>	<b>125</b>	<b>31.25</b>

Source: Author (2013)

### 4.6.3 Objective 3: NICs application of Project Planning Techniques

Objective three aimed at investigating NICs application of project planning techniques in executing their contractual obligation in building projects procurement systems. Table 4.12 shows NICs project planning tools application in building projects procurement systems. The table reveals that all

**Table 4.12: NICs Application of Projects Planning Tools**

<b>Contract Operations Planning</b>		
<b>Response</b>	<b>Frequency</b>	<b>%</b>
Yes	69	100
No	-	0
<b>Total</b>	<b>69</b>	<b>100</b>
<b>Persons/Unit Responsible for Planning</b>		
<b>Persons/unit</b>	<b>Frequency</b>	<b>%</b>
Firms construction/project managers'	46	66.7
Central administration	21	30.4
No response	2	2.9
<b>Total</b>	<b>69</b>	<b>100</b>
<b>Project Planning Techniques Application</b>		
<b>Planning tools application</b>	<b>Frequency</b>	<b>%</b>
Yes	61	88.4
No	8	11.6
<b>Total</b>	<b>69</b>	<b>100</b>
<b>Firms' Using One or Two Planning Technique(s) on a Project</b>		
<b>Use of planning tool(s)</b>	<b>Frequency</b>	<b>%</b>
One	21	34.4
Two	40	65.6
<b>Total</b>	<b>61</b>	<b>100.0</b>
<b>Project Planning Techniques (Tools) Combination Types</b>		
<b>Combination</b>	<b>Frequency(F)</b>	<b>%</b>
PERT & Link bar chart	3	7.5
CPM & PERT	8	20
PERT & Bar chart	8	20
Bar chart & Line of balance	2	5
Bar chart & Link bar chart	5	12.5
Bar chart & CPM	14	35
<b>Total</b>	<b>40</b>	<b>100</b>
<b>Usage of Planning Software/application Package</b>		
<b>Usage of planning software</b>	<b>Frequency</b>	<b>%</b>
Yes	10	16.4
No	51	83.6
<b>Total</b>	<b>61</b>	<b>100.0</b>

**Source:** Author (2013)

the contractors (100%) involved in the study claimed that they plan their project operations. In Almost 68% of the NICs organization, their construction/project managers are responsible for the planning of their project operations while, virtually a third (32%) of the NICs used their central administration for the planning of their project operations. Majority (80%) of the NICs apply planning techniques in project planning, as against few (11.6%) who do not apply it. One third (34.4%) of the contractors that apply planning techniques, apply only1 type of planning technique; bar chart. Two third (66%) of the NICs apply 2 types of planning techniques on a single project.

However, only one third (35%) of the NICs apply the appropriate combination of planning techniques; bar chart and CPM. More than two thirds (75%) of the NICs that applied 2 types of planning techniques, applied it inappropriately. Only a few of the NICs (16.4%) adopt computer software/application package in planning their project tasks. While, a majority of the NICs (86.6%) do not adopt computer software/application packages in planning their project tasks. This result revealed that the NICs inappropriately apply project planning techniques and their ICT compliance in project planning is poor. Thus, indicating that the NICs have a poor attitude towards project planning.

#### **4.6.4 Objective 4: NICs Project Planning Challenges**

Objective 4 aimed at identifying NICs project planning challenges and their level of severity on contractors' project planning in building procurement systems. Literature review was employed to identify possible challenges that NICs might encounter in

planning their projects tasks in building procurement systems. These identified challenges level of severity were then assessed by respondents.

Table 4.13 shows the assessment of NICs projects planning challenges. The table shows the weighted mean ranges of: 2.9697-4.2059; 3.0000-4.3182; and 3.0794-4.1450 for contractors, consultants and public building professionals respectively. These results revealed that all the respondents' assessments were almost and above a score of 3 in the Likert scale. This revealed that each of the individual group's assessments acknowledged that NICs experienced these challenges to a severe level in projects planning. The 3 most severe factors for the individual groups are: late honoring of payments certificates (4.2059), too many variations (4.1912), and delays (4.0169) for contractors; late honoring of payments certificates (4.3182), design deficiencies (4.1136), and too many variations (4.0000) and increase in prices of materials and labour (4.0000) for consultants; and technical incompetence (4.1450), late honoring of payments certificates (4.0469) and too many variations (4.0469) for public building professionals.

The results of each of the individual respondents' groups SD's show low values: (0.8904-2.7289), (0.7559-1.3148), and (0.88985-1.1882) for contractors, consultants and PBPs respectively. These results indicate that there is uniformity (consistency) in each of the respondents' group's opinions.

**Table 4.13: Individual Groups Assessment of NICs Projects Planning Challenges**

S/N	Factors	Contractors			Consultants			PBPs		
		Mean	SD	Rank	Mean	SD	Rank	Mean	SD	Rank
1	Too many variations	4.1912	0.9345	2	4.0000	0.7559	3	4.0469	0.9332	3
2	Project complexity	3.7059	0.9152	8	3.6190	0.8540	10	3.6190	0.9576	12
3	Materials shortages or late delivery	3.9853	0.9541	4	3.8810	1.0407	5	3.9194	1.0291	6
4	Client's dissatisfaction	3.2826	1.2769	17	3.4419	1.3148	14	3.7188	1.1882	8
5	Claims	3.6176	1.1974	10	3.6744	0.8652	9	3.5556	0.9466	16
6	Poor weather conditions	3.1176	1.0724	19	3.2727	1.0199	18	3.3750	1.0616	19
7	Accidents on site	2.9697	1.0809	21	3.1818	1.0625	19	3.1094	0.9278	21
8	Plants, equipment's & machine breakdown/inadequacy	3.6324	1.0914	9	3.5814	1.0518	12	3.6557	1.1088	10
9	Late honoring of payments' certificates	4.2059	0.8904	1	4.3182	0.9590	1	4.0469	0.8985	2
10	Disputes	3.7941	1.0867	7	3.4318	1.1493	15	3.5873	1.1164	13
11	Technical incompetence	3.868	1.1833	6	3.9070	1.2500	4	4.1450	1.1852	1
12	Organizational problems	3.5522	1.0340	13	3.6136	1.1855	11	3.5714	1.1175	14
13	Communications problem between functional areas of business	3.2647	1.0597	18	3.4091	1.0852	16	3.5079	1.0453	18
14	Cultural influence	3.0147	1.2518	20	3.0000	1.1206	21	3.0794	1.1116	22
15	Poor work definition	3.5588	1.3646	12	3.5682	1.1289	13	3.6250	1.0764	11
16	Environmental regulations	3.5294	2.7289	14	3.3721	1.1132	17	3.2813	0.9835	20
17	Inadequate project documentation	3.6119	1.0438	11	3.8636	1.2122	6	3.5625	1.0370	15
18	Design deficiencies	3.8806	1.1081	5	4.1136	1.1251	2	3.9375	1.0965	5
19	Delays	4.0169	0.9190	3	3.8409	1.0103	7	3.7656	1.0800	7
20	Project risks & uncertainty	3.4746	0.9533	15	3.7045	0.9543	8	3.5238	0.9308	17
21	Absenteeism of workers/shortage of craftsmen	3.3559	1.2967	16	3.1591	1.1195	20	3.6984	1.1864	9
22	Increase in prices of materials/labour	3.3559	1.2967	16	4.0000	0.7559	3	3.9531	0.9500	4

**Table 4.14: Combined Assessment of NICs Project Planning Challenges**

<b>S/N</b>	<b>Project Planning Challenges</b>	<b>Mean</b>	<b>SD</b>	<b>Ranking</b>
1	Late honouring of payments certificates	4.1761	0.9120	1
2	Too many variations	4.0914	0.8923	2
3	Technical incompetence	3.9770	1.2006	3
4	Design deficiencies	3.9600	1.1057	4
5	Material shortages or late delivery	3.9360	0.9979	5
6	Delays	3.8743	1.0071	6
7	Increase in prices of materials/labour	3.7545	1.1002	7
8	Inadequate project documentation	3.6571	1.0866	8
9	Project complexity	3.6532	0.9124	9
10	Disputes	3.6286	1.1164	10
11	Plants, equipment's & machine breakdown/inadequacy	3.6279	1.0820	11
12	Claims	3.6092	1.0297	12
13	Poor work definition	3.5852	1.2020	13
14	Organizational problems	3.5747	1.0979	14
15	Project risks & uncertainty	3.5542	0.9439	15
16	Client's dissatisfaction	3.4828	1.2618	16
17	Absenteeism of workers/shortages of craftsmen	3.4337	1.2229	17
18	Environmental regulations	3.4000	1.8785	18
19	Communication problems between functional areas of business	3.3886	1.0602	19
20	Poor weather condition	3.2500	1.0556	20
21	Accidents on site	3.0747	1.0201	21
22	Cultural influence	3.0343	1.1641	22

**Source:** Author (2013)

Table 4.14 shows a combined respondents assessments of NICs projects planning challenges and it shows a weighted mean range of 3.0343- 4.1761. This weighted means scores were above the score of 3 in the Likert scale and as such, revealed that all the groups assessed all the factors to be a challenge and are experienced in a severe level by NICs in the planning of their projects. The 3 most severe challenges are: late honoring of payments certificates (4.1761); too many variations (4.0914); and technical incompetence (3.9770). The results also show low values for the standard deviations (SD) and this revealed that all the respondents were highly

consistent in their opinions. This, confirms that all the major players (contractors, consultants and clients) in the management of building projects unanimously acknowledged that all the assessed factors are definitely experienced to a severe level by NICs in projects planning.

#### **4.6.5 Objective 5: Factors for Influencing NICs Project Planning**

Objective 5 aimed at identifying factors that can significantly influence NICs project planning and to ascertain their order (level) of importance. The factors were identified through literature search and respondents were asked to rank their level of importance in the questionnaires.

Table 4.15 is an assessment by the individual respondents of the significant factors that can influence NICs project planning in construction procurement systems. It shows the weighted means and ranks of the individual respondents' assessments of the level of importance of the significant factors for NICs project planning. The table shows the weighted means range of the individual group's respondent's level of importance of factors that can significantly influence NICs project planning in construction procurement systems as: 4.54-3.45, 4.68-3.73, and 4.81-3.44 for contractors, consultants and PBPs respectively. These ranges show that all the rankings of the respondents' are above the score of 3 in the Likert scale, hence, revealing that all the identified factors are important to NICs in project planning of their procurement tasks. The top three most significantly important factors as assessed by individual respondent groups, are: contractors' project manager's capability, technical competence, and contractors' project management capability (contractors'); technical competence, understanding contractors' project procurement

task, and contractors' project manager's capability (consultants'); and technical competence, contractors' project management capability, and understanding contractors project procurement task.

The computed standard deviation (SD) results for contractors (0.6788-1.2548), consultants (0.4891-1.0330), and PBPs (0.4375-1.1109) show a low value, hence, indicating that each of the groups are in agreement of their assessments. These results therefore revealed that each of the group respondents is in harmony in their assessment on the identified factors. Looking at the individual group's assessment, there is barely any divergence in the groups assessments on the factors assessed. This revealed that the assessed factors are unanimously acknowledged by the major players in the management of projects to be very significant in improving the project planning potentials of NICs in any type of building project procurement systems.

**Table 4.15: Individuals Groups Assessment of Factors for Influencing NICs Projects Planning**

S/N	Contractors' Influencing Factors	Contractors'			Consultants'			PBPs		
		Mean	SD	Rank	Mean	SD	Rank	Mean	SD	Rank
1	Contractors project manager's capability	4.5441	.67876	1	4.6136	.51817	4	4.5312	.43753	5
2	Technical Competence	4.4783	.77855	2	4.6818	.53226	1	4.8065	.56497	1
3	Contractor's project management capability	4.4493	.60722	3	4.6279	.48908	3	4.6719	.65143	2
4	Understanding contractor's project procurement task	4.4493	.73837	4	4.6364	.57933	2	4.6404	.68895	3
5	Adherence to the concept of buildability/constructability	4.2969	1.00285	5	4.1818	.83780	7	4.3651	.61641	7
6	Prompt honoring of payments certificates	4.2754	.99829	6	4.3636	.7947	5	4.5714	.7553	4
7	Compliance with safety procedures	4.1471	.99648	7	4.1591	.78571	9	4.1452	.82894	10
8	Adequacy of plants & equipment's	4.1304	.87301	8	4.1818	.84283	8	4.2698	.80735	8
9	Continuous improvement of contractors business knowledge	4.1180	.8381	9	4.2050	.91355	6	4.4690	.72306	6
10	Contractor's organizational structure	4.0435	.97671	10	4.0000	.88214	11	4.2187	.82674	9
11	Fairness & transparency in industry's business culture	3.8406	.96441	11	3.9318	.98830	12	3.9194	.80533	12
12	Understanding environmental Laws	3.7353	1.16693	12	4.0476	.89955	10	3.9531	.91074	11
13	Contractors ICT compliance	3.6471	1.00394	13	3.7273	1.03302	15	3.4375	.94996	15
14	Type of procurement system	3.6084	1.12743	14	3.8182	.92190	14	3.8226	1.06335	13
15	Good response to weather	3.4493	1.25483	15	3.8409	.89867	13	3.6094	1.11091	14

Source: Author (2013)

**Table 4.16: Combined Ranking of Factors Influencing Project Planning**

<b>S/N</b>	<b>Contractors Influencing Factors</b>	<b>Mean</b>	<b>SD</b>	<b>Rank</b>
1	Technical competence	4.6457	0.6253	1
2	Contractor's project management capability	4.5739	0.5709	2
3	Understanding contractor's project procurement task	4.5650	0.6636	3
4	Contractors project manager's capability	4.5568	0.6299	4
5	Prompt honouring of payments certificates	4.4034	0.8631	5
6	Adherence to the concept of buildability/constructability	4.2924	0.8858	6
7	Improvement of contractor's business knowledge	4.2670	0.8087	7
8	Adequacy of plants & equipment's	4.1932	0.8398	8
9	Compliance with safety procedures	4.1494	0.9127	9
10	Contractor's organizational structure	4.0960	0.8962	10
11	Fairness & transparency in industry's business culture	3.8914	0.9252	11
12	Understanding environmental Laws	3.8908	0.9823	12
13	Type of procurement system	3.7371	1.0168	13
14	Good response to weather	3.6045	1.1390	14
15	Contractors ICT compliance	3.5909	1.0213	15

**Source:** Author (2013)

Table 4.16 shows that the weighted means of the combined respondents' ranking of the level of importance of factors that can significantly influence NICs project planning in construction procurement systems ranges between 3.5909 and 4.6457. This reveals that all the identified factors are significantly important to the NICs in project planning of their procurement tasks. The top 3 most significantly important factors are: technical competence (4.66); contractors' project management capability (4.60); and understanding contractors' procurement tasks (4.57). The results show low values for the standard deviations, which indicates a high degree of consistency in the respondents' opinions. This shows that all the respondents' are in agreement that the assessed factors are significant in improving the NICs project planning.

#### **4.6.6 Objective 6: Success Indicators for Contractors' Project Planning**

Objective six aimed at identifying contractors projects planning success indicators and their level of importance in building projects procurement systems. This study used a thorough literature search to identify contractors' project planning success indicators and requested respondents' to assess their level of importance in attaining contractors' project planning success.

Table 4.17 shows individual groups' respondents' assessment of contractors' project planning success indicators. The weighted mean range for the 3 respondents groups are: 3.7206-4.6119, 3.7727-4.5682, and 3.5238-4.5512 for contractors, consultants and PBPs respectively. These show that their score was above the score of three in the Likert scale, thus, revealing that each groups assessed all the success indicators to be very important to contractors in attaining projects planning success. The most important success indicators as assessed by the individual groups are: adequacy of plan in determining suppliers' delivery dates (4.6119), plan's adherence to quality (4.4925), plan's adherence to time (4.4412) and plan's capability to accommodate contractors work (4.4412) for contractors; plan's adherence to quality (4.5682), plan's adherence to time (4.5455), and plan's adherence to cost estimate (4.4318) for consultants; and plan's adherence to time (4.5512), plan's adherence to quality (4.5469) and adequacy of plan in determining suppliers' delivery dates (4.5079) for PBPs. The computed weighted means reveal low values for the SDs' indicating a high degree of consistencies in the respondents' opinions, thus signifying that each member of the group's opinion on the assessment are not conflicting and this confirmed that there is uniformity in their opinions.

Table 4.18 shows combined respondents' assessments of contractor's projects planning success indicators. Their weighted mean ranges from 3.7299- 4.7159. This shows that the combined respondents' assessment score exceeded the Likert scale score of three, hence, revealed that all the groups are in consensus that all the identified contractor's project planning success indicators are important to the contractors' in attaining their projects planning success. The most important success indicators according to the consensus of all the respondents' groups are: plan's adherence to time (4.7159), plan's adherence to quality (4.5314), and adequacy of plan in determining suppliers' delivery dates (4.5230). The computed weighted means used for the assessments shows low values of SD's, thus, revealing that there is uniformity in the respondents' opinions in the assessments of the factors.

**Table 4.17: Individual Group's Assessment of Contractors' Project Planning Success Indicators**

S/N	Contractors' Planning Success Indicators	Contractors			Consultants			PBPs		
		Mean	SD	Rank	Mean	SD	Rank	Mean	SD	Rank
1	Plan's adherence to time	4.4412	0.65523	3	4.5455	0.6271	2	4.5512	0.6034	1
2	Plan's adherence to quality	4.4925	0.72557	2	4.5682	0.7281	1	4.5469	0.7954	2
3	Adequacy of plan in determining suppliers' delivery dates	4.6119	0.67319	1	4.4091	0.6220	4	4.5079	0.6444	3
4	Plan's adherence to cost estimate	4.3529	0.89384	5	4.4318	0.7594	3	4.4677	0.6198	4
5	Plan's adherence to project technical requirements	4.3529	0.74843	4	4.4091	0.8441	5	4.3968	0.6849	5
6	Ability of plan in facilitating project resource organization	4.3088	0.73824	6	4.2273	0.7428	6	4.2813	0.6540	7
7	Plan's provision for facilitating project monitoring and control	4.2794	0.82581	7	4.1364	0.9546	8	4.3438	0.6228	6
8	Plan's capability to accommodate contractors' work	4.4412	0.65523	3	4.1364	0.7019	7	4.1563	0.6228	9
9	Plan's clarity in communication	4.3529	0.89384	5	4.0455	0.8614	10	4.1935	0.6488	8
10	Plan's provision of basis for preparing schedules	4.2794	0.82581	7	3.9318	0.8183	11	3.9375	0.7319	11
11	Plan efficiently integrates sub-contractors work	3.9559	0.9990	9	4.0909	0.8302	9	3.8594	0.7318	12
12	Plan's flexibility	4.0294	1.0646	8	3.9091	1.0525	13	3.6875	0.8141	14
13	Plan's comprehensibility among trade heads	3.9559	0.9531	10	3.7727	0.8856	16	3.8438	0.8399	13
14	Plan's efficiency in identifying accident-prone areas	3.7206	0.9279	13	3.8182	1.0404	15	3.9375	0.7319	10
15	Plan's facilitation of claim assessment for delay	3.8235	0.9611	11	3.8864	0.7223	14	3.6406	0.7208	15
16	Plan's ability to curtail rework	3.8060	1.0334	12	3.9091	0.8844	12	3.5238	0.8587	16

**Source:** Author (2013)

**Table 4.18: Combined Assessments of Contractors Project Planning****Success Indicators**

S/ N	Contractors Planning Success Indicators	Mean	SD	Rank
1	Plan's adherence to time	4.7159	3.04424	1
2	Plan's adherence to quality	4.5314	0.74886	2
3	Adequacy of plan in determining suppliers' delivery dates	4.5230	0.65140	3
4	Plan's adherence to cost estimate	4.4138	0.76863	4
5	Plan's adherence to project technical requirements	4.3829	0.74798	5
6	Ability of plan in facilitating project resource organization	4.2784	0.70653	6
7	Plan's provision for facilitating project monitoring and control	4.2670	0.79444	7
8	Plan's capability to accommodate contractors work	4.2614	0.66752	8
9	Plan's clarity in communication	4.2184	0.81070	9
10	Plan's provision of basis for preparing schedules	4.0682	0.80421	10
11	Plan's efficiently integrates sub-contractors work	3.9545	0.86730	11
12	Plan's flexibility	3.8750	0.98343	12
13	Plan's comprehensibility among trade heads	3.8693	0.89441	13
14	Plan's efficiency in identifying accident prone areas	3.8239	0.89296	14
15	Plan's facilitating claim assessment for delay	3.7727	0.82431	15
16	Plan's curtailing rework	3.7299	0.94442	16

**Source:** Author (2013)

#### 4.6.7 Measures for Enhancing NICs Project Planning

The last part of all the three questionnaires used for this study seeks to elicit information on measures for enhancing NICs projects planning through open-ended questions. These opinions were collected, organized and presented in their order of importance based on frequencies and percentages (Table 4.19).

**Table 4.19: Measures for Enhancing Contractors' Project Planning**

S/N	Measures for Enhancing Contractors Project Planning	F	%	Rank
1	Adequate and competent workforce	48	14.50	1
2	Efficiency in firm's management systems	38	11.48	2
3	Fairness and transparency	27	8.16	3
4	Uninterrupted project cash flow	24	7.25	4
5	Use and adherence to appropriate planning techniques	24	7.25	4
6	Training and retraining of contractors workforce	22	6.65	5
7	Compliance with contract documents	21	6.34	6
8	Adequate project monitoring and evaluation	21	6.34	6
9	Understanding work schedule	19	5.74	7
10	Adequacy of plant and equipment's	17	5.14	8
11	Good knowledge of construction markets	14	4.23	9
12	Adequate cost planning	12	3.63	10
13	Adequate contract documentation	7	2.11	11
14	Minimal variations	6	2.72	12
15	Government patronage	6	2.72	12
16	Enforcing planning through contract condition	6	2.72	12
17	Granting soft loans to indigenous contractors	5	1.51	13
18	Staff welfare	4	1.21	15
19	Avoidance of sub-standard materials	4	1.21	15
20	Inclusion of project management in curriculum of technical and vocational schools	2	0.60	16
21	Proper project record keeping for future reference	2	0.60	16
22	Availability and use of local standardised materials	2	0.60	16
23	Indigenous contractors partnering with expatriate contractors on technical issues	1	0.30	11

**Source:** Author (2013)

Table 4.19 shows 23 measures for enhancing NICs project planning identified by the respondents'. The measures with high frequencies and percentages as ranked by all the respondents' in descending order are: adequate and competent workforce (1); efficiency of firms' management systems (2); fairness and transparency in the construction industry (3); uninterrupted project cash flow (4); use and adherence to appropriate planning techniques (4); training and retraining of contractors workforce (5); adequate project monitoring and evaluation (6); compliance with contract documents (6); understanding work schedule (7); adequacy of plants and

equipment's (8); good knowledge of construction markets (9); and adequate cost planning (10).

#### **4.7 Case Study Data Analysis**

This section conveys information concerning a collective case study on NICs: data analysis, presentation and interpretation. A collective case study is a research design concerned with studying a group of similar cases, in this case the NICs, so as to ascertain whether their involvement, time and cost performance, project planning challenges, and planning techniques application follow the same pattern in Nigeria (Guthrie, 2010; McNabb, 2009). Hence, the design is used to suggest whether some characteristics might be common to larger populations of similar cases (Guthrie, 2010). The case study was also used to probe the responses received from the contractors questionnaire survey (Guthrie, 2010).

##### **4.7.1 Analysis of Case Study**

Table 4.20 shows the data presentation for the research collective case study (CS). The CS collected data on projects executed in Abuja, Bauchi/Gombe, and Kano between 2003 and 2013 (10 years); a total of 15 number case studies (CS01-CS15) were presented.

##### **CS01: Hospital Building**

The CS01 is a hospital building located in Abuja procured by a public client through the *design-bid-build* method (DBB), using JCT form of contract. It was contracted in 2009 at an initial cost (contract sum) of ₦248, 618,816.25, and expected to be completed in 6½ months. The building was finally completed at a cost of ₦421, 041,104, in 30 months. The contract recorded a cost and time overrun of 69.35%

(~~₦~~172, 422,288) and 361.54% (23½ months) respectively. Documentary evidence attributed the cost and time overrun to late honoring of payment certificates and, variations emanating from the project consultants' and the client's due to: change in specification, additional hospital wards and consulting rooms, and omitted items in the BOQ. The main contractor for the project used Bar Chart but later discarded it, because it became invalid. The work was done based on money provided by the client. The contractor did not use any computer software/application package for planning the project.

**CS02: Administrative Block Building:**

CSO2 is an administrative office building (3-storey) located in Abuja procured by a government ministry (public client) through the DBB method, using ministry of housing condition of contract (lump sum with quantities). It was awarded in 2003 at an initial cost of ₦282, 560,190 and expected to be executed within 54 months. The building was completed at a final cost of ~~₦~~712, 874,024 and within 117 months. Delay of interim payments and the conversion of car parks to offices, shoot up the contract sum and duration. The contract recorded a cost and time overruns of 152.29% (~~₦~~430, 313,834) and 117% (63 months) respectively. The only planning tool used by the contractor was bar chart, and there were no evidence of applying computer software/application packages for planning the project.

**CS03: Mega Shopping Plaza:**

CS03 is a mega shopping plaza (3-storey) procured through *design-build* (DB) method, by a private client, using JCT condition of contract. It is located in Abuja and contracted in 2003. The structure was completed at a cost of ~~₦~~680, 015,245, in

21 months as against an initial cost estimate and duration of ₦572, 350,095 and 14 months respectively. The initial estimated cost and time, overran by 18.81% (₦107, 665,150) and 50% (7 months) respectively. Documents studied reveals the cost and time overrun was as a result of delayed payments and variation emanating from expansion and alteration of initial design, which eventually necessitated structural details adjustments. A completed staircase and a hall were altered resulting in a rework. The only planning tool used by the contractor was bar chart, and there were no evidence of applying computer software/application package for planning the project.

#### **CS04: Administrative Block**

CS04 is an administrative block building (2-storey) located in Abuja, contracted in 2005 by a public client, through a DBB method, using JCT contract condition (awarded as fluctuation price contract). The structure was built within 28 months at a final cost of N297, 787,635. It was initially estimated to cost ₦249, 109,900, and to be built within 15 months. The differences in cost and time were 19.30% (₦48, 677,735) and 86.67% (13 months) respectively. The causes of the cost and time overrun as gathered from the project file emanates from: poor feasibility study, delay in payments, fluctuation in prices of materials and labour, and design inadequacies.

The proposed location of the structure was changed to another location 25 km away from the initial location after it has been contracted. The change of location increased the cost of labour and materials due to an increase in transportation. Progress of work was smooth in the first 5 months of the contract. Afterwards, work stopped on site due to non-honoring of payment certificates; only 1 payment out of 5, was

honored in the entire 5 months period. This resulted in the contractor abandoning the work for 10 months. Amendment of a structural design error took the structural engineer a lot of time to address. This also contributed to delay in the project progress of work. These delays resulted in a fluctuation in materials and labour prices to the sum of ₦12, 696,164 and loss and expenses on running preliminaries amounting to ₦1, 840,800. Other variations in the contract cost a total of ₦34, 140,771. The only planning tool used by the contractor was bar chart, and there was no evidence of applying computer software/application package for planning the project.

#### **CS05: Shops & Offices**

CSO5 is a private owned 3-storey shops and offices building procured through DB method. It was contracted in 2009 using the JCT form of contract (fixed sum; no fluctuation claims is to be entertained from the contractor). The contractor was paid 15% mobilization fee before the commencement of work. Yet, the contract overran its initial estimated cost and time by 44.15% (₦10, 341,485) and 50% (2 ½ months) respectively. The initial estimated contract sum and duration was ₦23, 423,325 and 5 months respectively.

Variations from the client call for the adjustment of the structural details, costing N1, 749,440, and resulted in delay also. The contractor's fluctuation claim to the sum N8, 592,045 for increase in prices of materials and labour was accepted. Consequently, shoot up the initial cost and duration to N33, 764,810 and 7 ½ months respectively. A bar chart was the only evidence of the planning tool used for the project. No

computer software/application package was used in planning the project by the contractor.

#### **CS06: Lecture Hall**

CS06 is a 2-storey lecture hall located in Bauchi/Gombe contracted in 2011 by public client using Education Trust Fund (ETF) condition of contract. It was awarded at a cost of ₦47, 193,052, and expected to be executed within 7 ½ months. Documentary evidence reveals that the contract experienced delays both from the contractor and the client. There was a delay in payments and in the contractor's work and supply of materials. Variation from the client resulted in cost overrun of 21.19% (₦10, 000,000). Hence, the duration of the contract was extended to 16 months (113.33%). Bar chart was the only evidence of planning tool used for the project. No computer software/application package was used in planning the project by the contractor.

#### **CS07: Office Block**

CS07 is a public institution office block building located in Bauchi/Gombe and contracted in 2007. The building was procured through DBB method, using the ETF condition of contract. Documentary study shows that the contract was awarded at a sum of ₦13, 050,430 and for a duration of 3 months. The contractor for the job was paid 25% advance payment prior to commencement of work. Thereafter, there was a delay due to the Government bureaucratic process in confirming the contractor's competence and integrity. The delay caused by the Government was used to claim for material fluctuation amounting to ₦1, 773,405. The client in-house consultant issued 16 number variation orders in the course of the project. The reasons for the variation as gathered from the project file were a result of poor feasibility study and

design inadequacies. These contributed to an increase in the contract sum by ~~₦~~481,190. The contract was finally completed at a cost of ₦15,305,025, in 21 months, reflecting 17.32% (~~₦~~2,254,595) and 600% (17 months) increase in the contract sum and duration respectively. Bar chart was used by the contractor for planning the project. No computer software/application package was used in planning the project by the contractor.

#### **CS08: Classroom Block**

CS08 is a classroom block procured by a public client located in Bauchi/Gombe and contracted in 2005. The project for the building was contracted out at a cost of ₦23,680,260, for duration of 4 months, using ETF condition of contract. It was completed at a cost of ~~₦~~31,968,351, for duration of 8 months. The contract recorded 35% (~~₦~~8,288,091) and 50% (4 months) cost and time overrun respectively. Variations and delay in payments resulted in the differences in cost and time. No planning tool was used by the contractor to plan the project.

#### **CS09: Classroom and Residential Building**

CS09 is the renovation of existing classrooms, building of new classrooms and residential buildings in Bauchi/Gombe. It is a State government contract, awarded in 2010, using the State government contract agreement (inclusive of conditions) to a single contractor. The contract was a fixed sum contract subject to variation from the client, under the DBB method. The initial contract sum was ~~₦~~190,052,787, for duration of 15 months. The contractor was advanced 50% payment prior to commencement of work. The initial contract sum and duration overran by 18.94% (~~₦~~36,000,000) and 50% (7 months) respectively.

Documentary evidence indicated that the cause of the overruns were: additional payments of ₦28, 000,000 recommended by the client in-house consultants (PBPs) for additional works not explicitly stated and backed by documents and; an observation raised by the contractor for work items omitted in the BOQ and a fluctuation claim for increase in prices of materials and labour, to a turn of ₦8, 000,000. These resulted in a final contract sum and duration of ₦226, 052,787.68 and 21 ½ months respectively. No planning tool was used by the contractor to plan the project.

#### **CS10: Residential Building**

CS10 is a 3-bedroom residential apartment procured through the traditional method (DBB) by a public client in Bauchi/Gombe. It was contracted in 2010 on a fixed sum basis, subject to variation from the client, using the State government condition of contract. The project files studied reveals that the contractor was paid 50% in advance prior to commencement of the work. However, the contract was eventually completed at a cost of N21, 850,000, in a duration of 5 months, as against its initial estimated cost and duration of N18, 215,052 and 2 months respectively. This translates to a difference in cost and duration of 19.92% (N3, 634,948) and 150% (3 months). Causes of the difference in cost and time respectively, as deduced from contract correspondence, pointed to: bureaucratic hiccups, delay in honoring payments and delay in the contractor's operations. There was no evidence of planning tool (s) used by the contractor for planning the project.

### **CS11: Library Extension**

CS11 is a contract for extending a library building (1-storey), procured by a public institution through the DBB method in Kano. The contract was a fixed fee contract, using the JCT condition of contract. The contractor for the job was paid an advance of 30%, prior to commencement of work. The job was finally completed at the initial estimated cost of N87, 124,454, recording a 0% cost overrun. However, the duration of the contract over shot its initial estimated duration of 9 months by 55.56% (5 months). Causes of duration extension as evident from the contract correspondence are: delay in payments; and an instruction from the project architect to the contractor for the removal and reconstruction of 8 number work items (rework), due to the usage of sub-standard materials and poor workmanship. Bar chart was the only planning tool used for planning the project programme of work.

### **CS12: Lecture Theatre**

CS12 is a 1000 capacity lecture theatre, with integrated offices, procured by a public client through the DBB method, using the JCT contract condition. It was contracted at a sum of ~~N~~87, 772,643, and to be executed in 14 months. However, it was completed in 20 months and at a cost of ~~N~~114, 804,671. It record a cost and time overrun of 30.8% (~~N~~27, 032,028) and 42.86% (6 months) respectively.

The differences in cost and time emanates from a poor feasibility study, and variations and fluctuations. Inadequacy of aggregates at and within the domain of the contract compelled the contractor to source for it from a neighboring State 200 km away from the site. Thirteen (13) number variations were introduced by the consultants, mostly due to design inadequacies. There was a revision in electrical

services drawing. There was also inadequate information on the theatre's furniture which form part of the main contractor's work. Poor soil test resulted in an excess of 80% excavation in rock, which was not anticipated. There was delay in payments (2-4 months delay). All these brought about delays and fluctuation in prices of materials and labour. These compel the contractor to ask for an extension of 6 months. The only planning tool used for developing the contractor's programme of work was bar chart.

### **CS13: Offices and Classrooms Block**

CS13 is a 3-storey office and classroom block building, procured by a public client, through the DBB method, using the JCT condition of contract. The contract record a cost and time overrun of 4.6% (₦7, 430,035) and 23.53% (2 months). Against an initial estimated cost and time of N163, 011,157.70 and 8 ½ months respectively. The differences in cost and time are as a result of variations due to inadequacies in architectural and structural design. This resulted to delay in the progress of work on site. The contractor therefore requested for an extension of time and additional payment. The contractor used only bar chart to plan his programme of work.

### **CS14: Residential Building**

CS14 is a 3-bedroom residential building procured by a private client, using the DB method. The contract as awarded at a sum of N10, 000,000 and to be completed in 8 months. However, the final cost and time shoot to ₦14, 630,000 and 14½ months respectively. Recording a cost and time overrun of 46.3% (₦4, 630,000) and 81.25% (6½ months) respectively. This was a result of variations, delays in payments and

fluctuation of prices. The contractor did not use any planning tool for planning its programme of work.

### **CS15: Shops and Offices**

CS15 was a one-storey block building for shops and offices, owned by a private client. The contract used the DB method for the project. The contract was awarded at a sum of ₦20, 000,000 and expected to be completed in 9 months. The project was completed at a sum of ₦27, 360, 000 and in a period of 16 months. The project recorded a cost and time overrun of 36.8% (₦7, 360,000) and 73.68% (7 months) respectively. Causes of differences in cost and time were variations, delays in payments and fluctuation of prices. No any planning tool used and no programme of work for the work.

### **4.7.3 Case Study Interpretation**

Table 4.19 shows the detail of the data used for the case study. The following are detail interpretation of the documentary case studies conducted on 15 number projects executed within a period 10 years (2003-2013).

### **NICs Procurement Involvements**

1. NICs were involved in both traditional and non-traditional procurement methods. The major clients were public (73.33%). Majority of the procurement type used was DBB (89%). Most of the projects procured (80%) by public clients were through the DBB method. While, 67% of the projects procured by private clients were through the DB methods. NICs are not involved in other types of non-traditional procurement systems.

2. NICs are more involved in the traditional method than the non-traditional methods; DB only.

### **NICs Project performance Cost and Time Overruns**

1. All the projects (100%) record time overrun rates ranging from 23.53-361.54 and 50-81% in the DBB and DB methods respectively.
2. Almost all (93.33%) the projects experienced cost overrun. Their rate ranges from 4.6-152% and 5-21% for DBB and DB respectively.
3. The cumulative initial contract sum and duration for all the 15 number projects were ₦2.04 billion and 175½ months respectively. However, the differences in cost and time resulted to the cumulative final cost and time to shoot to ₦2.91billion and 352 months respectively.
4. The cumulative cost and time overrun for the 15 projects were 43.02% (₦876, 040,000) and 100.57% (176½ months) respectively.

### **NICs Project Planning Challenges**

1. Late honouring of payment certificates
2. Too many variations.
3. Design inadequacies
4. Delays
5. Incompetence,
6. Changes in prices of materials and labour.

### **NICs Application of Project Planning Techniques**

1. Virtually sixty seven percent (66.67%) of the contractors used only bar charts in planning their projects operations, while 33.33% of the contractors did not used any planning tool.
2. None of the contractors apply computer software/application package in planning their project operations.

**Table 4.20: Case Study Data Presentation**

Cases	Type of building	Year	Location	Client's type	Procurement Type	Cost (Nigerian Naira; ₦) (000,000)			Time overrun (months)		Time overrun	Planning tool (s) used
						E	F	%	E	F	%	
CS01	Hospital	2009-2012	Abuja	Public	DBB	248.62	421.04	69.35	6.5	30	361.54	Bar chart
CS02	Administrative block	2003-2012	Abuja	Public	DBB	282.56	712.87	152.29	54	117	117.00	Bar chart
CS03	Mega shopping plaza	2008-2010	Abuja	Private	DB	572.35	680.02	18.81	14	21	50.00	Bar chart
CS04	Administrative block	2005-2009	Abuja	Public	DBB	249.12	297.79	19.30	15	28	86.67	Bar chart
CS05	Shops & offices	2009-2010	Abuja	Private	DB	23.42	33.76	44.15	5	7.5	50.00	Bar chart
CS06	Lecture hall	2011-2013	Bauchi/Gombe	Public	DBB	47.20	57.20	21.19	7.5	16	113.33	Bar chart
CS07	Office blocks	2007-2009	Bauchi/Gombe	Public	DBB	13.05	15.31	17.32	3	21	600	Bar chart
CS08	Classroom blocks	2005-2006	Bauchi/Gombe	Public	DBB	23.68	31.97	35	4.5	8.5	88.89	Non used
CS09	Classrooms & Residential	2010-2011	Bauchi/Gombe	Public	DBB	190.05	226.05	18.94	15	22.5	50.00	Non used
CS10	Residential	2010	Bauchi/Gombe	Public	DBB	18.22	21.85	19.92	2	5	150.00	Non used
CS11	Library extension	2006-2007	Kano	Public	DBB	87.12	87.12	0.00	9	14	55.56	Bar chart
CS12	Lecture theatre	2003-2004	Kano	Public	DBB	87.77	114.80	30.80	14	20	42.86	Bar chart
CS13	Offices/classrooms	2005-2006	Kano	Public	DBB	163.01	170.44	4.60	8.5	10.5	23.53	Bar chart
CS14	Residential	2004-2005	Kano	Private	DB	10.00	14.63	46.30	8	14.5	81.25	Non used
CS15	Shops & offices	2010-2011	Kano	Private	DBB	20.00	27.36	36.80	9.5	16.5	73.68	Non used
<b>TOTAL</b>						<b>2036.2</b>	<b>2912.2</b>	<b>43.02</b>	<b>175.5</b>	<b>352</b>	<b>100.57</b>	

**Note: E- estimation; F-final; DBB-design-bid-build; DB-design-build; Naira-Nigerian currency: US\$1= ₦ 160**

**Source:** Author (2013)

## **CHAPTER FIVE**

### **5.0 DISCUSSION OF RESULTS**

#### **5.1 Introduction**

This chapter is concerned with the discussion of results. It entails interpreting findings in light of previous studies, as well as describing the implications of the findings. This study was informed by NICs underperformance in the management of construction projects, which is due to inexperience, none or inappropriate application of project planning techniques, none appreciation for indigenous contractors projects planning challenges, inadequate understanding of factors that can significantly influence contractors project planning, and poor understanding of project planning success indicators that will ensure successful project delivery in the NICs.

This study broadly used both quantitative and qualitative research approaches. For the quantitative approach, the study employed the exploratory and descriptive survey methods through an extensive literature search and questionnaire survey methods respectively. While for the qualitative design approach, it employed an explanatory method through a collective case study based on documentary analysis. This study results were presented using average mean scores (AMS), frequencies and percentages.

#### **5.2 NICs Involvement in Project Procurement Systems**

The first objective was to establish the level of NICs involvement in building projects procurement systems. Data analysis and questionnaire responses from NICs revealed that both public and private clients involved NICs in traditional and non-traditional procurement system. Seventy five percent of building projects contracted

to NICs was procured by public clients, while 15% of the projects contracted to NICs were procured by private clients. It also revealed that the Government (public) clients procure 75% of their projects through the DBB traditional procurement systems, as against 15% procured through the non-traditional systems. The private clients contracted 78% of their projects to NICs through non-traditional procurement system, as against 12% through traditional procurement system. This result revealed that there is no disproportionate distribution in the frequencies of responses to a question on their level of involvement in building procurement systems among NICs, hence, confirming that the NICs are involved in both traditional and non-traditional procurement systems. However, their level of involvement in both procurement systems is very low and much lower in the non-traditional procurement systems.

This result conforms to Ojo *et al.* (2006) findings that DBB systems are mostly used by public and uninformed private clients in Nigeria. This result seems to corroborate Aniekwu and Audu (2010) assertions that the NICs has lesser share in the volume of contracts executed in the NCI compares to their foreign counterparts. The result also reveals that public clients have the largest share of the projects contracted to NICs in the industry. This corroborates Mbamali and Okotie (2012), and Iro *et al.* (2012) assertion that the Government in Nigeria (public client) has almost 75% of the total construction share. Furthermore, it revealed that private clients employ more non-traditional procurement systems in procuring projects than the public clients.

These results revealed that NICs are less involved in the countries construction activity and this has a tremendous consequences in their experience and technical development. The result also implies that if the NICs are to remain relevant and

attract more patronage from the construction industry and competes globally, they need to understand and perfect how to plan their projects vis-à-vis their role in the non-traditional building procurement systems. This is because globally (Nigeria inclusive) public sector are encouraging and promoting active private sector involvement in the provision of public infrastructure and services due to: dwindling public resources competing for alternative uses; the global shift toward scaling back the size of governments through policies of deregulation and privatization; and a natural quest for more efficient and sustainable systems and structures for provision of public services and a need to supplant the largely bureaucratic public sector led regime (Ibrahim& Musa-Haddary, 2010; Omagbitse, 2010).

The implication is that public clients will in future surrender to the public clients the position of being the major client of the industry, and the private clients' method of procuring projects is mostly through non-traditionally procurement systems (Ojo *et al.*, 2006). Hence, contractor need to develop project management skill because, project management is a management discipline that is applied to all types of building project procurement systems to attain project success (Georg & Tryggestad, 2009 cited in Ekundayo, *et al.*, 2013; Harris & McCaffer, 2005).

### **5.3 NICs Project Time and Cost Performances**

The second objective was to examine NICs time and cost performances in building projects procurement systems. Data analysis of questionnaire responses from NICs revealed that the NICs recorded time overruns of 34-146% and 45-60% in the traditional and non-traditional procurement systems respectively. The NICs cost performances recorded cost overruns of 35-47% and 31-36% in the traditional and

non-traditional procurement systems respectively. This result reveals that the NICs recorded high rates of time and cost overruns in the execution of both traditional and non-traditional procurement systems. This indicates that NICs underperformed in terms of cost and time in building procurement systems. These findings are in agreement with the findings of Idoro (2012); Mbamali and Okotie (2012); Babatunde *et al.* (2010); Ikediashi *et al.* (2012); Ibrahim(2008); Ojo *et al.* (2006), that both traditional and non-traditional procurement systems application in Nigeria record high cost and time overruns. According to Jagboro and Aibinu (2002), most building projects in Nigeria experience severe time and cost overruns due to delay.

Odeyinka and Yusif (1997) cited in Jagboro and Aibinu (2002, p.594) acknowledged that contractor-related delays include financial difficulties, material management problems, planning and scheduling problems, inadequate site inspection, equipment management problems and shortage of manpower. Most of these problems according to Ekundayo, *et al.* (2013) are attributed to the NICs adoption of traditional management approach. Moreover, the adoption of this approach results in poor project planning and coordination (Ekundayo, *et al.*, 2013; Kerzner, 2000). According to Passenheim (2009) poor project planning results in poor project coordination, and cost and time overruns.

The QSRBN (2012), as well as several studies, have confirmed that contractors' poor project planning is the major cause of cost and time overruns in building projects in Nigeria (Idoro, 2012b; Aniekwu & Audu, 2010; Bala, *et al.*,2009; Muazu & Bustani, 2004; Saleh, 2004; Achueny, *et al.* 2000; Adams, 1997). This among other things, is the reason why the NICs underperformed in terms of cost.

According to Passenheim (2009) adequate project planning is a fundamental tool used in building project management in meeting the projects time, cost, and scope. The implication of this result to the NICs is that unless they are well equipped with a requisite management approach capable of addressing these problems, their quest for attaining successful project delivery in the management of modern building projects will be unattainable.

The adoption of the project management approach has been proven to address such problems in the construction industries of developed and some advanced developing countries, to achieve all of the project objectives of cost, time, quality, scope, risks and uncertainty, change and stakeholder management (Ekundayo, *et al.*, 2013; Aina & Wahab, 2011; Kerzner, 2000). Hence, NICs need to adopt project management techniques (Ekundayo *et al.*, 2013; Kerzner, 2000).

#### **5.4 NICs Application of Project Planning Techniques**

The third objective was to investigate NICs application of project planning techniques for contractual operations in building projects procurement systems. Data analysis and questionnaire responses revealed that NICs inappropriately apply planning techniques. In some cases, the NICs central administration are responsible for planning the company's project tasks for their construction/project managers. This action conflicts with the project management requirement which bestowed the responsibility of project planning to project managers (Gupta, 2010; Passenheim, 2009). There are contractors who do not apply planning techniques and those who do, applied it inappropriately. Few of the contractors (33%) who apply planning technique, apply only bar chart. Unfortunately, bar chart is not an appropriate

planning technique; it is only appropriate for construction projects planning when used as a complement of the CPM (Chitkara, 2012; Bhavikatti, 2012; Abubakar *et al.*, 2008; Krishnamurthy & Ravindra, 2010; Roberta & Wallace, 2004; Seeley, 1986).

Most of the contractors (75%) that apply two type of planning techniques on a single projects, apply it wrongly. Only a few of the contractors (35%) used the appropriate combination of planning techniques; bar chart and CPM (Chitkara, 2012; Bhavikatti, 2012; Abubakar *et al.* 2008; Krishnamurthy & Ravindra, 2010; Roberts & Wallace, 2004; Seeley, 1986).

The research also reveals that most of the contractors (84%) do not apply computer software/application package in project planning. This verifies the findings of Mbamali and Okotie (2012), and Inuwa (2006) that there is poor adoption of computer application in the NCI. This study reveals that the NICs have a poor attitude towards project planning; only a few use the appropriate planning techniques. Furthermore, most indigenous contractors do not use computer software/application package in planning their project.

Despite the contractors' project managers' experience, high educational qualification and specialization in building procurement, their responses on project planning techniques application exposes their incompetence and poor attitude towards project planning. This confirms the assertions of several authors that indigenous contractors are unable to plan their contractual obligation (Aniekwu & Audu, 2010; Muazu & Bustani, 2004; Saleh, 2004; Achuenu, *et al.*, 2000; Adams, 1997). The results also

confirm NICs non-adoption of the project management approach (Ekundayo, *et al.*,2013). In addition, the result reveals that the NICs do not apply ICT in planning their projects. This corroborates Mbamali and Okotie (2012), and Inuwa (2006) claims that the NICs poorly adopt ICT in the planning and management of their projects. The shortcomings of the NICs in the application of project planning techniques, and poor adoption of ICT, confirms Aniekwu and Audu (2010) assertion that most of the NICs performance problems can be addressed through training, pre-construction planning and the application of modern construction techniques, which Gollenbeck (2008) admitted can be curbed through the application of project management techniques.

### **5.5 NICs Project Planning Challenges**

The fourth objective was to identify NICs project planning challenges in building procurement systems. The data analysis and questionnaire responses from the NICs, consultants and PBPs revealed that the identified project planning challenges (Table 4.14) were agreed by the respondents to be experienced to a severe degree by NICs in planning their project tasks in building project procurement systems in Nigeria, and as such should be taken seriously and addressed accordingly.

However, late honoring of payments certificates, too many variations, and technical incompetence, were found to be the most severe challenges faced by NICs in project planning. The research further discovered that these identified challenges faced by NICs in executing project planning emanates from the clients, consultants and the contractors as well. The result indicates that the distribution of rankings is the same among the respondents on the challenges of NICs project planning in building

procurement systems, hence, confirming that all the respondents agrees on the challenges face by NICs in the planning of building projects.

Late honoring of payments certificates, too many variations, and design deficiencies in the NCI, are challenges emanating from consultants and clients, which according to Aina and Jagboro (2002), are due to the deficiencies in clients and consultants project management procedure. The issue of incompetence is a challenge emanating from the contractors' organization. This result concurs with the findings of Aniekwu and Audu (2010), Bala *et al.* (2009), Bustani and Muazu (2004), Achuenu, *et al.* (2000), and Adams (1997), that NICs are incompetence.

The implication of this result is that unless these challenges are taken seriously and addressed accordingly, the project planning performance of NICs will never improve. The challenges emanating from the clients and consultants can be controlled through prompt honoring of payment certificates, curtailing variations through exhaustive brief evaluation, adequate feasibility study and appropriate scope definition, and adherence to project management procedures (Aniekwu & Audu, 2010; Bala, *et al.* 2009; Aina & Jagboro, 2002). The NICs can curtail their issue of incompetence through the development of entrepreneurial skills and the adoption of project management (Ekundayo, *et al.*,2013; Bala, *et al.* 2009).

### **5.6 Influencing Factors for NICs Project Planning**

The fifth objective was to identify significant factors that can influence NICs project planning in building projects procurement systems. The data analysis and questionnaires responses from NICs, consultants and PBPs revealed that the

identified influencing factors (Table 4.16) were agreed to be significantly important in influencing NICs building projects planning in building procurement systems by all the respondents. Besides, technical competence, contractor's project management capability and understanding contractors' procurement tasks were assessed to be the most important factors. This result indicate that the distribution of ranking among the respondents is the same, hence confirming that all the respondents are in agreement that the factors are significantly important to NICs project planning.

It is therefore necessary for NICs to take these factors seriously in developing their project planning potentials. Research on NICs by Aniekwu and Audu (2010); Bala *et al.* (2009); Muazu and Bustani (2004); Saleh (2004); Achuen, *et al.* (2000); Adams (1997) confirmed that technical competence, among other things, is a panacea for NICs to improve on its project planning performance. Research has also shown that the adoption of traditional management in the NCI, despite its shortcomings, has contributed to NICs underperformance in project management (Ekundayo *et al.* 2013).

By implication, this result reveals that NICs attainment of the significant factors that can influence project planning will improve the NICs potentials in the planning of projects in any type of building project procurement system. Project management gives the NICs avenue to develop these potentials (Ekundayo, *et al.*, 2013); as it employs the application of efficient ways required for the attainment of project success, exposes hindrances and proffers ways of curbing them to achieve project success (Kerzner, 2000). Moreover, if NICs are not able to acquire these significant factors, and other project stakeholders such as clients and consultants, are not able to

meet the factors emanating from them like prompt honoring of payment certificate, then the vision of the NCI of developing the NICs to compete national and internationally will never be achieved. The attainment of these influencing factors for NICs project planning will facilitate its meeting international construction best practice.

### **5.7 Contractors' Project Planning Success Indicators**

The sixth objective was to identify contractors' project planning success indicators in building project procurement systems. Data analysis and questionnaire responses from the NICs, consultants and PBPs revealed that contractors' project planning success indicators identified (Table 4.18) were important to contractors in achieving project planning success. In addition, plan's adherence to time, plan's adherence to quality and, adequacy of plan in determining suppliers' delivery dates are the most important contractors' project planning success indicators in project planning. This result indicates that the distribution of rankings is the same among the respondents on contractors' project planning success indicators in building project procurement systems.

The contractors' aim of planning construction project is to pre-determine how their project objectives will be achieved (Chitkara, 2012), and the attainment of this aim requires that project plans meet the: essential characteristics of good project plan, basic use/benefits of contractors' project planning and, things being considered by supervision engineers'/architects' when checking to ensure the effectiveness and efficiency of contractor's project planning. This result agrees with the publications of: Gahlot and Dhir (1992) on the essential characteristics of good project plans;

Chitkara (2012) and Seeley (1986) on the use/benefits of project plans. The result is also in line with Scott's (1995) finding on the things being considered by supervision engineer's/architect's when checking to ensure the effectiveness and efficiency of contractor's project plans.

Furthermore, the research agrees with the opinion of Krishnamurthy and Ravindra (2010) that a contractor's project plan should be flexible to accommodate changes brought about by unexpected events. It also agrees with the finding of Scott (1995) that the contractor's project plan should be comprehensible and realistic in predicting what will happen in future. The implication of this result is that contractors who understand and adhere to these indicators will be able to address their management and project planning incapacity, and enhance their probabilities in delivering building projects successfully (Scott, 1995).

### **5.8 NICs Project Performance Case Study**

This study conducted a collective case study on some selected NICs projects performance historic (documentary) data. The case study solely aimed at probing the responses received from the questionnaires so as to ascertain whether the performance and involvement, planning challenges and application of planning techniques in procurement systems in the NICs follow the same pattern. The collective case study revealed the following:

- Both public and private clients involved NICs in traditional and non-traditional procurement systems.
- Seventy three percent (73.33%) of the clients are public clients, while 26.67% are private clients.

- Public clients procured 91.67% of their projects through traditional procurement systems, while private clients procured 8.33% of their projects through traditional procurement systems.
- Private clients procured 78.26% of their projects through the non-traditional procurement systems, as against 33.33% procured through non-traditional procurement systems by public clients.
- Ninety three percent (93%) of the projects recorded cost overruns ranging between 46% and 152.29%.
- All the projects (100%) recorded time overruns ranging between 23.53% and 361.54%.
- Seventy three percent (73.33%) of the projects experienced late honouring of payment certificates resulting in delays.
- Virtually eighty seven percent (86.67%) of the projects experienced high frequency of variations.
- Almost fifty four percent (53.85%) of the causes of variations are design inadequacies, omitted items in the BOQ, poor work definitions, and the clients' changes in decision, which constitute 46.15% of the causes of variation.
- Contractors, consultants and clients all contributed to delays. But clients and consultants are the main causes of delay, due to indecision, poor feasibility studies and design inadequacies.
- Twenty percent (20%) of the projects were poorly finished and delayed as a result of contractors' incompetence.

- Virtually forty seven percent (46.67%) of the projects encountered changes in prices of materials and labour, due to delays emanating from the clients and the consultants.
- Nearly sixty seven percent (66.67%) of the contractors used bar chart only for planning their project programmes, 33.33% of the contractors did not used any planning tool and none of the contractors combined two planning techniques for planning a project.
- None of the contractors applied computer software/application package in planning their projects.

The collective case study result revealed that the NICs: are involved in both traditional and non-traditional procurement systems (DB method only); underperformed in terms of cost and time; and experienced project planning challenges. All these are in conformity with the questionnaire responses. However, the case study revealed most of the contractors (67%) applied only bar chart as their planning technique. None of the contractors used computer software/application packages in planning their projects. This confirms that NICs apply only bar chart and do not used computer software/application packages in planning. This result conflicts with the contractors' questionnaire responses that revealed that few contractors' (33%) apply the appropriate planning techniques combination; bar chart and CPM. It also conflicts with the contractors' questionnaire responses on computer application in planning.

## **5.9 Measures for Enhancing NICs Project Planning**

Respondents identified 23 measures (Table 4.18) that can enhance NICs projects planning through open-ended questions. The measures identified with high level of importance in descending order are: adequate and competent workforce, efficiency of firms' management systems, fairness and transparency in the construction industry, uninterrupted project cash flow, use and adherence to appropriate planning techniques, and training and retraining of contractors' workforce.

These results are in agreement with the assertions and findings of Muazu and Bustani (2004), Aniekwu and Audu (2010) and, Ekundayo, *et al.* (2013) on the reasons behind the poor projects management performance of the NICs in the NCI. Muazu and Bustani (2004) reported that NICs are characterised with an incompetent workforce, poor projects planning and scheduling, and poor management systems. These, according to Muazu and Bustani (2004), among other factors defines the underperformance of the NICs in the NCI. Aniekwu and Audu (2010) agree with this assertion and advocate for the adoption of project management techniques and the embarking on continuous training and retraining of the NICs personnel. To Ekundayo, *et al.* (2013) the adoption of the traditional management approach is majorly the cause of the NICs projects management underperformance, and they advocated for the adoption of project management techniques by the NICs in the management of their projects. Hence, there is a need for the NICs to adopt project management techniques for them to improve on their project planning, which will eventually improve their project management potentials.

## **5.10 Strategy for NICs Projects Operational Planning**

This study used literature review and the findings from its objectives to establish a strategy for NICs project operational planning. The responsibility of project planning in the contractors' organization should be headed by the contractors' project managers, and the contractors organizations should provide all the necessary resources that will enable the project manager achieve project management success. The strategy is subdivided into: initiation, implementation, monitoring and controlling, and completion.

### **5.10.1 Initiation Stage**

The initiation stage is divided into three stages: acquisition of project operational planning influencing factors, development of contractor's projects operational plan using the TFV concepts, and project resource organization.

#### **Acquisition of Projects Operational Planning Influencing Factors**

The first step at the initiation stage for the strategy for NICs project operational planning is for contractors to acquire the skills and adhere to the conditions that will significantly influence their project operational planning towards project success. This is in compliance with the concept of management-as-planning in the theory of planning (Kraemer, et al., 2014; Koskela & Howell, 2002b). The concept advocated that management involves planning and organizing (Kraemer, et al., 2014; Koskela & Howell, 2002b). At the planning stage, according to Kraemer, *et al.* (2014), there are two functions involved; managerial and effector. The managerial function bestowed the responsibility of projects planning to the management and as such, it becomes necessary for the contractors' management to acquire skills that will enable

it perform its duty of planning its projects operations (Kraemer, et al., 2014, Koskela & Howell, 2002b). The skills were identified in this study's objective five (Table 4.16) and were assessed to be very important for influencing NICs project operational planning.

However, prompt honoring of payment certificates is excluded; this is because it is emanating from the clients side and is beyond the control of the contractors. Hence, the factors that constitute NICs project planning influencing factors includes: technical competence, contractors' project management capability, understanding contractors' project procurement tasks, contractors' project managers' capability , adherence to the concept of buildability/constructability, improvement of contractor's business knowledge, adequacy of plant and equipment, compliance with safety procedures, contractor's project organizational structure, fairness and transparency in industry's business culture, understanding environmental laws, understanding all types of procurement systems, good response to weather and contractor's ICT compliance. The next step at the initiation stage is for the contractor to use the skills he has acquired to develop projects operational plan using the TFV concepts.

### **Development of Project Operational Plan Using the TFV Concepts**

This stage involves a series of successive steps and procedures using the TFV concept and is in compliance with the 'effector' part of the management-as-planning in the theory of planning. The effector part of planning is concerned with making sure that what is planned is accomplished effectively and efficiently (Kraemer, *et al.*, 2014, Koskela & Howell, 2002b). These steps and procedures serve as measures that

will ensure effective accomplishment of contractors' project operational plan. The steps and procedures are:

- i. Identify scope of contractors' contractual obligation
- ii. Identify and acquire the preconditions necessary for the commencement of all the contractors' tasks within its contractual obligations.
- iii. Identify each and every discrete tasks (operations) within the scope of the contractor's contractual obligation.
- iv. Capture all the contractors' tasks (operations) by top-down decomposition (work breakdown structure; WBS) within the project transformation path.
- v. Establish the best method for executing each task through: elimination of non-value adding activities (e.g. idleness, waiting time, etc.), improved efficiency (value-adding activities), elimination of process time and flow variability, and match value with client requirements.
- vi. Plan the project operations using the CPM, which will be used to establish (Bailey, *et al.*, 2008): total tasks constituted in the project, how each and every tasks are related, tasks duration and cost, tasks demand on resources, degree of flexibility or floats of the individual tasks within the project, milestones and, the project minimum lead time (critical path).
- vii. Use bar chart as a supplementary planning technique to establish a project operation schedule and to serve as a control chart for trending and tracking project schedule performance.
- viii. The project manager should also use the contractors' project planning success indicators (Table 4.18) as a standard performance of project planning and use it as a controlling unit to gauge project planning performance.

### **Contractor's Project Resource Organization**

The next stage is to organize the project resource and this is in compliance with the concept of planning-as-organizing. This requires the assembly of the necessary resources for carrying out the work defined in the plan (Kraemer, *et al.*, 2014; Weiss & Wysocki, 1992). The project manager should use CPM to assemble the project resources; which can be referred to as assets, actions and strategy that can be drawn or used by a person or an organization in order to function effectively (Oxford Dictionary of English, 2000). Therefore, the contractor's project resources include: materials, finance, manpower, plant and equipment, time, space, and project organizational structure (management).

The activities involved in the contractor's project resource organization are:

- I.** The contractor adopts a project management organizational structure (Kerzner, 2000); organizes and manages work flow and project coordination horizontally and vertically.
- II.** Defines the work tasks with the responsibilities
- III.** Allocates tasks to positions and designs the procedures in the organization.
- IV.** Selects adequate operatives for the positions.

The next stage is the implementation stage.

#### **5.10.2 Implementation Stage**

The implementation stage is further subdivided into two stages: the execution stage and the monitoring and controlling stage.

### **The Execution Stage**

At this stage the contractor's project manager put the project operational plan developed using the CPM into action. The contractor uses the CPM as a basis for dispatching tasks to work stations. In dispatching tasks, the contractor should make sure that workflow of all critical tasks along the critical path is not delayed. The dispatching of all other tasks not on the critical path can be delayed but not to an extent of affecting the overall duration of the project.

The methods/tools used in instructing the tasks execution to the contractor's operatives should be communicated in the right way. The contractor should create a feedback mechanism from the operatives to ensure that the instructions passed to them on the tasks dispatched are clearly understood and comprehensive.

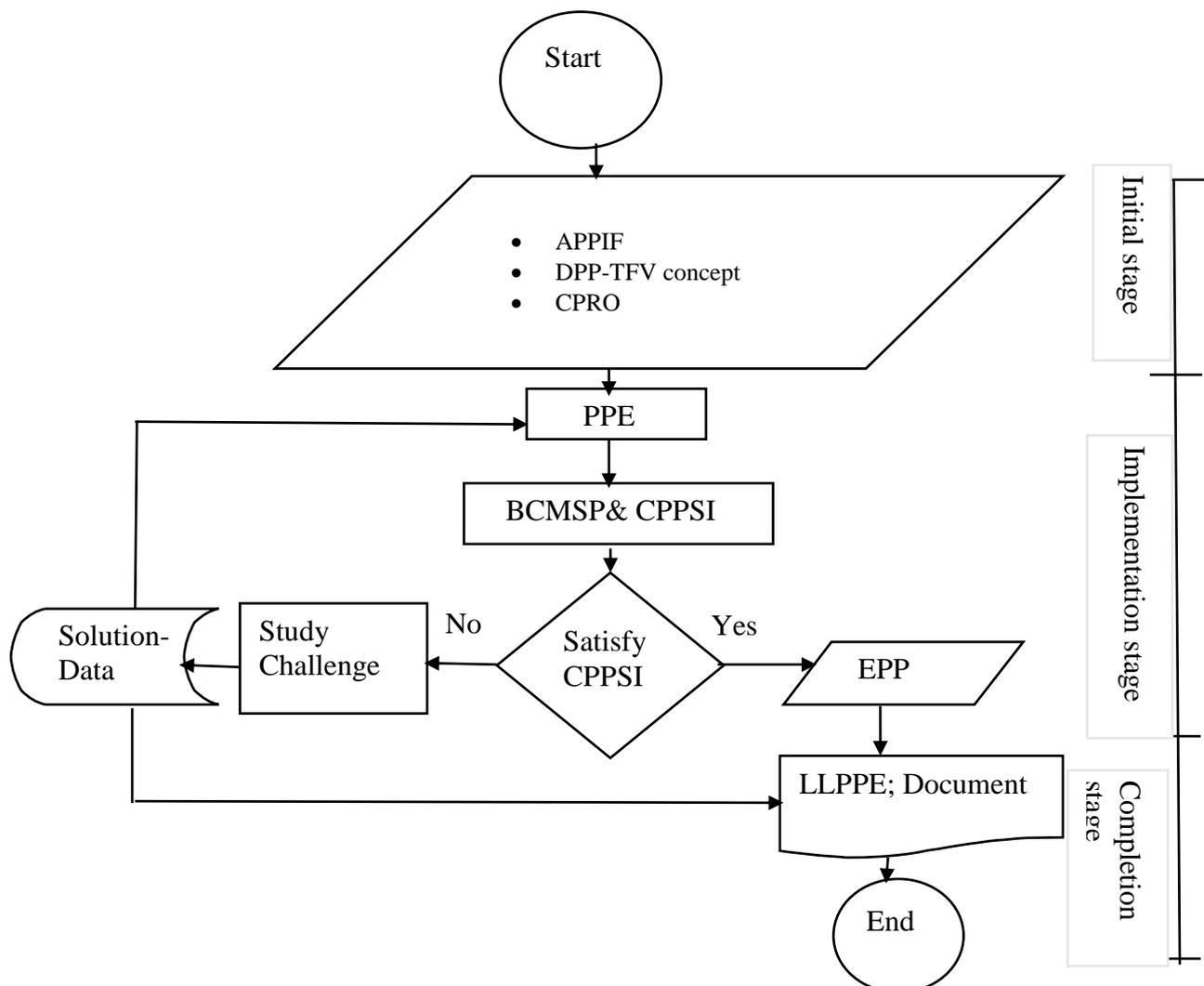
### **Monitoring and Controlling Stage**

This stage goes concurrently with the execution stage. At this stage, the contractor's project manager monitors and controls the project planning performance. The bar chart should be used to monitor the project schedule performance, while the contractor's project planning success indicators should be used to monitor project planning success. Both the bar chart and the success indicators are then used to control the contractor's project operational plan. The controlling aspect is concerned with noting deviations in the schedule performance and success indicators. These deviations are then subjected to the scientific experimental method of control; which involves uncovering the causes of deviation and proffering solutions to counter its effects on the project plan. This process should be a continuous process throughout the execution stage and should be considered a learning process. These solutions are

then effected in the project plans, and the lessons learn can also be applicable to subsequent projects.

### **5.10.3 Completion Stage**

This stage comes after the accomplishment of the project operational plan. At this stage the contractor should document all the lessons learned from the challenges, and the deviations encountered during the execution of the project operational plan. The lessons learned from the execution of a project plan should be used in solving similar challenges and deviations encountered in prospective project planning. Figure 5.1 depicts a flow chart of the strategy for contractors project operational planning



**Figure 5.1: Strategy for Contractors Project Operational Planning**

Source: Author (2013)

**Flow chart Keys:**

- APPIF: Acquisition of project planning influencing factors
- BCMSP: Bar chart for monitoring schedule performance
- CPRO: Contractor’s project resource organization
- CPPSI: Contractor’s project planning success indicators
- DPP-TFV concept: Development of project plan using TFV concept
- EPP: End of project planning

- PPE: Project plan execution
- LLPPE: Lesson learned during project planning execution.

## **CHAPTER SIX**

### **6.0 CONCLUSIONS AND RECOMMENDATIONS**

#### **6.1 Introduction**

This chapter is concerned with the result that is derived from the reasoned judgement of the issues raised by this study (Oso & Onen, 2011).

This study aimed at investigating NICs project operational planning in construction procurement and to establish a strategy for NICs project operational planning that will ensure successful project delivery in the NCI. This was in relation to the underperformances of the NICs project delivery due to: inexperience, inappropriate application of project planning techniques, none appreciation of project planning challenges, inadequate understanding of factors that can significantly influence project planning; and poor understanding of contractor's project planning success indicators, compared to other developed countries.

This study used six objectives to achieve its aim. The study objectives determine the data collection methods and analysis used. The data obtained were subsequently interpreted in line with the study objectives. This study used both quantitative (exploratory and descriptive) and qualitative design methods (explanatory-case study). The quantitative design methods employs an explorative technique through literature review to identify most importantly, the variables and constructs that produce questions used to answer the study objectives. Afterwards, interviews were used to identify additional variables and constructs to enrich the study questionnaires. The questionnaires were then pretested before being administered to

contractors, consultants and PBPs in northern Nigeria using a purposive sampling technique. The qualitative method employs an explanatory technique through a collective case study to probe the contractors' questionnaire responses. The contractors for the case study were selected through a stratified random sampling technique. The quantitative method used Spearman's correlation, Chi-square, Kruskal-Wallis H test, AMS, frequencies and percentages for its analysis, while the qualitative method used Bloom's taxonomy hierarchy, frequencies and percentages for its analysis.

These study objectives were to: establish the level of NICs involvement in building procurement systems; examine NICs time and cost performances in building procurement systems; investigate NICs application of project planning techniques for contractual operations in project procurement; identify and evaluate NICs project planning challenges in building procurement systems; identify and evaluate significant factors that can influence NICs project planning in projects procurement systems; and identify and evaluate contractor's project planning success indicators in building project procurement systems. This study was able to achieve its stated objectives.

The results for this study hypotheses show that:

- NICs are involved in both traditional and non-traditional procurement systems in the NCI.
- NICs underperformed in terms of time and cost in building projects procurement systems in Nigeria.

- NICs inappropriately apply planning techniques in planning their projects procurement tasks.
- All the respondents are in agreement on the factors that constitute NICs project planning challenges in building projects procurement systems.
- All the respondents are in agreement on the factors that can significantly influence NICs project planning in building projects procurement systems.
- All the respondents are in agreement on the factors that determines contractors' project planning success indicators in building procurement systems.

## **6.2 Summary of Findings**

In the light of the study objectives and hypotheses, this study presents the following as its summary of findings:

- i. The NICs are involved in both traditional and non-traditional procurement systems. Their major clients are the public client (75%) and the majority of the public client projects (77.54%) were contracted through the traditional procurement system. While, majority of the private clients projects (53%) were contracted through the non-traditional procurement systems. However, the NICs frequency of involvement in both traditional and non-traditional procurement systems is very low and, it is much lower in the non-traditional procurement systems.
- ii. The NICs underperformed in projects time and cost in both traditional and non-traditional procurement systems. NICs project performance record high rates of time and cost overruns. The NICs projects delivery time overrun rates

range from 34-146% in traditional procurement systems and 45-60% in non-traditional systems. Their project cost overrun rates ranges from 35-47% in traditional system and 31-36% in the non-traditional systems.

- iii. Some of the NICs do not apply project planning techniques, and majority of the NICs that applies project planning techniques applied it inappropriately. The NICs do not use computer application for project planning.
- iv. Twenty two (22) projects planning challenges experienced by NICs were identified, and assessed to be experienced to a severe level by NICs during their projects planning (Table 2.15). The most severe challenges are: late honouring of payment certificates, technical incompetence, design deficiencies, materials shortages/supply and, delays, increase in prices of materials/labour, inadequate documentations, and projects complexity and, disputes.
- v. Fifteen (15) factors were identified and assessed to be significantly important for influencing NICs project planning in any type of procurement systems (Table 4.12). The factors in order of importance are: technical competence, contractor's project management capability, understanding contractor's procurement tasks and, contractor's project manager's capability.
- vi. Sixteen (16) contractors' project planning success indicators' were identified, and acknowledged to be very important in determining contractor's project planning success (Table 2.17). The contractor's project planning success indicators in order of importance are: plan's adherence to time, plan's

adherence to quality, adequacy of plan in determining suppliers' delivery dates, plan's adherence to cost, plan's adherence to project technical requirements, ability of plan in facilitating project resource organization, plan's capability to accommodate contractor's work, plan's provision of basis for preparing schedules, plan's efficiently integrates subcontractors work and, plan's flexibility.

## **6.2 Conclusions**

This study used literature review, interviews, questionnaire survey methods, and a collective case study to attain its aim of investigating NICs projects planning, and to establish a strategy for NICs project planning in building projects procurement systems. The study concludes that:

- NICs are involved in both traditional and non-traditional procurement systems. However, their frequency of involvement in both traditional and non-traditional procurement systems is very low and it is much lower in the non-traditional procurement systems. NICs lack adequate experience in the management of non-traditional building projects and this contributes to their poor projects planning.
- NICs underperformed in terms of time and cost in both traditional and non-traditional project procurement systems. NICs project performance record high rates of time and cost overruns. This is as a result of their inability to plan their projects.

- Some NICs used their central administration instead of their project managers to plan their projects operations; some NICs do not apply a project planning technique. Majority of the NICs apply project planning techniques, inappropriately. NICs do not adopt ICT in projects planning. NICs poor attitude towards project planning contributed to their underperformance in project time and cost. This is an indication of the NICs poor project management capability.
- NICs experienced severe challenges in project planning. The most severe challenges experienced are: late honouring of payment certificates, technical incompetence, design deficiencies, materials shortages/supply, delays, increases in prices of materials/labour, inadequate documentation, and projects complexity and disputes. These challenges emanate from the contractors, consultants, and PBPs.
- The factors that can positively influence the NICs project planning performance were identified to be important. The most important factors are: technical competence, contractor's project management capability, understanding contractor's procurement tasks and, contractor's project manager's capability.
- The identified contractors' project planning success indicators are important to the NICs for attaining project planning success. The most important success indicators in descending order are: plan's adherence to time, plan's adherence to quality, adequacy of plan in determining suppliers' delivery

dates, plan's adherence to cost, plan's adherence to project technical requirements, ability of plan in facilitating project resource organization, plan's capability to accommodate contractor's work, plan's provision of basis for preparing schedules, plan's efficiently integrates subcontractors work and, plan's flexibility. The NICs adherence to these factors will guide their project planning capability, as well as ensure their project planning success.

- This study concluded that the inability of the NICs in project planning is as a result of non-adoption of project management techniques.

### **6.2.1 Addition to Knowledge**

Notable contributions to knowledge of this study are explained in the following paragraphs:

Most literatures available on building projects procurement (Bailey, *et al.*, 2008; Harris & McCaffer, 2005; Bennett, 2003) explained the role of the three principal parties in project management (client, contractor, and consultant) in relation to various procurement systems in a way that is complex to comprehend. The information they provide did not explicitly enumerate at each stage of the project delivery system the role of the contractor in the various procurement systems available. This study however, used literature review to explicitly enumerate in detail the roles of contractors at each stage of the project delivery systems in the building project procurement systems.

Previous studies revealed that NICs have less patronage compared to their foreign counterparts (Aniekwu & Audu, 2010; Bala, *et al.*, 2009; Oladapo, 2006; Muazu &

Bustani, 2004; Adams, 1997). In addition, other studies revealed the application of building project procurement systems in the NCI (Ikediashi *et al.* 2012; Idoro, 2012b; Mbamali & Okotie, 2012; Babatunde, *et al.* 2010; Ibrahim 2008; Ojo, *et al.*, 2006). However, none of the studies provided a detail account of the NICs level of involvement and performance in building projects procurement systems. This study revealed the extent of NICs involvement and performance in project delivery systems. The NICs are involved in both traditional and non-traditional procurement systems. However, their extent of involvement (experience) in non-traditional procurement systems is very low.

Despite several studies acknowledgement of the NICs inability to plan their projects (Ekundayo, *et al.*, 2013; Aniekwu & Audu, 2010; Bala, *et al.*, 2009; Muazu & Bustani, 2004; Saleh, 2004; Achuen, *et al.*, 2000; Adams, 1997), none investigated the NICs project planning. This study investigated NICs project planning, and provided information on NICs: planning techniques application, planning challenges, and project planning influencing factors. It also established contractors' project planning success indicators, which can be used as a standard for contractors' project planning performance (benchmark), as well as a controlling unit for contractors' project planning monitoring and control. This study established a strategy for contractors' operational planning using the theory of project management.

The research on the application of ICT in the NCI has been centred on general application across the industry (Inuwa, 2006; Oladapo, 2006). However, studies on NICs adoption and application of ICT in the management of projects is not available. This study to some extent depicts the level of NICs ICT adoption in project planning.

The findings of this study are a valuable resource and reference in academia in the teaching and understanding of the actual position of the NICs as it relates to: involvement and performance in building project procurement in the NCI, application of project planning techniques, project planning challenges, project planning influencing factors, ICT application in project planning, and what constitutes contractors' project planning success indicators. It will as well provide information on indigenous contractors' project planning attitude in developing countries.

### **6.3 Recommendations**

- This study has argued that NICs low level of involvement in the execution of building projects in NCI negatively affects their competency and capability to adequately plan projects. Their underperformance in cost and time is argued to result from poor project planning. It has also argued that NICs have a poor attitude towards project planning and do not adopt ICT in their project planning. Besides, the NICs experience severe challenges in the execution of their project operational plans. These challenges can be curbed by acquiring and adhering to factors that can influence their project planning. This study also argued that the NICs understanding and adherence to contractors' project planning success indicators will guide the NICs in the planning and management of projects to ensure project success. Based on this study findings, the following recommendations are proffered:

- The NICs should acquire skills for the management of non-traditional procurement systems.
- There should be developmental effort by the Nigerian construction academicians and the Nigerian Government to train NICs in the management and planning of building projects in the non-traditional procurement systems.
- The Nigerian Government should patronize NICs in the execution of building projects in non-traditional procurement systems. The Government should also encourage private clients to engage more NICs in the execution of their projects.
- The Nigerian Government should create and enforce a policy that will ensure the involvement of competent NICs in the NCI.
- The NICs and the NCI should discard the traditional management approach and adopt the project management approach. The NICs should organize their project tasks horizontally and vertically, so as to ensure extensive planning and coordination. In addition, the NICs should adopt the concept of buildability.
- The NICs should apply the appropriate project planning techniques. They should employ competent personnel and embark on continuous training, and also adopt ICT in their operations.
- The NICs should invest in knowledge management so as to keep abreast with global trends in the construction industry.

- The standard form of contracts used in Nigeria should be reviewed to include a clause enforcing contractors to apply the appropriate project planning techniques.
- Clients should promptly honor payments certificates and adhere to project management procedure.
- Consultants/contractors should employ exhaustive evaluation of briefs, adequate feasibility study, and appropriate scope definition to curtail variations.
- The NICs should acquire entrepreneurial and project management skills.
- The NICs should improve on their technical competence and acquire project management capability.
- The NICs should have a good understanding of their role in project procurement systems.
- The NICs should use the contractors' project planning success indicators as a guide in the management and planning of their project operational tasks.
- The NICs should use the contractors' project planning success indicators as a standard for project planning performance, and as a controlling unit for monitoring and controlling project planning performance.

- Project management course should be introduced in the curricula of vocational training centres, technical colleges, polytechnics, colleges of education and universities across Nigeria.
- The findings of this study should serve as a basis for further research to improve on contractors' project management performance.

### **6.3.1 Recommendations for Further Studies**

This study recognized from its findings, areas of concern and importance to NICs project planning that could not be studied appropriately in the course of this work, hence are worthy of further study.

#### **1. Factors Inhibiting NICs Application of Project Management**

This study discovered that one of the major problem militating against the NICs adequate project planning, and project management performance is their non-adoption of the project management techniques in the planning and management of projects. Further study can be conducted to investigate factors inhibiting the NICs in applying project management so as to proffer solutions to that effect.

#### **2. NICs ICT Literacy and Application in Project Management**

The volume and complexity of information generated during project planning and management calls for the adoption of ICT if success is to be attained in project management. However, this study discovered that virtually all the NICs involved in this study do not adopt ICT in planning building projects. Therefore, further study can be conducted to investigate the level of NICs

ICT literacy and application, and what factors hinder NICs adoption of ICT in project planning.

### **3. Review of Standard Form of Construction Contracts in Nigeria.**

The FMHUD standard form of contract used in Nigeria was adopted from the British standard form of contract (Joint Contract Tribunal; JCT). This study discovered that most of the clauses on project planning do not emphasized the planning techniques to be used for building projects; presumably because it is British oriented where most contractors are competent and educated to know the best technique that will enhance their contract performance (Harris & McCaffer, 2005). However, that is not the case in Nigeria and other developing countries, where construction contracting is open to everybody that can afford to register a company. Most of the contractors lack the basic skills to use appropriate planning technique in construction. A study can be conducted therefore to review the standard form of contract in order to introduce measures that will enforce proficiency on contractors.

### **4. Contractors Competency Requirements for Modern Procurement Systems**

A study should be conducted to ascertain contractors' competency requirement for the management of modern building procurement systems.

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## APPENDICES

### Appendix 1: Questionnaire Cover Letter



**JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND  
TECHNOLOGY  
SCHOOL OF ARCHITECTURE AND BUILDING SCIENCES (SABS)  
DEPARTMENT OF CONSTRUCTION MANAGEMENT  
NAIROBI-KENYA**

18<sup>TH</sup> March, 2013.

**TO WHOM IT MAY CONCERN**

Dear Sir/Madam,

***PROJECT PLANNING IN CONSTRUCTION PROCUREMENT: The Case of  
Nigerian Indigenous Contractors'***

I am a Postgraduate student in the above addressed institution conducting a research on the above subject area. The research is for meeting the requirement for the degree of Doctor of Philosophy in Construction Project Management at the Jomo Kenyatta University of Agriculture and Technology, Nairobi. The research aims at contributing to the development of Nigerian Indigenous Building Contractors in the discharge of their contractual obligation.

Kindly respond to the attached questionnaire by completing it. By cooperating to respond to the questionnaire, you are making a significant contribution to the construction industry as well as to the economic growth of Nigeria.

I assure you that the information you provide will be treated with the utmost confidentiality and will only be used as an empirical data to enhance the reliability of the research. Your prompt response will be highly appreciated.

Thanking you in anticipation of your cooperation.

Sincerely yours,

Inuwa Ibrahim Ibrahim  
(Reg. Nr: AB443-3627/2012)  
PhD (Construction Project Management) Candidate  
(Email: [inuwaibrahimibrahim@yahoo.com](mailto:inuwaibrahimibrahim@yahoo.com)) (Tel Nr: +2348087775505;  
+254738279277)

Dr. Wanyona Githae  
(Lead supervisor)

## Appendix 2: Questionnaire for Contractors

### *PROJECT PLANNING IN CONSTRUCTION PROCUREMENT: The Case of Nigerian Indigenous Contractors'*

DEPARTMENT OF CONSTRUCTION MANAGEMENT  
SCHOOL OF ARCHITECTURE AND BUILDING SCIENCES (SABS)  
JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY  
NAIROBI-KENYA

#### **QUESTIONNAIRE FOR INDIGENOUS BUILDING CONTRACTORS**

##### **SECTION 1: DEMOGRAPHIC DATA**

This section requires respondent to provide demographic information about the contractor and the firm's Project Manager. Kindly put a tick (✓) in the box next to the selected response.

##### **A: ORGANISATIONAL**

1. Kindly indicate the geographical location of your firm's operational headquarters

Abuja (FCT)       Bauchi/Gombe       Kano

2. Kindly indicate your firm's contract registration category

D (Over ₦50m)       C (₦15m-₦50m)       B (₦5m-₦15m)

3. Kindly indicate your firm's business registration category

Sole proprietorship       Partnership       Private Company

Public Company

4. How long has your firm been in contracting business?

Less than 5years       5-10years      10years

Over 15years

5. Please indicate the number of full time staff in your firm

Less than 10       10-20       21-30

31-40       41-50       Above 50

6. Please indicate the number of contract (part time) staff in your firm

- Less than 25       25-50       50-75  
 75-100       Over 100

**B: FIRMS' CONSTRUCTION/PROJECT MANAGER**

1. Please indicate how long you have worked in the construction industry?

- Less than 5years       5-10years       10-15years  
 Over 15years

2. Kindly indicate highest level of educational qualification attained

- Trade test Higher       National diploma  
 Certificate       Bachelor's degree  
 National Diploma       Masters       others (specify).....

7. Kindly indicate your educational specialization

- Architecture       Building  
 Quantity surveying       Project management  
 Engineering       Estate management  
 Land surveying       Accounting  
 Business administration       other (specify).....

8. Kindly indicate the management level of your status in the firm?

- Top management       Middle management  
 Lower management       others (specify).....

**C: PROJECT DATA**

Using the **keys below**, kindly fill in the information on the type of procurements system your firm has been involved in the last five (5) years (2008-2013)

S/N	Type of Procurement system	Type of clients		Contract Period (Months)		Average percentage (%) cost overrun of projects' at completion							
		Public	Private	Initial	Final	0%	< 25%	25-50%	50-75%	75-100%	100-125%	125-150%	> 150%

**Type of Procurement systems: Keys**

- 1. Design-Bid-Build (Traditional) **A**
- 2. Management contract **B**
- 3. Construction management contract **C**
- 4. Design, management and construction contract **D**
- 5. Design and construct Contract **E**
- 6. Design and build **F**

**\*NB: Kindly use the table on the overleaf of this sheet if you need more space in responding to section C (Project Data)**

## SECTION 2: PROJECT PLANNING

### A: PROJECT PLANNING

1. Does your firm plan its contract operations?  
 Yes  No (If No, please go to section B)
2. If yes, who is responsible for the operational planning?  
 Central administration  Firms construction/project manager  
 Others (kindly specify).....
3. Does your firm use planning techniques (tools)?  
 Yes  No (If No, please go to section B)
4. If yes, please indicate the **type** or **types** of planning technique?  
 Bar chart  Link bar chart  
 Line of balance  Critical path network (CPM)  
 Project evaluation and review techniques (PERT)  
 Project managers experience  others (specify).....
5. Does your firm combine two type of operational planning technique on a single project?  
 Yes  No (If No, please go to question 7)
6. If yes, please indicate the combination your firm mostly used for building project contracts?  
 Bar chart and Critical path method  PERT and Bar chart  
 Bar chart and Link bar chart  CPM and PERT  
 Bar chart and Line of balance  PERT and Link bar chart
7. Does your firm use operational planning software package?  
 Yes  No (If No, please go to section B)
8. If yes, kindly state the name of the Software.....

**B: CHALLENGES IN IMPLEMENTING CONTRACTORS PROJECT PLANNING**

The table below is a list of *challenges in executing contractors’ project planning in construction procurement systems*. Kindly tick (✓) a number on each of the **rank scale** to rank the level of severity of each of the challenges on contractors ‘project planning in construction procurement systems.

Please rank the level of severity on the *five-point-scale* provided:

**Rank Scale:** 5-Extremely Severe (ES); 4-Severe (SE); 3-Moderately Severe (MS); 2-Least Severe (LS); 1-Not Severe (NS)

S/N	CHALLENGES IN EXECUTING PROJECT PLANNING	Rank Scale				
		ES	SE	MS	LS	NS
1	Absenteeism of workers/shortage of craftsmen	5	4	3	2	1
2	Accidents on site	5	4	3	2	1
3	Claims	5	4	3	2	1
4	Client’s dissatisfaction	5	4	3	2	1
5	Communication problem between functional areas of business	5	4	3	2	1
6	Cultural influence	5	4	3	2	1
7	Delays	5	4	3	2	1
8	Design deficiencies	5	4	3	2	1
9	Disputes	5	4	3	2	1
10	Environmental regulations	5	4	3	2	1
11	Inadequate project documentation	5	4	3	2	1
12	Increase in prices of materials/labour	5	4	3	2	1
13	Late honoring of payments’ certificates	5	4	3	2	1
14	Material shortages or late delivery	5	4	3	2	1
15	Organizational problems	5	4	3	2	1
16	Plants, equipment’s and machine breakdown/Inadequacy	5	4	3	2	1
17	Poor weather conditions	5	4	3	2	1
18	Poor work definition	5	4	3	2	1
19	Project complexity	5	4	3	2	1
20	Project risks and uncertainty	5	4	3	2	1
21	Technical incompetence	5	4	3	2	1
22	Too many variations	5	4	3	2	1
23	Others (specify):	5	4	3	2	1

**SECTION 3: INFLUENCINGFACTORS FOR CONTRACTORS  
PROJECT PLANNING**

Please **rank** each of the following *factors influencing contractors' project planning in construction procurement systems'* in order of their importance.

Kindly tick (√) to rank the level of importance on the *five-point-scale* provided:

**Rank Scale:** 5-Very Important (VI); 4-Important (IM); 3-Fairly Important (FI); 2-Least Important (LI); 1-Not Important (NI)

S/ N	FACTORS INFLUENCING CONTRACTORS' PROJECT PLANNING	Rank Scale				
		VI	IM	FI	LI	NI
1	Adequacy of plants and equipment's	5	4	3	2	1
2	Adherence to the concept of buildability/constructability	5	4	3	2	1
3	Compliance with safety procedures	5	4	3	2	1
4	Contractors ICT Compliance	5	4	3	2	1
5	Contractors organizational structure	5	4	3	2	1
6	Continuous improvement of contractor's business Knowledge	5	4	3	2	1
7	Contractor's project management capability	5	4	3	2	1
8	Contractors project manager's capability	5	4	3	2	1
9	Fairness and transparency in Industry's business culture	5	4	3	2	1
10	Good response to weather	5	4	3	2	1
11	Prompt honoring of payments certificates	5	4	3	2	1
12	Technical competence	5	4	3	2	1
13	Type of procurement system	5	4	3	2	1
14	Understanding environmental laws	5	4	3	2	1
15	Understanding Contractor's project procurement task	5	4	3	2	1
16	Others (specify) :	5	4	3	2	1
		5	4	3	2	1

**SECTION 4: CONTRACTORS PROJECT PLANNINGSUCCESS INDICATORS**

Next to each *success indicators for contractors project planning* listed below, tick (√) a number on each of the **rank scale** to rank the level of importance of the *success indicators*.

Kindly rank the level of importance on the *five-point-scale* provided:

**Rank Scale:** 5-Extremely Important (EM); 4-Important (IM); 3-Moderately Important (MI); 2-Least Important (LI); 1-Not Important (NI)

S/N	SUCCESS INDICATORS FOR CONTRACTORS' PROJECT PLANNING	Rank Scale				
		EM	IM	MI	LI	NI
1	Ability of plan in facilitating project resource organization	5	4	3	2	1
2	Adequacy of plan in determining suppliers' delivery dates	5	4	3	2	1
3	Plan's adherence to cost estimate	5	4	3	2	1
4	Plan's adherence to project technical requirements	5	4	3	2	1
5	Plan's adherence to quality	5	4	3	2	1
6	Plan's adherence to time	5	4	3	2	1
7	Plan's capability to adequately accommodate contractors work	5	4	3	2	1
8	Plan's comprehensibility among trade heads	5	4	3	2	1
9	Plan's clarity in communication	5	4	3	2	1
10	Plan's curtailing rework	5	4	3	2	1
11	Plan's efficiency in identifying and mitigating site accident prone areas	5	4	3	2	1
12	Plan's efficiently integrates sub-contractors work	5	4	3	2	1
13	Plan's facilitating claim assessment for delay	5	4	3	2	1
14	Plan's flexibility	5	4	3	2	1
15	Plan's provision of basis for preparing schedules	5	4	3	2	1
16	Plan's provision for facilitating project monitoring and control	5	4	3	2	1
17	Others (specify):	5	4	3	2	1

Please state in your opinion measures you think will enhance your firm's project planning in any type of construction procurement systems?

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*Thank you for your time!*

### Appendix 3: Questionnaire for Consultants

#### *PROJECT PLANNING IN CONSTRUCTION PROCUREMENT: The Case of Nigerian Indigenous Contractors'*

DEPARTMENT OF CONSTRUCTION MANAGEMENT  
SCHOOL OF ARCHITECTURE AND BUILDING SCIENCES (SABS)  
JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY  
NAIROBI-KENYA

#### **QUESTIONNAIRE FOR BUILDING CONSTRUCTION CONSULTANTS**

##### **SECTION 1: DEMOGRAPHIC DATA**

This section requires respondent to provide information about their experience and that of their consulting firms. Kindly put a *tick* (✓) in the box next to the selected response.

##### **A: ORGANISATIONAL**

1. Kindly indicate the geographical location of your firm's operational headquarter

Abuja (FCT)                       Bauchi/Gombe                       Kano

2. Kindly indicate your firm's consultancy type.

Architecture                       Building Technology

Construction management

Engineering (Civil)                       Quantity surveying

Others (specify).....

3. Kindly indicate to what form of business registration your firm belongs

Sole proprietorship                       Partnership

4. Kindly indicate how long your firm has been in practice as consultant.

Less than 5years                       5-10years                       10-15years

Over 15years

5. Please indicate your age.

- Under 25years       25-30years       31-40years  
 41-50years       Over 50 years

**SECTION 2: CHALLENGES IN IMPLEMENTING CONTRACTORS  
PROJECT PLANNING**

The table below is a list of *challenges in executing contractors' project planning in construction procurement systems*. Kindly tick (√) a number on each of the **rank scale** to rank the level of severity of each of the challenges on contractors' project planning in construction procurement systems. Please rank the level of severity on the *five-point-scale* provided:

**Rank Scale:** 5-Extremely Severe (ES); 4-Severe (SE); 3-Moderately Severe (MS); 2-Least Severe (LS); 1-Not Severe (NS)

S/N	CHALLENGES IN EXECUTING PROJECT PLANNING	Rank Scale				
		ES	SE	MS	LS	NS
1	Absenteeism of workers/shortage of craftsmen	5	4	3	2	1
2	Accidents on site	5	4	3	2	1
3	Claims	5	4	3	2	1
4	Client's dissatisfaction	5	4	3	2	1
5	Communication problem between functional areas of business	5	4	3	2	1
6	Cultural influence	5	4	3	2	1
7	Delays	5	4	3	2	1
8	Design deficiencies	5	4	3	2	1
9	Disputes	5	4	3	2	1
10	Environmental regulations	5	4	3	2	1
11	Inadequate project documentation	5	4	3	2	1
12	Increase in prices of materials/labour	5	4	3	2	1
13	Late honoring of payments' certificates	5	4	3	2	1
14	Material shortages or late delivery	5	4	3	2	1
15	Organizational problems	5	4	3	2	1
16	Plants, equipment's and machine breakdown/Inadequacy	5	4	3	2	1
17	Poor weather conditions	5	4	3	2	1
18	Poor work definition	5	4	3	2	1
19	Project complexity	5	4	3	2	1
20	Project risks and uncertainty	5	4	3	2	1
21	Technical incompetence	5	4	3	2	1
22	Too many variations	5	4	3	2	1
23	Others (specify):	5	4	3	2	1

**SECTION 3: INFLUENCINGFACTORS FOR CONTRACTORS  
PROJECT PLANNING**

Please **rank** each of the following *factors influencing contractors’ project planning in construction procurement systems’* in order of their importance. Kindly tick (√) to rank the level of importance on the *five-point-scale* provided:

**Rank Scale:** 5-Very Important (VI); 4-Important (IM); 3-Fairly Important (FI); 2-Least Important (LI); 1-Not Important (NI)

S/ N	FACTORS INFLUENCING CONTRACTORS’ PROJECT PLANNING	Rank Scale				
		VI	IM	FI	LI	NI
1	Adequacy of plants and equipment’s	5	4	3	2	1
2	Adherence to the concept of buildability/constructability	5	4	3	2	1
3	Compliance with safety procedures	5	4	3	2	1
4	Contractors ICT Compliance	5	4	3	2	1
5	Contractors organizational structure	5	4	3	2	1
6	Continuous improvement of contractor’s business Knowledge	5	4	3	2	1
7	Contractor’s project management capability	5	4	3	2	1
8	Contractors project manager’s capability	5	4	3	2	1
9	Fairness and transparency in Industry’s business culture	5	4	3	2	1
10	Good response to weather	5	4	3	2	1
11	Prompt honoring of payments certificates	5	4	3	2	1
12	Technical competence	5	4	3	2	1
13	Type of procurement system	5	4	3	2	1
14	Understanding environmental laws	5	4	3	2	1
15	Understanding Contractor’s project procurement task	5	4	3	2	1
16	Others (specify) :	5	4	3	2	1
		5	4	3	2	1

**SECTION 4: CONTRACTORS PROJECT PLANNING SUCCESS INDICATORS**

Next to each *success indicators for contractors project planning* listed below, tick (√) a number on each of the **rank scale** to rank the level of importance of the *success indicators*. Kindly rank the level of importance on the **five-point-scale provided**:

**Rank Scale:** **5**-Extremely Important (EM); **4**-Important (IM); **3**-Moderately Important (MI); **2**-Least Important (LI); **1**-Not Important (NI)

S/N	SUCCESS INDICATORS FOR CONTRACTORS' PROJECT PLANNING	Rank Scale				
		EM	IM	MI	LI	NI
1	Ability of plan in facilitating project resource organization	5	4	3	2	1
2	Adequacy of plan in determining suppliers' delivery dates	5	4	3	2	1
3	Plan's adherence to cost estimate	5	4	3	2	1
4	Plan's adherence to project technical requirements	5	4	3	2	1
5	Plan's adherence to quality	5	4	3	2	1
6	Plan's adherence to time	5	4	3	2	1
7	Plan's capability to adequately accommodate contractors work	5	4	3	2	1
8	Plan's comprehensibility among trade heads	5	4	3	2	1
9	Plan's clarity in communication	5	4	3	2	1
10	Plan's curtailing rework	5	4	3	2	1
11	Plan's efficiency in identifying and mitigating site accident prone areas	5	4	3	2	1
12	Plan's efficiently integrates sub-contractors work	5	4	3	2	1
13	Plan's facilitating claim assessment for delay	5	4	3	2	1
14	Plan's flexibility	5	4	3	2	1
15	Plan's provision of basis for preparing schedules	5	4	3	2	1
16	Plan's provision for facilitating project monitoring and control	5	4	3	2	1
17	Others (specify):	5	4	3	2	1

Please state in your opinion measures you think will enhance indigenous contractors' project planning in any type of construction procurement systems?

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***Thank you for your time!***

## Appendix 4: Questionnaire for PBPs

### *PROJECT PLANNING IN CONSTRUCTION PROCUREMENT: The Case of Nigerian Indigenous Contractors'*

DEPARTMENT OF CONSTRUCTION MANAGEMENT  
SCHOOL OF ARCHITECTURE AND BUILDING SCIENCES (SABS)  
JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY  
NAIROBI-KENYA

#### **QUESTIONNAIRE FOR PUBLIC BUILDING PROFESSIONALS (PBPs)**

##### **SECTION 1: DEMOGRAPHIC DATA**

This section requires respondent to provide demographic information and their construction experience in public service. Kindly put a *tick* (✓) in the box next to the selected response.

##### **A: ORGANISATIONAL**

1. Kindly indicate the geographical location of your public operational headquarters

Abuja (FCT)                       Bauchi/Gombe                       Kano

2. Kindly indicate your educational specialization type.

Architecture                       Building Technology

Construction management                       Engineering (Civil)

Quantity surveying                       others (specify).....

3. Kindly indicate highest level of educational qualification attained

HND                       BSc                       MSc

PhD                       others (specify).....

4. Kindly indicate to which professional body you are registered to, if not leave out the question

NIA                       NIOB                       NIQS

NSE  others (specify).....

5. Kindly indicate how long you have been practicing as public construction professional

Less than 5years  5-10years  10-15years

Over 15years

6. Please indicate your age.

25-35years  35-45 years  45-55 years

Over 55 years

7. Kindly indicate the management level of your status in the organisation you work

Top  Middle  Lower

Others (specify).....,

## SECTION 2: CHALLENGES IN IMPLEMENTING CONTRACTOR PROJECT PLANNING

The table below is a list of *challenges in executing contractors' project planning in construction procurement systems*. Kindly tick (✓) a number on each of the **rank scale** to rank the level of severity of each of the challenges on contractors' project planning in construction procurement systems. Please rank the level of severity on the *five-point-scale provided*.

**Rank Scale:** 5-Extremely Severe (ES); 4-Severe (SE); 3-Moderately Severe (MS); 2-Least Severe (LS); 1-Not Severe (NS)

S/N	CHALLENGES IN EXECUTING PROJECT PLANNING	Rank Scale				
		ES	SE	MS	LS	NS
1	Absenteeism of workers/shortage of craftsmen	5	4	3	2	1
2	Accidents on site	5	4	3	2	1
3	Claims	5	4	3	2	1
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9	Disputes	5	4	3	2	1
10	Environmental regulations	5	4	3	2	1
11	Inadequate project documentation	5	4	3	2	1
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14	Material shortages or late delivery	5	4	3	2	1
15	Organizational problems	5	4	3	2	1
16	Plants, equipment's and machine breakdown/Inadequacy	5	4	3	2	1
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19	Project complexity	5	4	3	2	1
20	Project risks and uncertainty	5	4	3	2	1
21	Technical incompetence	5	4	3	2	1
22	Too many variations	5	4	3	2	1
23	Others (specify):	5	4	3	2	1

**SECTION 3: INFLUENCING FACTORS FOR CONTRACTORS  
PROJECT PLANNING**

Please **rank** each of the following *factors influencing contractors' project planning in construction procurement systems'* in order of their importance. Kindly tick (√) to rank the level of importance on the *five-point-scale* provided.

**Rank Scale:** 5-Very Important (VI); 4-Important (IM); 3-Fairly Important (FI); 2-Least Important (LI); 1-Not Important (NI)

S/ N	INFLUENCING FACTORS FOR CONTRACTORS' PROJECT PLANNING	Rank Scale				
		VI	IM	FI	LI	NI
1	Adequacy of plants and equipment's	5	4	3	2	1
2	Adherence to the concept of buildability/constructability	5	4	3	2	1
3	Compliance with safety procedures	5	4	3	2	1
4	Contractors ICT Compliance	5	4	3	2	1
5	Contractors organizational structure	5	4	3	2	1
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12	Technical competence	5	4	3	2	1
13	Type of procurement system	5	4	3	2	1
14	Understanding environmental laws	5	4	3	2	1
15	Understanding Contractor's project procurement task	5	4	3	2	1
16	Others (specify) :	5	4	3	2	1
		5	4	3	2	1

**SECTION 4: CONTRACTORS' PROJECT PLANNING SUCCESS INDICATORS**

Next to each *success indicators for contractors project planning* listed below, tick (✓) a number on each of the **rank scale** to rank the level of importance of the *success indicators*.

Kindly rank the level of importance on the *five-point-scale* provided:

**Rank Scale:** 5-Extremely Important (EM); 4-Important (IM); 3-Moderately Important (MI); 2-Least Important (LI); 1-Not Important (NI)

S/N	SUCCESS INDICATORS FOR CONTRACTORS' PROJECT PLANNING	Rank Scale				
		EM	IM	MI	LI	NI
1	Ability of plan in facilitating project resource organization	5	4	3	2	1
2	Adequacy of plan in determining suppliers' delivery dates	5	4	3	2	1
3	Plan's adherence to cost estimate	5	4	3	2	1
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5	Plan's adherence to quality	5	4	3	2	1
6	Plan's adherence to time	5	4	3	2	1
7	Plan's capability to adequately accommodate contractors work	5	4	3	2	1
8	Plan's comprehensibility among trade heads	5	4	3	2	1
9	Plan's clarity in communication	5	4	3	2	1
10	Plan's curtailing rework	5	4	3	2	1
11	Plan's efficiency in identifying and mitigating site accident prone areas	5	4	3	2	1
12	Plan's efficiently integrates sub-contractors work	5	4	3	2	1
13	Plan's facilitating claim assessment for delay	5	4	3	2	1
14	Plan's flexibility	5	4	3	2	1
15	Plan's provision of basis for preparing schedules	5	4	3	2	1
16	Plan's provision for facilitating project monitoring and control	5	4	3	2	1
17	Others (specify):	5	4	3	2	1

Please state in your opinion measures you think will enhance indigenous contractors' project planning in any type of construction procurement systems?

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***Thank you for your time!***

### Appendix 5: Nigeria Geo-political Zones



## Appendix 6: List of Publications

### A. Journal Publications:

1. Inuwa, I.I., Wanyona, G., and Diang'a, S (2014) Indigenous Contractors Involvement and Performance in Construction Procurement Systems in Nigeria. *Global Journal of Researches in Engineering*. Vol. (14)1: 5-15
2. Inuwa, I.I., Wanyona, G., and Diang'a, S (2014) Construction Procurement Systems: Influencing Factors for Nigerian Indigenous Contractors' Project Planning. *International Journal of Engineering Research and Technology*. Vol. (3) 4: 43-50
3. Inuwa, I.I., Wanyona, G., and Diang'a, S (2014) Application of Project Planning Techniques in Construction Procurement: The Case of Nigerian Indigenous Contractors. *International Journal of Economic Development Research and Investment*. 5(1): 31-47
4. Inuwa, I.I., Saiva, D., and Alkizim, A. (2014) Investigating Nigerian Indigenous Contractors Project Planning In Construction Procurement: An Explanatory Approach. *International Journal of Civil & Environmental Engineering*. 14(04): 16-25
5. Inuwa, I.I., Wanyona, G., and Diang'a, S (2015) Identifying Building Contractors' Project Planning Success Indicators: The Case of Nigerian Indigenous Contractors. Accepted for publication: *African Journal of Applied Research (AJAR)*. Vol. 1(1).

## **B. Conference Proceedings:**

1. Inuwa, I.I., Wanyona, G., and Diang'a, S (2014) Construction Project Procurement: Project Planning Challenges of Nigerian Indigenous Contractors. *Proceedings of the International Council for Research and Innovation in Building and Construction Conference (CIB W107, 28-30 January, 2014, Lagos-Nigeria)*: 107-117.
2. Inuwa, I.I., Wanyona, G., and Diang'a, S (2014) Identifying Building Contractors' Project Planning Success Indicators: The Case of Nigerian Indigenous Contractors. *Proceedings of the 3<sup>rd</sup> Applied Research Conference in African. ARCA Conference, Accra, Ghana*: 468-482