FRAMEWORK FOR DETERMINING PERFORMANCE OF CONSTRUCTION PROJECTS IN NORTHERN NIGERIA

BY

ANAS MUHAMMAD

DEPARTMENT OF QUANTITY SURVEYING,
FACULTY OF ENVIRONMENT DESIGN,
AHMADU BELLO UNIVERSITY, ZARIA.

AUGUST, 2016

FRAMEWORK FOR DETERMINING PERFORMANCE OF CONSTRUCTION PROJECTS IN NORTHERN NIGERIA

BY

Anas MUHAMMAD, (BSc ABU 2009)

(MSC/ENV-DES/31208/2012-13.)

A DISSERTATION SUBMITTED TO THE SCHOOL OF POSTGRADUATE STUDIES,

AHMADU BELLO UNIVERSITY, ZARIA.

IN PARTIAL FULFILMENT FOR THE AWARD OF A MASTERS DEGREE IN PROJECT MANAGEMENT.

DEPARTMENT OF QUANTITY SURVEYING,

FACULTY OF ENVIRONMENT DESIGN,

AHMADU BELLO UNIVERSITY, ZARIA.

AUGUST, 2016

DECLARATION

I declare that the work in this dissertation entitled “Framework for Determining Performance of Construction Projects in Northern Nigeria” has been carried out by me in the Department of Quantity Surveying. The information derived from literature has been duly acknowledged in the text and a list of references provided. No part of this dissertation was previously presented for another degree or diploma at this or any other institution.

……..	……	……...
Anas Muhammad	Signature	Date

CERTIFICATION

This dissertation entitled "Framework for Determining Performance of Construction Projects in Northern Nigeria" by Anas Muhammad meets the regulations governing the award of a Masters degree in Project Management of Ahmadu Bello University, and is approved for its contribution to knowledge and literary presentation

……	……	……
Chairman, Supervisory Committee	(Signature)	Date
(Dr. M. Abdurrazaq)		
……	……..	……
Member, Supervisory Committee	(Signature)	Date
(Dr. K.J. Adogbo)		
……	……	……
Head of Department	(Signature)	Date
(Dr. Y.M. Ibrahim)		
……	……	……
Dean, School of Post Graduate Studies	(Signature)	Date
(Prof. K. Bala)		

DEDICATION

This dissertation is dedicated to my parents (late) Alh. Rilwanu Muhammad and Hajia Salamat Isa for their untiring love and relentless effort, my elder brother Mal. Ibrahim Rilwanu Muhammad, guardian Alh. Jibrin Goma and to the entire family.

ACKNOWLEDGEMENT

All praise, glory and gratitude are due to Allah (S.W.T) for his boundless favour, guidance and protection, may the peace and blessings of Allah be upon the noblest of his messenger and the most pious of mankind in character, prophet Muhammad (S.A.W), members of his household and his companions till the Day of Judgment. My sincere appreciation goes to my project supervisors Dr. M. Abdurrazaq and Dr. K. J Adogbo whom always make themselves available for me in cases of difficulties and clarification despite their tight schedule were able to provide constructive suggestions and criticisms for the success of the work.

I wish to also show my appreciation to the entire lecturers of the Department of Quantity Surveying, Professor. A.D Ibrahim, Dr. Y.M. Ibrahim, Mal Abdullahi Muhammad, Mal. Saidu M. Muhammad, Dr. Ibrahim Abdullahi, Alh. Abdul Ali, Mal. M.I. Kofarbai, Dr. K.J. Adogbo, Mr. Baba Adama Kolo, Dr. Mustapha Abdurrazaq, Dr. J.Y. Gandu, Dr. Y.G.M Haddary, Dr. P.G. Chindo, Mr. O. Egbuta, Mal.Haruna Musa, Mal Muhammad Abdullahi and Mrs Fatima Bello for their relentless effort for impacting knowledge on me. May Almighty Allah reward you abundantly.

My sincere appreciation will also go to my wife Aishatu Sani Umar for the courage and relentless effort she gave in the course of this work. I must also acknowledges my daughters Salamatu Muhammad Anas (Haneefa) and Fatima Muhammad Anas (Binafa)

My appreciation also goes to my siblings, Abubakar R.M, Hilal R.M., Sakina R.M, Uwani R.M, Zainab R.M, and Maqbulah R.M, for their support and encouragement. Worthy of mention here are my uncle Saidu Garba and Aunts (whose names cannot be mentioned here) who assisted me in vital ways during the course of my study. To my cousins, nephews and nieces whose are too numerous to mention, I say a big thank you and may Allah assist us in all we do.

At this juncture, I will like to express my sincere appreciation to my friends Arc Kabir Lawal, Abdullahi Muhammad, Sa'idu Idris, Bayo Oladoja and Ahmad Ibrahim Gurama, to mention just but a few and all the remaining friends and class mates, you have indeed made the journey both sweet and memorable. I pray may Almighty Allah see you through in your future endeavors'.

ABSTRACT

Several researches have been carried out in order to develop frameworks for determining performance of construction projects which were mostly based on Traditional criteria (i.e. cost, time and quality) only. And researches have highly criticized the use of traditional criteria only while determining construction project performance due to its inadequacy. However, literature has never developed framework for determining performance of Construction Projects using the emerging/non-traditional criteria since they also influence performance. This study developed a framework using the emerging construction projects performance criteria in the Northern Nigeria which was achieved through the following objectives; the identification of emerging criteria for determining performance of construction projects, assessment of the level of importance of the emerging criteria and development of framework for determining performance of construction projects using the emerging criteria. A total of 285 questionnaires were distributed to some construction industry stakeholders (i.e. Consultants, Contractors, Clients and End-users) were asked to assess the level of importance of the emerging criteria. A total of 147 valid questionnaires were retrieved which represents 51.58% of valid response rate and subsequently analysed using descriptive analysis with the aid of Statistical Package for Social Sciences (SPSS) software. The most important criteria ranked by the respondents are; client satisfaction on outcome, effective risk management, client satisfaction on cost, client satisfaction on time etc. Most important criteria ranked by respondents are client oriented base. Using the emerging criteria for determining performance of construction projects as ranked by respondents in descending of priority will help the parties of the construction industry to understand how important those criteria are. Furthermore, it was also found that most important criteria as key areas of activity which favorable results are absolutely necessary for a goal to be achieved. Additionally, using the framework developed in this study for determining performance of construction projects will help in the monitoring of performance and redirect organisational action when necessary. Lastly, it can also help the contractors' and other key stakeholders of the construction industry particularly the clients and consultants to monitor and evaluate projects more accurately towards achieving project objectives.

TABLE OF CONTENTS

LIST OF TABLES

Page

LIST OF FIGURES

Page

LIST OF APPENDICES

Page

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

The construction industry is dynamic in nature due to the increasing uncertainties in technology, budgets, and development processes (Chan, Scott and Ada, 2004). They further reported that, building projects are becoming much more complex and difficult, and facing unprecedented changes. Those uncertainties, along with many other documented problems, are the root causes of project delays and decline in construction projects performance (Ofori, 1991; Ogunlana, Promkuntong and Jearkirm, 1996).

The improvement of performance has become more critical to the success of construction projects which have been the subject of considerable amount of research and attention over the past two decades (Al-Otaibi, Omani and Price, 2013).

Studies have shown decline in construction projects performance both locally and internationally (Ogunlana, Li and Sukhera, 2003; Komolafe, Kingsley and Muhammad, 2014).

A number of authors have worked significantly on ways to improve performance from the view point of traditional criteria (i.e. cost, time and quality) (Neely *et al*., 1994; Idrus and Sodangi, 2010; Barkley and Saylor, 1994). Furthermore, in response to the decline of projects performance, several studies have developed and advocated the use of frameworks for assessing construction projects with a view to improve their performance (Cocca and Alberti, 2009; Kagioglou, Cooper and Ghassan, 2001; Belassi and Tukel, 2006). But the frameworks developed by several researches were mostly based on the traditional criteria that have been highly criticized (Paul, 2014). Additionally, some authors have argued that construction project

performance criteria should be look beyond the traditional criteria. They suggested that the non-traditional (i.e. sustainable development, partnership, research and development etc) should also be considered while determining project performance in today's construction industry (Xiao and Proverbs, 2003; Kingsley, 2010; Idrus, Sodangi, and Haq Husin, 2011). In furtherance, the position of the authors is that the non-traditional criteria also influence performance.

Xiao and Proverbs (2003) stated that, traditionally, clients normally expect their projects to be delivered within budget, on time and to the level of quality required. However, achieving those traditional criteria should not be at the expense of other project objectives (sustainable development, and other non-traditional criteria). This is because the non-traditional criteria also enhance construction project performance. They further identified a range of criteria that should be considered while assessing construction project performance these include; construction cost, cost certainty, client satisfaction on cost, construction time, time certainty, client satisfaction on time, defect, being called upon, liability period, client satisfaction on quality, profitability, investment in research & development and training, environment protection and health and safety.

Similarly, Idrus *et al.* (2011) also identified a range of criteria that should be considered while assessing construction project performance these include; construction cost, construction time, quality of finished projects, occupational health and safety, level of technology, environmental management, construction flexibility, labour dependency, quality of coordination by construction team, contractors project management and contractors' capacity on manpower. The range of emerging criteria provided in literature comprises both the traditional and non-traditional criteria.

The reason of proposing the emerging construction project performance measurement criteria is because they also influence performance. Framework being system or structure that could be used as the basis for making judgments, decisions etc. Following that, developing a framework using the emerging performance measurement criteria as suggested by Kingsley (2010) will serve as a guide to construction professionals, clients and contractors toward achieving the industry stakeholders' goals or objectives (i.e. client satisfaction, profits and environment management).

1.2 STATEMENT OF RESEARCH PROBLEM

Researches have shown that the use of traditional set of criteria (i.e. cost, time and quality) only, while assessing project performance is not adequate for use in today's construction industry (Xiao and Proverbs, 2003; Kingsley, 2010; Idrus *et al*, 2011; Komolafe *et al*, 2014). The traditional criteria is viewed as inadequate due to the fact that it does not take into account some set of emerging criteria which include issues to do with sustainable development, partnership, research and development etc. Furthermore, Paul (2014) reported that most Nigerian construction organisations/firms still rely on financial measures (traditional approach) which have been highly criticized. And a number of studies have developed frameworks for determining construction project performance which were mostly based on the traditional criteria that have been highly criticized (Cocca and Alberti, 2009; Kagioglou, Cooper and Ghassan, 2001; Belassi and Tukel, 2006). Following that, researches have advocated the use of some set of emerging/non-traditional criteria for determining construction projects performance. As a result, several researches have been carried out in order to determine construction project performance from the perspective of professionals, clients and contractors only. However, there was no research work carried out on the development of framework for determining performance of construction projects using the emerging measurement criteria and from the perspective of End-users in Northern Nigeria.

1.3 JUSTIFICATION FOR THE STUDY

Atkinson (1999) stated that, internationally, there is the need to propose unconventional performance measures which will help in satisfying the stakeholders' satisfaction.

Ibrahim (2014) identified stakeholders as sponsors, management and technical unit of the university, consultants, Contractors' and End users. He further stated that, stakeholders view in the construction industry as an important aspect of project delivery. Kingsley (2010), Idrus *et al.* (2011) stressed the needs to evaluate construction project performance criteria base on their level of importance which will further improve overall project performance.

Kingsley (2010), Idrus *et al*. (2011), Komolafe *et al.* (2014) suggested that a set of criteria for determining construction project performance shall be ascertained and assessed accordingly from the view point of contractors' and clients which would reflect opinion of the major stakeholders of the construction industry. Furthermore, end-users view was also considered since they are part of the key stakeholders of the construction industry.

Since Paul (2014) reported that most Nigerian construction firms still rely on financial measures (traditional approach) which have been highly criticized. Following that, it is likely that the development of frameworks using the emerging criteria proposed by recent researches for determining construction project performance will help by replacing frameworks developed in previous studies which were based on traditional criteria with the one developed using emerging criteria in the Nigerian construction industry. Lastly, developing a framework using the emerging construction projects performance measurement criteria as suggested by Kingsley (2010) will serve as a guide for construction organisations/contractors towards achieving the industry stakeholders goal or objectives (i.e. client satisfaction, profits, environment protection etc).

1.4 AIM AND OBJECTIVES

1.4.1 AIM

The study aims at developing a Framework for determining Performance of Construction Projects in Northern Nigeria.

1.4.2 OBJECTIVES

i. To identify the set of criteria used for determining performance of construction projects.

ii. To assess the level of importance of the set criteria for determining Performance of construction projects.

iii. To develop a Framework for determining performance of construction projects.

1.5 SCOPE AND LIMITATION

1.5.1 SCOPE

This study focuses on the following categories of respondents; clients, contractors', consultants, end-users and other category of respondents involved in the Northern Nigeria's Tertiary Institutions Projects particularly public universities, polytechnics and colleges of education with a view to get the opinions of the major stakeholders on those set of emerging criteria that were used in developing of the framework. Nigerian tertiary institutions projects are chosen because there are relatively high construction activities taking place in them. That is supported by a report from News Agency of Nigeria (NAN) that as at August, 2014, Tertiary Education Trust Fund (TETFUND) has a budget of three-hundred billion naira (N300Billion) meant to be spent for construction of projects in the Nigerian tertiary institutions.

Another reason for choosing Nigerian tertiary institutions' projects is because they are one of the projects where Clients and End-users sometimes act as different parties. That has helped this study in differentiating them, since it is looking at End-user as an independent party among the other stakeholders of the industry. Again, Nigerian tertiary institutions are chosen because they are located and visibly present in every state of the Nigerian federation. That has helped in reaching out to those key stakeholders of the construction industry operating in the Nigerian tertiary institutions' projects.

As it was not possible to cover the whole of Nigeria in the study, for that reason, the study was restricted to the tertiary institutions within the Northern Nigeria particularly north-west, north-east and north-central. Following that reason, a generalisation can be made for the entire country

based on what is obtained from any part or geo-political zone of the country. Since it is possible to use the most represent able sample size in research (Abdullahi, 2014).

1.5.2 LIMITATIONS

The effectiveness of the framework for determining performance of construction projects developed in this study is limited to the accuracy of data supplied by the respondents in the questionnaire.

The framework for determining performance of construction projects developed in this study could not capture all the views of the construction industry's stakeholders.

In general, the research sample was relatively adequate, because it was drawn using a convenient sampling technique which could affect the generalisation of the findings.

CHAPTER TWO

LITERATURE REVIEW

2.1 PERFORMANCE

Kwaku (2007) defined ‘performance’ as the behavioral action that is relevant in achieving goals of project-based organisations. Similarly, Idrus and Sodangi (2010) asserted that the ‘performance’ can take on different meanings depending on the context in which it is being used. They further defined ‘performance’ in their view as basically the measures of effectiveness and efficiency. Performance is considered as the calculation of achievement used to measure and manages project quality (source: project management book of knowledge: Glossary of terms PMI 1987).

Performance is the degree to which individuals or firms/organisations operate according to specific criteria/standards/guidelines or achieve results in accordance with state goals or plans. (Source: A guide for project M & E: Glossary of M & E concepts and terms). Olusola and Iyagba (2012) stated that issue of ‘performance’ has been challenging occurrence in the construction process for quite some time.

Base on the literature reviewed, it can be seen that ‘performance’ encompass the action performed which is on quantifiable basis. Or ‘performance’ entails the quantification of action based on some criteria or yardsticks.

2.2 PERFORMANCE MEASUREMENT

Neeley, Gregory and Platts (1994) defined 'performance measurement' as the set of metric used to quantify both efficiency and effectiveness of actions. Similarly, Idrus and Sodangi (2010) defined 'performance measurement' as the measure of effectiveness and efficiency in a quantifiable basis.

Kingsley (2010) also stated that performance measurement as the regular measurement of the results and efficiency of services of program. Similarly, Barkley and Saylor (1994) also stated that project performance measurement is based on cost, time and quality.

Kingsley (2010) further stated that, the review of 'performance measurement' in construction industry generally reaffirmed the need to have an objective technique rather than subjective technique of measuring construction project performance.

Takim *et al.* (2003) also defined performance measurement as the regular collection and reporting of information about inputs, efficiency and effectiveness of construction projects. From this definition, it can be seen that day to day decision that are usually taken concerning the efficiency and effectiveness of inputs applied is vital components of any effort for results.

Costa *et al.* (2005) asserted that performance measurement provide necessary information for process control which makes it possible to establish challenging and feasible goals.

In view of the literature reviewed in this section on performance measurement, it can be deduced that, the development of a set measurable criteria is key to any performance measurement system. That will enable the ascertainment of whether a particular goal is or not achieved.

2.3 PERFORMANCE MEASURES/INDICATORS

The issue of performance measurement cannot be discussed without talking about measurable criteria into performance measures and indicators. This is because previous studies have classified the performance measurable yardstick into measures and indicators. The concept of performance measures and indicators can be clearly explained as discussed by several authors.

Mbugau *et al.* (1999) stated that performance indicators specify the measurable evidence necessary to prove that a planned effort has achieved the desired result. Furthermore, when indicators can be measured with some degree of precision and without ambiguity are referred as measures. This is to say, when it is not possible to obtain a precise and accurate measurement that is usually referred as performance indicators. While "criteria" can be refer to as the judgment on accomplishment of some certain tasks.

On the opposite, performance measures are the numerical or quantitative indicators (Sinclair and Zairi, 1995). Furthermore, Mbugua *et al.* (1991) stated that performance measurement is the systematic way of evaluating the inputs and output in manufacturing operations or construction activity and acts as a tool for continuous improvement.

In view of the literature reviewed in this section, it can be seen that performance measurement can only be achieved through some performance measures and indicators. Those performance measures/indicators determine performance in a precise or on quantifiable manner.

2.4 IMPORTANCE OF PERFORMANCE MEASUREMENT

Osborne and Gaebler (2005) stated that failure to measure result means that a distinction cannot be made between success and failure, and if success is not appreciated, it cannot be rewarded, then, probably failure is being rewarded and the ability to recognize failure means it cannot be corrected. But if the results can be demonstrated or described, the improvement can be actualized.

Similarly, Kingsley (2010) stated that project performance measurement criteria can provide the industry with an objective assessment of performance with strength and weakness pointed out.

In summary, performance measurement provide a yardstick in which construction industry stakeholders can used to improved the quality of work, cost effectiveness and efficiency of operations which will in turn improve general performance.

2.5 BENCHMARKING

Benchmarking through the application of performance measurement systems has in recent times become a total issue in the construction industry (Proverbs, 2005). The Construction Industry Institute (CII) (2002) quoting from European benchmarking code of conduct defines 'Benchmarking' as; supply making comparing within other organisations and then learning lessons that those comparisons throw up.

2.6 PERFORMANCE MEASUREMENT OF PROJECT IN THE CONSTRUCTION INDUSTRY

Previous studies revealed that different types of criteria used in assessing construction project performance exist. Past research works look at evaluation of construction project performance from the perspective of traditional criteria while recent studies have pointed out the need to look beyond the conventional criteria only.

Bassioni *et al.* (2004) asserted that performance measurement has been subject to a considerable researches and attention over fifteen (15) years. Idrus *et al.* (2011) stated that, generally, there is no standard approach or guideline in evaluating construction performance.

A number of authors have worked significantly on construction project performance measurement concepts in the construction industry. The reason of carrying out several researches in this area could be attributed to a number of issues revealed. These issues range from the decline in project performance due to the weakness and inadequacy of the traditional criteria, the need for efficient and timely completion of project, the need for continuous improvement of construction project performance and lastly to satisfy clients satisfaction.

Some authors suggested that there is the need to focus attention on traditional criteria while gauging construction project performance while others argued the need to look beyond the conventional criteria.

Neely *et al.* (1994) viewed performance measurement and actions on quantitative basis or to quantify actions. But Idrus *et al.* (2011) stated that performance measurement can take on different meanings depending on the context it is being used. Costa *et al.* (2005) also argued that,

there is the need to shift performance measurement criteria from traditional historical orientation to preferable performance measurement criteria beyond the conventional approach.

In another narration, Xiao and Proverbs (2003) stated that, client normally expect their project to be delivered within budget, on time and to the level of quality required. However, achieving these traditional criteria should not be at the expense of others. Similarly, Idrus *et al.* (2011) argued that there is the need to consider non-traditional criteria while determining project performance. Robinson *et al.* (2004) also stated that, the inadequacy of traditional financial based performance measures have triggered the need to develop model that will look beyond the traditional criteria. Kingsley (2010) in his assertion pointed out that the review of performance measurement in construction generally reaffirmed the need to develop an objective technique rather than subjective technique used in measuring construction project performance.

Considering the literature reviewed in this section, it can be deduced that beyond the normal traditional criteria used for assessing project performance in the construction industry, there also exist other non-traditional criteria which reflect the dynamic nature of the industry. That is to say, these non-traditional criteria when considered while assessing construction project performance will provide a basis for superior performance. This will help all parties in the construction industry to improve the general project performance and achieve a successful project construction.

2.7 TRADITIONAL AND NON TRADITIONAL CRITERIA USED IN MEASURING CONSTRUCTION PROJECTS PERFORMANCE

Traditionally, construction project performance is usually measured base on conventional criteria (i.e. cost, time and quality). Studies have shown that the traditional criteria are too crude to be used in assessing performance in today's construction projects (Xiao and proverbs, 2003; Kingsley, 2010; Idrus *et al.*, 2011).

Xiao and Proverbs (2003) stated that traditionally, client normally expect their projects to be delivered within budget, on time and to the level of quality required. However, achieving these traditional criteria should not be at the expense of others (non-traditional criteria). This is because the non-traditional criteria also influence construction project performance. So in view, those criteria should also be considered while determining the project performance.

Xiao and Proverbs (2003) went forth to identify a range of non-criteria which are beyond the normal traditional criteria which can be used for determining performance in today's construction projects. The reason of providing these non-traditional criteria by the authors is towards achieving outstanding performance of construction projects in terms of cost, time, quality and sustainable development. Furthermore, Xiao and Proverbs (2003) defined overall contractors' performance to embrace construction cost, construction time, construction quality and sustainable development. The philosophy or idea being that achievement of one aspect should not be at the expense the other.

Table 2.0: The Indicators of Overall Construction Project Performance

ITEM	PERFORMANCE INDICATORS
Cost	Construction cost
	Cost certainty
	Client satisfaction on cost
Time	Construction time
	Time certainty
	Client satisfaction on time
Quality	Defects
	Liability period
	Client satisfaction on quality
Sustainable Development	Profitability
	Partnership
	Investment in R & D and training
	Health and safety

Source: Xiao and Proverbs (2003).

Similarly, Kingsley (2010) stated that the review of performance measurement in the construction industry generally has reaffirmed the need to an objective technique rather than a subjective technique of measuring performance.

Table 2.1: Performance Criteria

S/NO	CRITERIA
1.	Quality of final building product
2.	Duration of construction (delivery schedule)
3.	Ability to formulate and maintain practical programmes
4.	Standard workmanship
5.	Site management practices (effective quality control on site)
6.	Labour relations at site
7.	Relations with subcontractors and statutory authorities
8.	Attention to site welfare & safety
9.	Cooperation with stakeholders
10.	Appropriateness of organizational structure in managing project(well laid outlines of responsibility, delegation and communication)
11.	Effectiveness of communication (managing information flow)
12.	Employee development (qualified staff, motivation & training)
13.	Prompt correction of defects
14.	Creative and innovative ability in executing project (ability to propose alternative construction methods at site)
15.	Effective risk management (managing activities that can lead to financial loss and delay in delivering time)
16.	Environmental management (managing the impact of construction activities on the environment)
17.	Client satisfaction (in terms of product and service outcome)
18.	Financial stability (access to credit)
19.	Operational base of contractor (well set out office coordination)
20.	Equipment holding (equipment use at site as against equipment listed during tendering)
21.	Estimated cost of project

SOURCE: Kingsley (2010)

Kingsley (2010) asserted that apart from the normal conventional measures of performance, consideration should also be given to stakeholder perspective or interest like relations with customers, employees, financiers and the wider community.

Idrus *et al.* (2011) also stated that there are different types of criteria which are used while evaluating the construction project performance. They went forth to report that there is no standard approach or guideline use in evaluating construction project performance. In the early 1990s at project level success was measured by the project duration, monetary cost and project performance. Time, cost and quality are the basic criteria to project success known as the 'iron triangle' as it is included in any project performance evaluation. That is to say, construction projects performance was usually gauge based on the traditional criteria while in recent times researches have emphasized the need to consider non-traditional criteria.

Idrus *et al.* (2011) stated that identifying project performance criteria will serve as a guide to professionals and client to execute project efficiently and effectively. They also further identified a range of criteria that should be considered while assessing project performance as can be seen in Table 2.0 and Table 2.1

Table 2.2: Construction Project Performance Criteria

S/NO	CRITERIA
1.	Construction cost
2.	Construction time
3.	Quality of finish project
4.	Occupational health and safety
5.	Level of technology
6.	Environmental management
7.	Contractors flexibility
8.	Labour dependency
9.	Quality of coordination by construction team
10.	Contractors project management
11.	Contractors capacity on manpower

Source: Idrus *et al.* (2011).

Table 2.3: Project Performance Criteria

S/NO	CRITERIA
1.	Construction cost
2.	Construction time
3.	Quality of finish project
4.	Occupational health and safety
5.	Level of technology
6.	Environment management
7.	Contractors flexibility
8.	Labour dependency
9.	Quality of coordination by construction team
10.	Contractors' project management
11.	Contractors capacity on manpower

Source: Idrus *et al.* (2011).

Idrus *et al.* (2011) reported that the objective of every project is success of project performance. Identifying the performance measurement criteria as well as knowing the level of importance for each of the criteria is important to achieve the most favorable and desired outcome by both client and contractors.

Considering the literature reviewed in this section, it can be seen that project performance is critical to the success of any construction as they have influence on overall performance. Furthermore, project performance measurement can be viewed from two different perspectives. That is the traditional criteria (cost, time and quality) and the non-traditional criteria (i.e. the combination of traditional criteria and non-traditional criteria such as; sustainable development-partnership, investment in research & development and training, environment protection, profitability, health and safety).

Studies have shown that the traditional criteria for assessing project performance as too crude to be used in assessing their performance in today's construction industry. This is because the construction industry has a unique and dynamic nature. But some authors suggested that some performance measurement criteria should not be carried out at the expense of others.

Recent researches on project performance measurement have revealed the need to look beyond the normal traditional criteria used in assessing contractors' performance to non-traditional criteria. This is because the non-traditional project performance criteria consider a lot of issues beyond the mere conventional approach.

However, current research have stressed the need to carry out an evaluation of most significant key performance indicators of construction projects and to formulate recommendation to improve performance of construction projects in the Nigerian construction industry (Juliet and Omozokpia, 2014). Furthermore, those authors reason behind stressing the need to carry out an evaluation on project performance is because construction projects in Nigeria suffer from many problems and complicated issues of performance.

In view of all the literature reviewed in this chapter, it can be clearly seen that, there is the need to evaluate the contractors' performance criteria base on their level of importance and level of criticality which is likely to improve the contractors' performance. And improve project performance lead to client satisfaction which is one of the major objectives of the construction industry.

2.8 FRAMEWORKS FOR MEASURING PERFORMANCE

The construction industry is generally considered to have underperformed compared to other industries (Takim and Akintoye, 2002). Following that, a huge interest in performance measurement has been witnessed in practitioners' conferences and publications as well as in academic research (Neely, 1998).

Studies have shown that firms/organisations applying performance measurement systems as a basis for management do better than those that do not (Lingle & Schiemann, 1996). Furthermore, it is important for companies/organisations to employ an effective performance measurement system that will enabled good decisions to be made with a view to achieved some desired goals (Neely, 1998).

Bassioni, *et al.* (2004) describes performance measurement framework as general theoretical frame works developed to act as the basis for organisation's/ company's performance measurement system. Dissatisfaction with traditional performance system led to the development of multi-dimensional performance frame works to encourage balance view.

2.8.1 Characteristics of Performance Measurement Frameworks

i. Kaplan and Norton (1992) stated that the set of measures used by an organisation has to provide a "balanced" picture of the business. The set of measures should reflect financial

and non-financial measures internal and external measures, and efficiency and effectiveness measures.

ii. Frameworks provide a succinct overview of the firms/organisation's performance which in-turn help in the achievement of construction project objectives.

iii. Frameworks help organisations to implement a set of performance measures that are multi-dimensional. This reflects the need to measure all the areas of performance that are important to the organisation's success.

iv. Frameworks help organisations to function effectively through hierarchy of some set measures, encouraging congruence of goals and actions.

v. Performance measurement frameworks explain how functions lead to achieving results.

Considering the characteristics of performance measurement frameworks, it can be seen that, they demonstrates the need to consider/measure drivers and results of them so that the performance measurement system can provide data for monitoring past performance and planning future performance. Additionally, they demonstrates the way in which measures help/contribute to an organisation's planning (feed forward) and control (feedback) system (Ballantine and Brignall, 1994).

The discussion on those frameworks has highlighted the key attributes of existing performance measurement frameworks that organisations can use in indentifying the set of performance measurements that appropriately reflect their performance and objectives of project.

Base on Neely (1998); Lingle & Schiemann (1996) and Bassioni, *et al*. 2006) and (Ballantine and Brignall, 1994) assertion, it can be deduced that in designing or developing performance measurement system, the following constituents are important;

i. Individual measures that quantify the efficiency and effectiveness of action;

ii. A set of measures that combine to assess the performance of an organisation as a whole;

iii. A supporting infrastructure that enables data to be acquired, collated, sorted, analyzed, interpreted and disseminated.

Many frameworks have been developed for construction project performance (Cocca and Alberti, 2009; Kagioglou, Cooper and Ghassan, 2001; Belassi and Tukel, 2006).

The purpose of such frameworks is to guide some construction project stakeholders' particularly the professionals, clients and contractors to use in assessing/determining project performance that will reflect their objectives (Neely, 1998).

2.8.2 Existing Performance Measurement Frameworks

A number of frameworks were developed in the early of 20th Century with a view to guide organisations/companies in defining a set of measures/criteria that they could use in assessing/determining construction project performance. A typical example is framework developed by Belassi and Icmeli (1996) suggested that, the framework in figure 2.1 is based on these four (4) grouped factors'/areas

i. Factors related to the project

ii. Factors related to the project managers and the team members

iii. Factors related to the organisation and

iv. Factors related to the external environment

As can be seen from figure 2.1, the groups are interrelated. A factor in one group can influence a factor in another group, and a combination of several factors from various groups might lead to project to succeed or fail. The framework has the advantage of grouping the critical factors. It

can also help project managers to understand the intra relationships between the different factors in different groups. Using the framework, project managers will be able to evaluate and monitor their project more accurately.

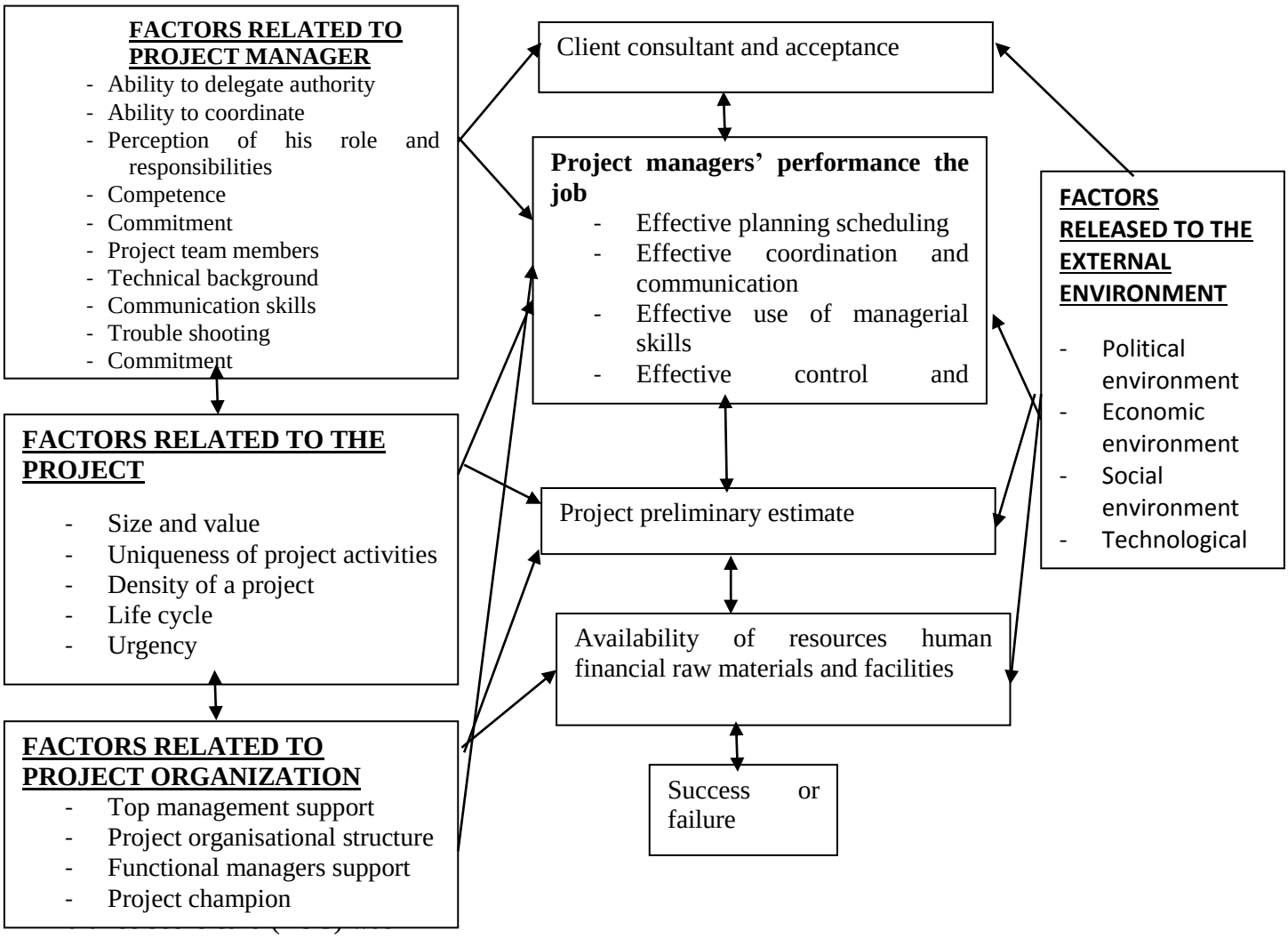

FIGURE 2.1: Performance measurement framework based on critical success/failure factors in project.

Source: Belassi and Tukel (2006).

Balance score card (BSC) was developed by Kaplan and Norton (1992) it is widely used management framework for the measurement of organisational performance and has a conceptual framework of translating an organisation's vision into set of performance indicators distributed among four (4) perspectives; financial, customer, internal business & process and learning & growth.

The authors identified the need to ensure that financial performance, the drivers of it (customer and internal operational performance), and the drivers of on-going improvement in future performance are given equal weighting. The balance scorecard reflects many of the attribute of other measurement frameworks but more explicitly links measurement to the organisation's strategy. The authors claim that it should be possible to deduce an organization's strategy by reviewing the measures on its balance scorecard.

Kaplan and Norton (1992) argued that the full potential of the balanced scorecard will only be realized if an organisation links its measures clearly, identifying the drivers of performance (Kaplan and Norton, 1996b). Conceptually, the use of the scorecard is similar to the use of the Tableau de Bord (Epstein and Manzoni, 1997). Developed in France in the early 20th century, the Tableau de Bord establishes a hierarchy of interrelated measures and cascading measures to different organisational levels, forcing functions and divisions of an organisation to position them in the context of the company's overall strategy.

Despite its widespread use, numerous authors have identified shortcomings of the balanced scorecard. It does not consider a number of features of earlier frameworks that could be used to enhance the framework. The absence of a competitiveness dimension, as included in Fitzgerald's et al's (1991) results and determinants framework, is noted by (Neely *et al.*, 1995). Others emphasized the importance of measurement of the human resources perspective/employees satisfaction, supplier performance, product/service quality and environmental/community

perspective (Maisel, 1992; Ewing and Lundahl, 1996, Lingle and Schiemann, 1996; Brown, 1996).

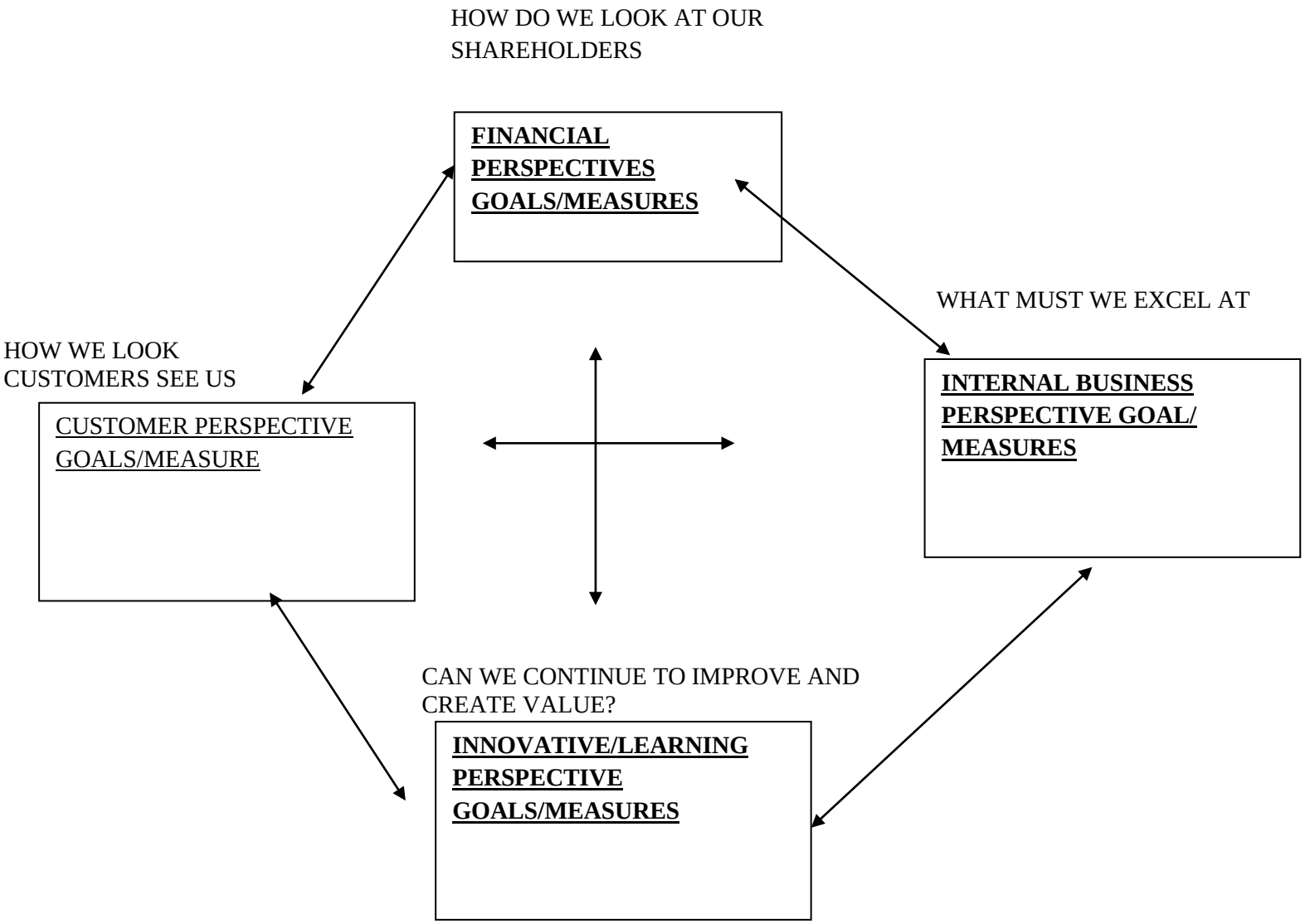

FIGURE 2.2: Balance scorecard (BSC) performance measurement framework

Source: Kaplan and Norton (1992).

Other frameworks developed are DuPont pyramid of financial ratios which shows a variety of financial ratios for return on investment. Furthermore, the pyramid of financial ratios provides information on hierarchical structure relating measures at different company levels (Kennerley & Neely, 2002).

The frameworks developed base on management accounting systems have some deficiencies in the way in which management accounting information is used to manage businesses (Johnson and Kaplan, 1987; Paul, 2014). Furthermore, they highlighted the failure of financial performance measures to reflect changes in the competitive circumstances and strategies of modern organisations. These deficiencies show shortcomings in the DuPont pyramid. Its cost focus provides a historical view, giving little information of future performance and encouraging short term issues (Bruns, 1998). That has prompted organisations to implement non-financial measures that appropriately reflect their objectives as well as financial measures that indicate the bottom line result.

Conclusively, Framework being system or structure that is used as the basis for making judgments, decisions etc. Following that, developing a framework using the emerging constrcuction performance measurement criteria as suggested by Kingsley (2010) will serve as a guide to construction professionals, clients and organisations/contractors' towards achieving the construction industry's stakeholders goal or project objectives (i.e. client satisfaction, profits and environment management)

2.9 ORGANISATIONAL STRUCTURE IN RELATION TO PERFORMANCE

Organisational structure is a firm's/organisation's formal role configuration, procedures, governance and control mechanisms, and authority and decision-making process.

Types of organisational structure

i. Simple structure: an organisational form in which the owner/manager makes all major decision directly & monitors all activities.
ii. Functional structure: consists of chief executive officer and limited corporate staff, with functional line managers in dominant areas such as production, accounting, marketing, research & development and human resources.
iii. Multidivisional (M-form)- structure composed of operating divisions where each division represents a separate business or profit center and the top corporate officer delegate responsibility for day to day operations and business-unit strategy to divisions managers.

2.9.1 Organisational system design

This is a crucial aspect of necessary project management skills. At the start of project, the organisational structure has to be put in place. This involves defining the roles and responsibilities of various members of the multidisciplinary team. The three (3) basic kinds of structures are;

i. Functional organisation is split into functional groupings. For example a company might be split into construction, engineering, finance and administration and other groups each with head of department or manager. Lines of command under the control of managers who share knowledge of the discipline and each section manager can easily see his/her responsibility and is readily aware of the people under his/her control.

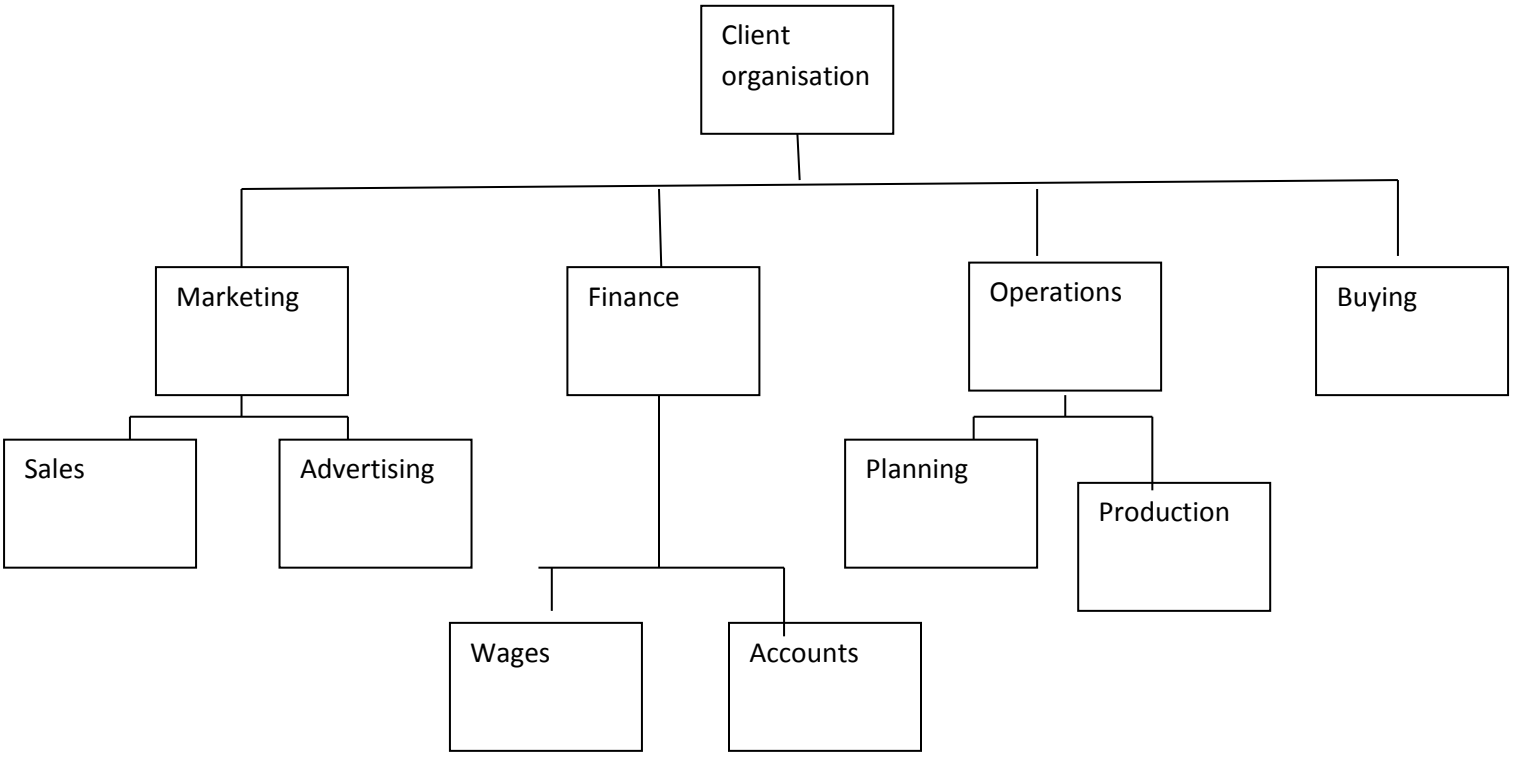

FIGURE 2.3: Functional organisational structure

Source: Fritz (1996).

ii. Project organisation: under this system, individuals are drawn from the functional grouping to work on the project. A project is established, which set the limits of the authority of the project manager within the overall functional organisation.

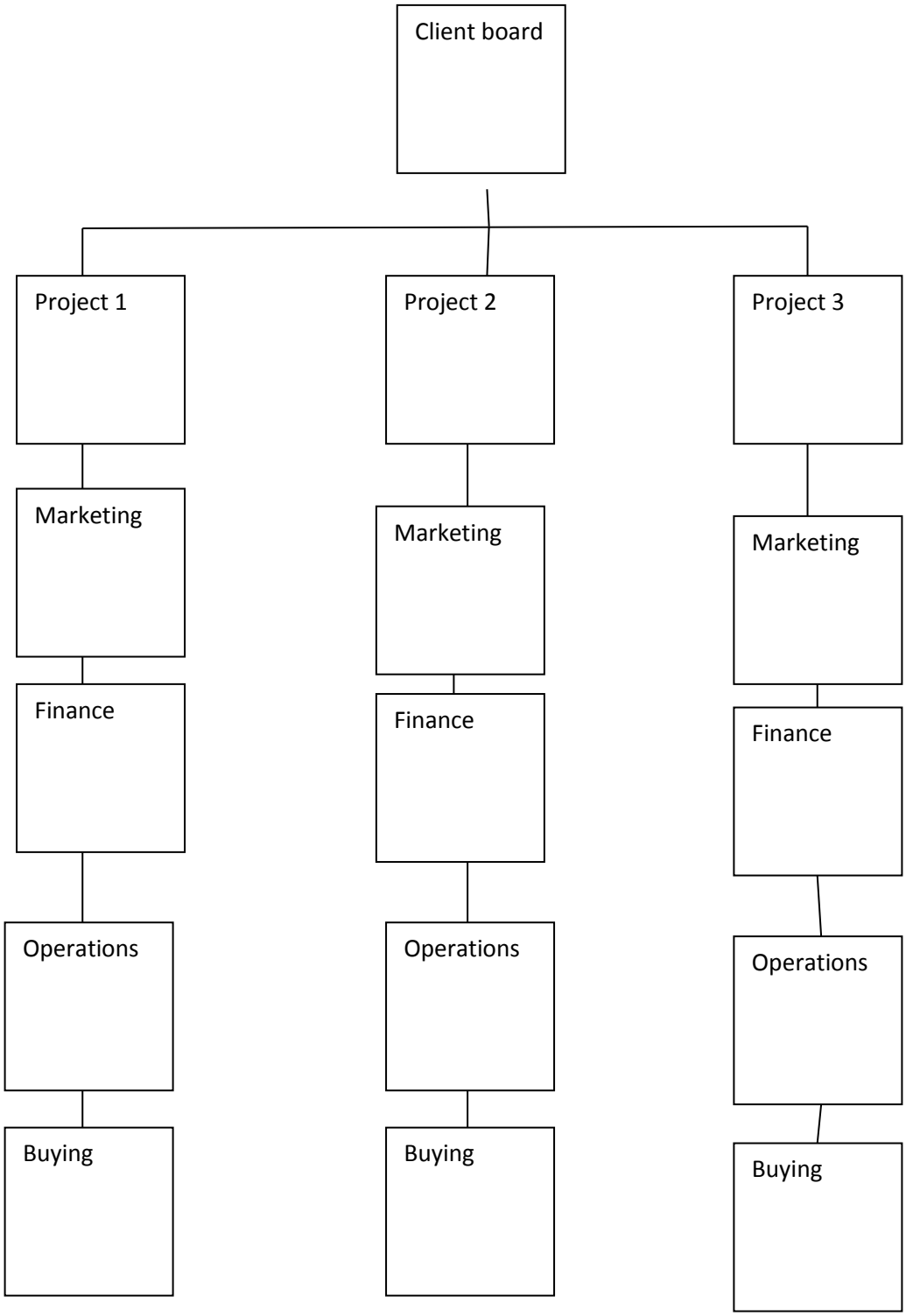

FIGURE 2.4: Project organisational structure

Source: Fritz (1996).

iii. Matrix organisation: organisation is selected from the functional groupings to work on a range of individual projects, not necessarily on full time basis. Authority over these persons is shared between their functional and project managers.

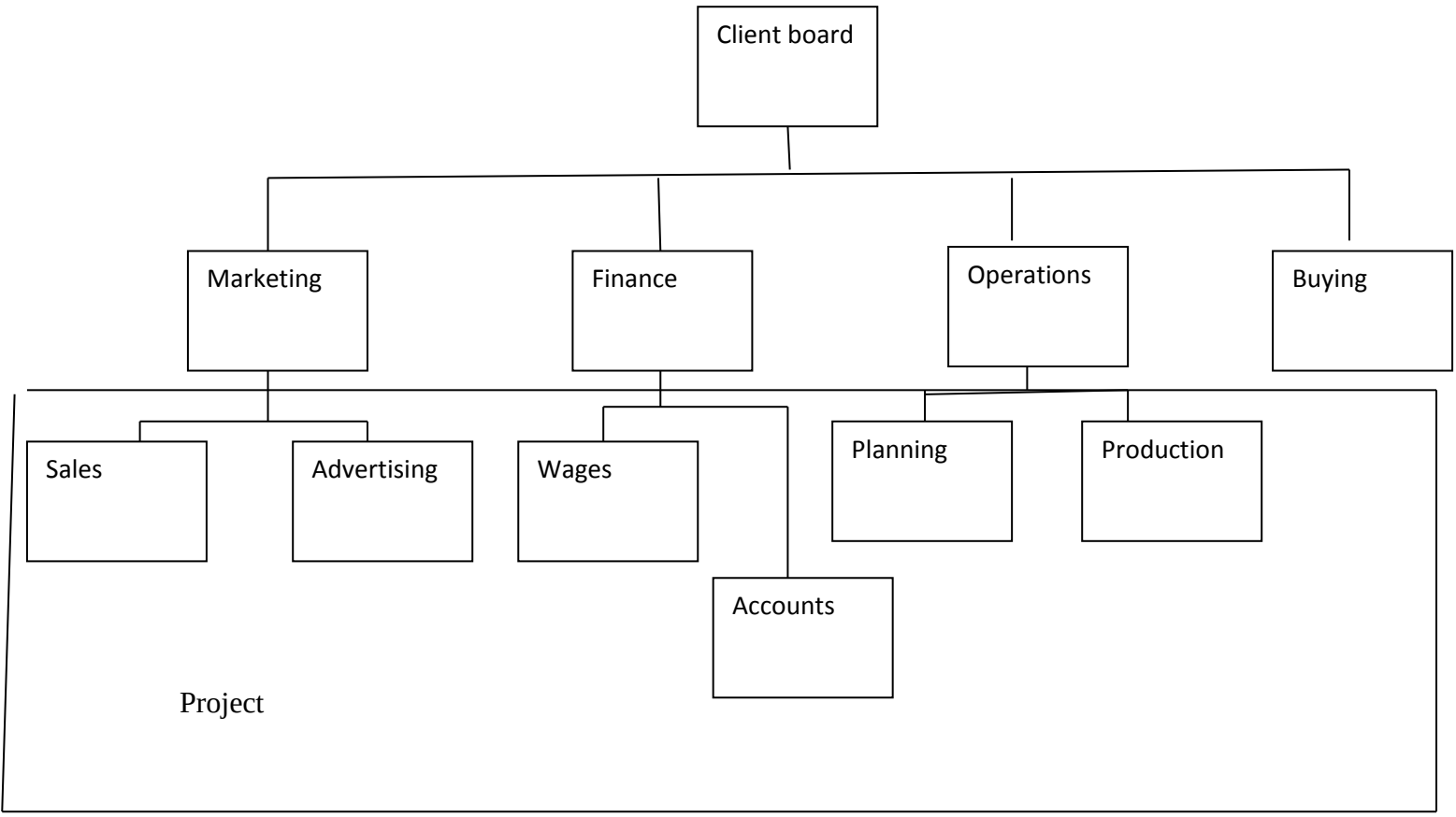

FIGURE 2.5: Matrix organisational structure.

Source: Fritz (1996).

2.9.2 Relationship between organisational structure and performance measurement criteria

Duggan (2014) asserted that organisational structure can inhibit or promote performance, depending how effectively the supervisory relationships and work flow influence productivity. Furthermore, organisational structure affects how performance is measured and managed. Dalton, Todor, Spendollin, Gordon and Porter (1978) reported that there is a positive relationship between duos well designed organisation's structure and performance.

Conclusively, most of the literature reviewed in this section shows that there is a direct relationship between organisational structure and performance. Following that, a well designed or structured organisational structure influence performance positively towards achieving project objectives.

Table 2.4: Thirty-seven (37) Harmonised Set of Construction Projects Performance Criteria

Criteria	Source
Construction cost (i.e. cost incurred while executing project)	(Xiao and Proverbs, 2003; Idrus *et al*., 2011)
Cost certainty (i.e. probability of completing project within budget)	(Xiao and Proverbs, 2003)
Client satisfaction on cost	(Xiao and Proverbs, 2003)
Construction time (i.e. the actual time use in executing project)	Xiao and Proverbs (2003), Idrus *et al*. (2011)
Time certainty (i.e. probability of completing project within programme)	Xiao and Proverbs (2003)
Client satisfaction on time	Xiao and Proverbs (2003)
Defects (shortcoming, imperfection observed at completion of the project)	Xiao and Proverbs (2003)
Liability period	(Xiao and Proverbs (2003)
Client satisfaction on cost	Xiao and Proverbs (2003), Komolafe *et al.*(2014)
Profitability	Xiao and Proverbs (2003)
Partnership	Xiao and Proverbs (2003), Komolafe, *et al.(* 2014)
Investment in R & D and training	Xiao and Proverbs (2003), Komolafe, *et al.(* 2014)
Environment protection	Kingsley (2010), Komolafe, et al. (2014)
Environmental management	Kingsley (2010)
Health and safety	Xiao and Proverbs (2003); Idrus *et al.*(2011)
Quality of finished project	Kingsley (2010), Idrus *et al*. (2011)
Level of technology	Idrus *et al.*(2011); Komolafe *et al.,(* 2014)
Contractors' flexibility	Idrus *et al.* (2011)
Labour dependency	Idrus et al. (2011)
Quality of coordination by construction team	Idrus et al. (2011)
Contractors project management Contractors capacity on manpower	Idrus *et al. (*2011)
Environment friendliness	Idrus *et al.*, (2011), Komolafe *et al.*, (2014)
Effective risk management	Kingsley (2010), Komolafe, *et al.*, (2014)

Operational base of contractors (i.e. well set out office coordination)	Kingsley (2010)
Effective communication (i.e. managing information flow)	Kingsley (2010)
Client satisfaction outcome (in terms of product and services)	Kingsley (2010)
Financial stability (i.e. access to credit)	Kingsley (2010)
Equipment holding (i.e. equipment use at site as against equipment listed during tendering)	Kingsley (2010)
Appropriateness of organizational structure in managing project (i.e. well laid outlines of responsibility, delegation and communication on site)	Kingsley (2010)
Creative and innovative ability in executing the project (i.e. ability to propose alternative constructional methods at site)	Kingsley (2010)
Prompt correction at site	Kingsley (2010)
Labour relations at site	Kingsley (2010)
Standard workmanship	Kingsley (2010)
Relations with subcontractors and statutory authorities	Kingsley (2010)
Site management practices (i.e. effective quality control system on site)	Kingsley (2010)
Ability to formulate and maintain practical programmes	Kingsley (2010)
Estimated cost of project	Kingsley (2010)

Source: Xiao and Proverbs (2003), Kingsley (2010), Idrus *et el*. (2011), Komolafe *et al*. (2014).

CHAPTER THREE

RESEARCH METHODS

3.0 RESEARCH APPROACH

A quantitative research approach was employed by the use of questionnaire survey for this study. Quantitative research deals with the collection and analysis of data in numeric form or nature (Hughes, 2006). The questionnaire survey helped in getting the needed data for the purpose of actualizing the research objectives by evaluating the data using different statistical analytical tools.

3.1 THE QUANTITATIVE RESEARCH APPROACH

Fellow and Liu (1999) stated that quantitative research approach is suitable for collecting data and in examining relationships between facts and help in linking those facts with theories and findings of any research carried out. It deals with measurable and quantifiable issues under research. Furthermore, it also deals with aspects for the measurement of quantity and amount (Eboh, 2009). Quantitative research approaches used scientific techniques to obtain measurements (quantified data) from social surveys such as; questionnaires, interview surveys, telephone survey etc. Lastly, reason of adopting quantitative research approach was to help in achieving the research objectives.

3.2 DATA COLLECTION METHOD

Based on the literature reviewed, a list of thirty-seven (37) criteria were found to be significantly and substantially used in today's industry for determining performance of construction projects. The thirty-seven (37) construction project performance measurement criteria were identified and harmonised from the literature reviewed (from different authors) and formed into a set of thirty-seven (37) project performance measurement criteria. The set of

thirty-seven (37) construction projects performance measurement criteria were identified from the review of the following; text books, conference papers, published national journals and published international journals.

3.3 QUESTIONNAIRE SURVEY

Questionnaire survey as a mode of data collection was chosen due the fact that it is widely used for descriptive and analytical surveys. Naom (1998), Enshassi *et al*. (2010) stated that the questionnaire is a widely used approach for descriptive and analytical surveys to find out the facts, opinions and views of respondents. The development of questionnaire was done in such a way that each question was clearly phrased to avoid ambiguity and checked for expression. It also offers researchers the opportunity to reach a large number of potential respondents in different locations, especially by using mail-response or online questionnaires (Russell, 2006). In general, questionnaire survey help in collecting information on facts, activities, level of knowledge, opinions, expectations and aspirations, membership of various groups, and attitudes and perceptions relevant to the study (Siniscalco and Auriat, 1998).

The aim of the research is to "develop a framework using the emerging criteria for determining performance of construction projects in Northern Nigeria". So in view of that, the project performance criteria that were derived from literature were used as basis for the respondents to assess and propose project performance criteria that would be useful in the Nigerian construction industry which reflect the view of major stakeholders of the industry.

The questionnaire Appendix (B) was designed in three (3) parts. The first part deals with general questions to the respondents with regards to their status in the construction industry, educational

qualification, years of experience in the industry, respondents' profession. This background information helps in ascertaining the reliability and credibility of data from the survey.

The second part of the questionnaire deals with information on the project performance criteria which respondents used as a guide on their assessment. The ranking was done in order to assess the level of importance of the set of thirty-seven (37) criteria with a view to determine the set of suitable criteria as suggested by (Kingsley, 2010; Idrus, *et al*., 2011).

The final part deals respondents additional comments. Respondents were given the opportunity to suggest any possible project performance criteria and also assess accordingly which is/are not part of the 37 criteria listed in the questionnaire. Based on the project performance criteria, likert rating scale was employed in order to help in making appropriate ratings. Likert scale generally includes an equal number of positively and negatively phrased statements.

Statement which employs the same response scale and randomly distributed through the questionnaire (Cheung and Mooi, 1994). Numerical score of 1 to 5 are assigned to each item for rating of those criteria.

The project performance criteria were ranked base on the level of importance of the set criteria used for determining construction project performance on a five (5) point likert rating scale of 1 to 5, 1 being not important and 5 being most important on level of importance where;

1= not important

2= least important

3= fairly important

4= important

5= most important

The questionnaire appendix (C) was designed in two parts. The first part deals with brief explanation on the framework developed in this study for determining construction project performance. The second part of the questionnaire consisted of respondents' assessment of the framework with a view to give its strengths and weakness. That will help subsequent researches in this area to make further improvements.

3.4 SAMPLING METHOD

According to list of Nigerian tertiary institutions (2015) there are seventy-three (73) public universities, eighty-five (85) polytechnics and fifty-eight (58) public colleges of education. This research obtained response from respondents (i.e. clients, contractors', consultants, end-users and other category of respondents) from the tertiary institutions within the Northern Nigeria.

Sample size

Sample size was drawn using Krejcie and Morgan's (1970) table for the determination of sample size for the five (5) categories of respondents (clients, contractors', consultants, end-users and others category of respondents). The reason of using Krejcie and Morgan's (1970) table is because the population is discrete since it has a finite (list able) range or it is known.

Below is how the research population was determined;

N the population size= (Total no. of universities in Nigeria + total no. of polytechnics + total no. of colleges of education)* (5 categories of respondents)

: N= (73 x 85 x 58) 5 = 1,080

Therefore, considering a population N = 1,080 using the Krejcie and Morgan's (1970) table, the sample size S will be = **285nr**. Conclusively, the required sample size for this study is two hundred and eighty-five (285) nr Questionnaires.

Questionnaire administration

A period of twelve (12) weeks was used for the distribution and retrieval of all responsive questionnaires appendix (B). Additional one (1) week was allowed to retrieve all administered questionnaires within the twelve (12) weeks which were not retrieved. All questionnaires which could not be retrieved after the elapse of thirteen (13) were considered as non-responsive. For questionnaire appendix (C), a period of two (2) weeks was used for distribution and retrieval.

Tertiary institutions in the Northern Nigeria are considered for the following reasons;

(a) The scope of the study is the construction projects in Northern Nigeria's tertiary Institutions. (b) The issue of logistic limited the number of the questionnaires that were administered. And this is supported statistically since it is possible to represent a population based on a number of samples (Kingsley, 2010).

(c) This study focuses on the following categories of respondents; Clients, Contractors', Consultants, End-users and other category of respondents (i.e. other campus community) involved in the Nigerian tertiary institutions projects particularly public universities,

polytechnics and colleges of education with a view to get the opinions of the major stakeholders on those set of emerging criteria. Nigerian tertiary institutions projects are chosen because there are relatively high construction activities taking place in them. That is supported by a report from News Agency of Nigeria (NAN) as at August, 2014, Tertiary Education Trust Fund (TETFUND) has a budget of three-hundred billion naira (N300Billion) meant to be spent on executing different projects in the Nigerian tertiary institutions. TETFUND is a Federal Government Agency saddles with the responsibility of managing, disbursing and monitoring tax fund meant for procuring construction projects and goods in Nigerian tertiary institutions in a form of intervention. Following that, it can be seen that TETFUND projects are normally run under similar conditions. Again, TETFUND projects can serve as a platform for easy access to most of the construction project stakeholders.

Another reason for chosen Nigerian tertiary institutions projects is because they are one of the projects where Clients and End-users sometimes act as different parties. That has helped this study in differentiating them, since it is looking at end-user as an independent party among the other stakeholders of the industry. Again, Nigerian tertiary institutions were chosen because they are located and visibly present in every state of the Nigerian federation. That has helped in reaching out to those key stakeholders of the Nigerian construction industry operating in the Nigerian tertiary institutions.

As it was not possible to cover the whole of Nigeria in the study, the study was restricted to some Tertiary Institutions within the Northern Nigeria. Since it is possible to use the most represent able sample size in research (Abdullahi, 2014).

3.5 DATA ANALYSIS TECHNIQUES

The data obtained from the questionnaire survey were analysed using descriptive analysis and simple percentages.

Descriptive Analysis

Weighted mean and standard deviation were used to determine the level of importance of the identified set of criteria used for determining performance of construction projects.

The formula that was used is as follows;

$$X = \frac{\sum fx}{\sum F} \quad \text{..... (i)}$$

$$SD = \frac{\sqrt{\sum f\left(x-\bar{x}\right)^2}}{\sum f} \quad \text{.....(ii)}$$

Where,

SD = Standard deviation

X = Mean

x = Ranking scale

N or $\sum fx$ = Sample size

F = Frequency of response

CHAPTER FOUR

RESULT, ANALYSIS AND DISCUSSIONS

4.1 DATA PRESENTATION

A total of two hundred and eighty-five (285) questionnaires were distributed to some key stakeholders involved in the tertiary institutions projects in Northern Nigeria.

4.1.1 Survey on Respondents' Status in the Construction Industry

The distribution of data collection by respondents' status in the construction industry shows that out of the two hundred and eighty-five (285) questionnaires administered, a total of one hundred and forty-seven (147) valid questionnaires were retrieved from the survey which represents 51.58% effective response rate. The following are how the responses stand; thirty-two (32) formed the responses from contractors', twenty-seven (27) formed the responses from consultants, twenty-one (21) forms response from clients, fifty-five (55) forms response from end-users and twelve (12) forms the response from others (i.e. other campus community). The response on the respondents' status in the construction industry is represented in the following percentages; contractors' formed 21.77%, consultants formed 18.37%, clients formed 14.29%, end-users formed 37.41% and others (other campus community) formed 8.16%

The distribution of data collection by respondents' status in the construction industry shows that there was wider coverage on capturing respondents' views and opinions. This is because responses were received from most of the key stakeholders of the construction industry which reflects the true view of the industry with regards to the emerging criteria used for determining construction project performance in today's environment.

Table 4.1: Distribution of Data collection by Respondents' Status in the Construction Industry

Status	Frequency	Percentage (%)	Valid percentage (%)
Contractors	32	21.77	21.77
Consultants	27	18.37	18.37
Clients	21	14.29	14.29
End-users	55	37.41	37.41
Others	12	8.16	8.16
Total	**147**	**100**	**100**

Source: Field work 2015

4.1.2 Survey on Respondents Qualifications

The data collection on respondents' qualification shows that the respondents' with Ordinary National diploma (OND) forms 17.01%, respondents with Higher National Diploma (HND) forms 23.81%, respondents' with Bachelor of science (BSc) forms 35.37%, respondents with masters of science (MSc) forms 20.41% and respondents with doctor of philosophy (PhD) forms 3.40%. That shows majority of the respondents' have qualifications of BSc and above. Based on that, it can be concluded that majority of the respondents have higher educational qualifications. That would further authenticate the reliability and validity of data obtained from the survey.

Table 4.2: Distribution of Data Collection by Respondents' Qualifications

Qualification	Frequency	Percentage (%)	Valid percentage (%)
ND	25	17.01	17.01
HND	35	23.81	23.81
BSc	52	35.37	35.37
MSc	30	20.41	20.41
PhD	5	3.40	3.40
Total	**147**	**100**	**100**

Source: Field work 2015

4.1.3 Survey on Respondents' Experience

The distribution of data collection by respondents experience in the construction industry shows that, respondents who are below 5 years forms 19.05%, 5-10years forms 23.13%. 11-15years forms 23.81%, 16-20years forms 14.29% and above 20years forms 19.72%. That has shown majority of the respondents are highly experienced in the construction industry. That has also helped the validity and reliability of data obtained in this study.

Table 4.3: Distribution of Data Collection by Respondents Experience in the Construction Industry

Experience	Frequency	Percentage (%)	Valid percentage (%)
Below 5years	28	19.05	19.05
5-10 years	34	23.13	23.13
11-15 years	35	23.81	23.81
16-20 years	21	14.29	14.29
Above 20 years	29	19.72	19.72
Total	**147**	**100**	**100**

Source: Field work 2015

4.1.4 Survey on Respondents Profession

The data collection on respondents' profession shows that Quantity surveyors forms 25.85%, Architects forms 23.81%, Builders forms 13.61%, structural engineers forms 10.20% Mechanical and Electrical engineers forms 5.44% and others (i.e. students and other members of campus community) forms 21.09%. It can be concluded that, professionals of the construction industry forms the highest percentage of respondents in this research. For that reason, that has also helped the reliability and validity of the research result.

Table 4.4: Distribution of Data Collection by Respondents' Professions

Profession	Frequency	Percentage (%)	Valid percentage (%)
Quantity Surveyors	38	25.85	25.85
Architects	35	23.81	23.81
Builders	20	13.61	13.61
Structural engineers	15	10.20	10.20
M & E engineers	8	5.44	5.44
Others	31	21.09	21.09
Total	**147**	**100**	**100**

Source: Field work 2015

The following are additional comments/ suggestions made by the respondents';

i. Ability to forecast and check fluctuation in market prices of basic items

ii. Our construction companies need to a align with global use of technology and equipment in gearing up with the construction works and other civil works, perhaps take lessons from countries like Dubai, who encourages innovative construction (modern day construction & strategy).

iii. Most indigenous construction firms/organisations lack essential equipments for their chosen trade and do decline partnership on areas of importance and also on man power.

iv. Economic policies need to be formed in such away to empower Nigeria construction contractors'.

v. Nigerian construction performance criteria in today's project environments centers' mainly around how much profit would a project yield. The higher the profitability level of a project, the higher the contractor performance will be.

The aforementioned additional comments from respondents may help if incorporated in the thirty seven (37) construction project performance criteria. This is because the additional comments and suggestions given by the respondents reflect what ought to be considered in the Nigerian construction industry towards improving construction project performance. That is also in-line with assertion of some authors who highlighted profitability, equipment holding, partnership, level of technology among other set of criteria that influence project performance (Kingsley, 2010; Idrus *et al*., 2011; Komolafe *et al.,* 2014).

4.2 DATA ANALYSIS

This section aims at analysing the data obtained from the questionnaire survey.

4.3 INTERPRETATION OF RESULTS

This section aims at discussing the result obtained after computation of the responses in terms of mean, standard deviation and ranking.

4.2.1 Assessing the overall ranking made by all the categories of respondents in terms of mean, standard deviation and rank values on the level of importance of the set of criteria

The ranking made by all the categories of respondents on the thirty-seven (37) criteria are in descending order of priority on the level of importance of the set of criteria for determining performance of construction projects in Northern Nigeria.

The ranking on the set criteria use for determining project performance is in descending order of priority which is in-line with the assertion made by Idrus *et al*. (2011) who reported that, identifying the performance measurement criteria as well as knowing the level of importance for each of the criteria as key in achieving the most favorable and desired out come for both clients and contractors'.

Therefore, considering these criteria; *client satisfaction on outcome* with mean value (4.23) ranked first, *effective risk management* with mean value (4.03) ranked second, *client satisfaction on cost* with mean value (4.03) also ranked second, *client satisfaction on time* with mean value (3.98) ranked third, *effectiveness of communication* with mean values (3.97) ranked fourth, *health and safety* with mean value (3.91) ranked fifth, *environment management* with mean value (3.88) ranked sixth, *cost certainty* with mean values (3.82) ranked seventh, *profitability*

with mean value (3.80) ranked eighth, client satisfaction on quality with mean value (3.80) ranked eighth, construction cost with mean value (3.76) ranked ninth, partnership with mean value (3.68) eleventh, investment in Research and Development and training with mean value (3.65) ranked tenth, environment protection with mean value (3.64) ranked eleventh, contractor's project management with mean value (3.64) also ranked eleventh, equipment holding with mean value (3.61) ranked twelfth, creative and innovative ability in executing project with mean value (3.53) ranked thirteenth, estimated cost of project with mean value (3.52) ranked fourteenth, quality on finished project with mean value (3.52) also ranked fourteenth, etc down to the last or thirty-seventh criteria *liability period* with mean value (2.33) have the potential to help the key parties in the construction industry to understand which criteria should be considered first and more important while determining project performance which would help in achieving project objectives. Additionally, the overall respondents' view with regard to the most important set of criteria is in-line with assertion made by Rockart (1982) who reported that most important construction project performance factors/criteria as key areas of activity which favorable results are absolutely necessary for a goal to be achieved.

All the standard deviation values calculated for these set of criteria; *client satisfaction on outcome, effective risk management, client satisfaction on time, effectiveness of communication, health and safety, environment management, construction cost, equipment holding, contractors' capacity on manpower, time certainty, standard workmanship, operational base of contractors' labour dependency and liability period* are low. The low standard deviation values obtained which are below 1.00 for those criteria shows that the ranking were made clustered around the mean values. That signifies the respondents ranking on those set of criteria is consistent. That shows a kind of agreement on the respondents ranking. But the highest standard deviation values

which are 1.00 and above obtained for the remaining criteria shows that the respondents have a disagreement. This is because the overall respondents ranking on the level of importance for the emerging criteria were not made clustered around the mean values.

DESCRIPTIVE ANALYSIS

Descriptive analysis tested the rankings of respondents to this research work in terms of mean and standard deviation with regards to level of importance of the set criteria used for determining construction project performance in the Northern Nigerian projects.

The ranking of the thirty-seven (37) construction project performance criteria in Table 4.5 are arranged in descending order of priority as ranked by respondents. The calculated mean values result help in the arrangement of the thirty-seven (37) construction project performance criteria in descending of priority. That was further used in the development of framework for determining performance of construction projects.

Table 4.5: Overall ranking made by all the categories of respondents in terms of mean, standard deviation and rank values on the level of importance for the criteria in descending order priority.

Criteria	Mean	Standard deviation	Rank
Client satisfaction on outcome	4.22	0.973423	1
Effective risk management	4.03	0.763991	2
Client satisfaction on cost	4.03	0.817654	2
Client satisfaction on time	3.98	0.999883	3
Effectiveness of communication	3.97	0.858795	4
Health and safety	3.91	0.779098	5
Environment management	3.88	0.886048	6
Cost certainty	3.82	1.065676	7
Profitability	3.80	1.07015	8
Client satisfaction on quality	3.80	1.192537	8
Construction cost	3.76	0.961739	9
Partnership	3.68	1.152377	10
Investment in R&D and training	3.65	1.074065	11
Environment protection	3.64	1.223317	12
Contractor's project management	3.64	1.061731	12
Equipment holding	3.61	0.974739	13
Creative and innovative ability un executing project	3.53	1.205369	14
Estimated cost of project	3.52	1.041337	15
Quality of finished project	3.52	1.070477	15
Appropriate of organisational structure in managing project	3.47	1.126188	16
Contractor's capacity on manpower	3.47	0.948192	16
Construction time	3.44	0.86164	17
Ability to formulate and maintain programmes	3.39	1.213752	18
Time certainty	3.39	0.974739	18
Quality of coordination of construction team	3.38	1.147105	19
Financial stability	3.36	1.131865	20
Standard workmanship	3.27	0.937188	21
Labour relations at site	3.18	1.021448	22
Level of technology	3.14	1.201107	23
Site management practice	3.12	1.030536	24
Operational base of contractor	3.08	0.846906	25
Labour dependency	3.06	0.990397	26
Relations with subcontractors and statutory authority	2.89	1.229494	27
Contractor's flexibility	2.89	1.111185	27
Prompt correction of defect	2.87	1.009627	28
Defect	2.58	1.096296	29
Liability period	2.33	0.966092	30

Source: Research findings 2015/16

4.2.2 Assessing the ranking made by contractors' in terms of mean, standard deviation and rank values on the level of importance of the set of criteria

The ranking by contractors' in terms of mean, standard deviation and rank values on the thirty-seven (37) criteria are in descending order of priority on the level of importance of the set of criteria used for determining performance of construction projects in Northern Nigeria.

Therefore, the contractors' are of the view that, considering these criteria; *client satisfaction on outcome* with mean value (4.25) ranked first, *health and safety* with mean value (4.06) ranked second, *profitability* with mean value (4.06) also ranked second, *effective risk management* with mean value (3.88) ranked third, *ability to formulate & maintain practical programmes* with mean values (3.81) ranked fourth, *standard workmanship* with mean values (3.81) ranked fifth, *quality on finished project* with mean values (3.81) ranked fifth, *partnership* with mean value (3.75) ranked sixth, etc down to the last or thirty-seventh criteria *liability period* with mean value (2.38) have the potential to help the key parties in the construction industry to understand which criteria should be considered first and more important while determining construction project performance which would lead to successful completion of project. All the standard deviation values calculated for all the set of criteria are low. Except for the following set of criteria; *creative & innovative ability in executing project, financial stability, construction cost, client satisfaction on cost, cost certainty, relations with subcontractors' and statutory authorities, client satisfaction on quality, environment protection, defect and liability period.*. The low standard deviation values obtained which are below 1.00 for those criteria shows that the ranking were made clustered around the mean values. This signifies that there is a consistency on the respondents ranking on those set of criteria. But the highest standard deviation values which are 1.00 and above obtained for the remaining criteria shows that the

respondents have a disagreement. This is because the contractors ranking on the level of importance for the emerging criteria were not made clustered around the mean values.

Table 4.6: Ranking made by Contractors in terms of mean, standard deviation and rank values on the level of importance of the Set of Criteria in descending order of priority

Criteria	Mean	Standard deviation	Rank
Client satisfaction on outcome	4.25	0.68313	1
Health and safety	4.06	0.771902	2
Profitability	4.06	0.853913	2
Effective risk management	3.88	0.806226	3
Ability to formulate and maintain practical programmes	3.81	0.834166	4
Standard workmanship	3.81	0.834166	4
Quality on finished project	3.81	0.910586	4
Partnership	3.75	0.856349	5
Effectiveness of communication	3.69	0.946485	6
Equipment holding	3.63	0.806226	7
Creative and innovative ability in executing project	3.63	1.087811	7
Financial stability	3.63	1.087811	7
Environment management	3.63	0.718795	7
Construction cost	3.56	1.093542	8
Appropriate of organisational structure in managing product	3.56	0.813941	8
client satisfaction on cost	3.50	1.264911	9
Quality of coordination of construction team	3.31	0.946485	10
Investment in R & D and training	3.31	0.873212	10
Cost certainty	3.31	1.138347	10
Client satisfaction on time	3.25	0.930949	11
Time certainty	3.25	0.856349	11
Site management practice	3.19	0.981071	12
Relations with subcontractors and statutory authority	3.13	1.087811	13
Labour dependency	3.13	0.806226	13
Operational base of contractors	3.06	0.853913	14
Construction time	3.06	0.853913	14
Level of technology	3.00	0.966092	15
Client satisfaction on quality	3.00	1.154701	15
Contractors capacity on manpower	3.00	0.632456	15
Contractors project management	3.00	0.632456	15
Contractors flexibility	2.94	0.771902	16
Estimated cost of project	2.88	0.806226	17
Labour relations at site	2.69	0.946485	18
Environment protection	2.69	1.195478	18
Defect	2.69	1.195478	18
Prompt correction of defect	2.63	0.957427	19
Liability period	2.38	1.147461	20

Source: Research findings 2015/16

4.2.3 Assessing the ranking made by consultants in terms of mean, standard deviation and rank values on the level of importance of the set of criteria

The ranking by consultants in terms of mean, standard deviation and rank values on the thirty-seven (37) criteria are in descending order of priority on the level of importance of the set criteria used for determining performance of construction projects in Northern Nigeria.

Therefore, the consultants' are of the view that, considering these criteria; *client satisfaction on outcome* with mean value (4.64) ranked first, *partnership* with mean value (4.43) ranked second, *environment management* with mean value (4.43) also ranked second, *ability to formulate & maintain practical programmes* with mean values (4.29) ranked third, *client satisfaction on quality* with mean values (4.29) also ranked third, *effectiveness of communication* with mean values (4.21) ranked fourth, *contractors' project management* with mean value (4.21) also ranked fourth, etc down to the last or thirty-seventh criteria *liability period* with mean value (2.07) have the potential to also help the key parties in the construction industry to understand which criteria should be consider first and more important while determining contractors' performance which would help in achieving project objectives.

All the standard deviation values calculated for all the set of criteria are low. Except for the following set of criteria; *contractors' project management,* client satisfaction on time, financial stability, investment in research and development & training, time certainty, construction time, profitability, quality on finished project, estimated project cost, prompt correction of defect, equipment holding and appropriateness of organisational structure in managing project. The low standard deviation values obtained which are below 1.00 for those criteria shows that the ranking were also made clustered around the mean values. This signifies that there is a consistency on the respondents ranking on those set of criteria. But the highest standard deviation values which are

1.00 and above obtained for the remaining criteria shows that the respondents have a disagreement. This is because the consultants ranking on the level of importance for the emerging criteria were not made clustered around the mean values.

Table 4.7: Ranking made by Consultants in terms of mean, standard deviation and rank values on the level of importance of the set of criteria in descending order of priority

Criteria	Mean	Standard deviation	Rank
Client satisfaction on outcome	4.64	0.744946	1
Partnership	4.43	0.513553	2
Environment management	4.36	0.928783	3
Ability to formulate and maintain practical programmes	4.29	0.61125	4
Client satisfaction on quality	4.29	0.726273	4
Effectiveness of communication	4.21	0.801784	5
Contractors project management	4.21	1.121714	5
Quality of coordination of construction team	4.21	0.892582	5
Cost certainty	4.14	0.864438	6
Construction cost	4.14	0.770329	6
Effective risk management	4.07	0.828742	7
Contractors capacity on manpower	4.00	0.784465	8
Health and safety	3.93	0.828742	9
Creative and innovative ability in executing project	3.79	0.974961	10
Client satisfaction on time	3.71	1.138729	11
client satisfaction on cost	3.71	0.99449	11
Financial stability	3.64	1.215739	12
Investment in R & D and training	3.64	1.336306	12
Time certainty	3.64	1.008208	12
Construction time	3.64	1.008208	12
Relations with subcontractors and statutory authority	3.57	0.851631	13
Profitability	3.57	1.01635	13
Standard workmanship	3.50	0.94054	14
Quality on finished project	3.50	1.224745	14
Labour relations at site	3.50	0.759555	14
Site management practice	3.36	1.336306	15
Estimated cost of project	3.21	1.121714	16
Environment protection	3.14	1.167321	17
Equipment holding	3.07	1.268814	18
Labour dependency	2.86	0.949262	19
Operational base of contractors	2.86	0.949262	19
Level of technology	2.79	1.368805	20
Contractors flexibility	2.57	1.157868	21
Appropriate of organisational structure in managing product	2.50	1.091928	22
Prompt correction of defect	2.14	0.856771	23
Defect	2.14	0.949262	23
Liability period	2.07	0.916875	24

Source: Research findings 2015/16

4.2.4 Assessing the ranking made by Clients in terms of mean, standard deviation and rank values on the level of importance of the set of criteria

The ranking by clients' in terms of mean, standard deviation and rank values on the thirty-seven (37) criteria are in descending order of priority on the level of importance of the set criteria used for determining performance of construction projects in Northern Nigeria.

Therefore, the clients considered the following as the important set of criteria in descending order of priority; *effective risk management* with mean value (4.58) ranked first, *client satisfaction on outcome* with mean value (4.58) also ranked first, *partnership* with mean value (4.42) ranked second, , *client satisfaction on cost* with mean value (4.25) ranked third, *equipment holding* with mean values (4.17) ranked fourth, *contractors' project management* with mean value (4.17) also ranked fourth, *client satisfaction on time* with mean values (4.17) ranked fourth, *environment management* with mean value (4.08) also ranked sixth, *client satisfaction on quality* with mean value (4.08) etc down to the last or thirty-seventh criteria *liability period* with mean value (2.08) have the potential to also help the key parties in the construction industry to understand which criteria should be consider first and more important while determining construction project performance which would lead to successful completion of project.

All the standard deviation values calculated for all the set of criteria are low. Except for the following set of criteria; *client satisfaction outcome,* cost certainty, *estimated cost of project, labour relations at site, ability to formulate & maintain practical programmes, creative & innovative ability in executing project, contractors' capacity on manpower, investment in research and development & training, financial stability, profitability, level of technology, quality on finished project, labour relations and contractors' flexibility.* The low standard deviation values obtained which are below 1.00 for those criteria shows that the ranking were

also made clustered around the mean values. This signifies that there is a consistency on the respondents ranking on those set of criteria. But the highest standard deviation values which are 1.00 and above obtained for the remaining criteria shows that the respondents have a disagreement. This is because the Clients ranking on the level of importance for the emerging criteria were not made clustered around the mean values.

Table 4.8: Ranking made by Clients in terms of mean, standard deviation and rank values on the level of importance for the criteria in descending order of priority

Criteria	Mean	Standard deviation	Rank
Effective risk management	4.58	0.514929	1
Client satisfaction on outcome	4.58	1.1645	1
Partnership	4.42	0.514929	2
client satisfaction on cost	4.25	0.753778	3
Equipment holding	4.17	0.717741	4
Contractors project management	4.17	0.937437	4
Client satisfaction on time	4.17	0.834847	4
Environment management	4.08	0.792961	5
Client satisfaction on quality	4.08	0.900337	5
Effectiveness of communication	4.00	0.852803	6
Quality of coordination of construction team	4.00	0.852803	6
Cost certainty	4.00	1.128152	6
Estimated cost of project	3.92	1.1645	7
Health and safety	3.92	0.900337	7
Construction time	3.92	0.900337	7
Labour relations at site	3.75	1.05529	8
Ability to formulate and maintain practical programmes	3.67	1.073087	9
Creative and innovative ability in executing project	3.50	1.243163	10
Appropriate of organisational structure in managing product	3.50	1.087115	10
Contractors capacity on manpower	3.50	1.167748	10
Investment in R & D and training	3.50	1.381699	10
Time certainty	3.50	0.904534	10
Financial stability	3.42	1.311372	11
Profitability	3.42	1.1645	11
Construction cost	3.33	0.984732	12
Operational base of contractors	3.33	0.984732	12
Level of technology	3.33	1.497473	12
Quality on finished project	3.33	1.154701	12
Site management practice	3.25	0.866025	13
Environment protection	3.17	1.193416	14
Prompt correction of defect	3.08	0.792961	15
Contractors flexibility	2.92	1.311372	16
Standard workmanship	2.83	0.834847	17
Relations with subcontractors and statutory authority	2.75	0.965307	18
Labor dependency	2.50	0.904534	19
Defect	2.50	0.904534	20
Liability period	2.08	0.996205	21

Source: Research findings 2015/16

4.2.5 Assessing the ranking made by End-users in terms of mean, standard deviation and rank values on the level of importance of the set of criteria

The ranking made by end-users' in terms of mean, standard deviation and rank values on the thirty-seven (37) criteria are in descending order of priority on the level of importance of the set criteria used for determining performance of construction projects in Northern Nigeria.

Therefore, the end-users considered the following as the important set of criteria which are in descending order of priority; *client satisfaction on time* with mean value (4.45) ranked first, *client satisfaction on cost* with mean value (4.4) ranked second, *environment management* with mean value (4.15) ranked third, *profitability* with mean value (4.10) also ranked fourth, i*nvestment in research and development & training* with mean value (4.05) ranked fifth, *effectiveness of communication* with mean value (4.0) ranked sixth, *client satisfaction on quality* with mean value (4.0) also ranked sixth, *appropriateness of organisational structure in managing project* with mean values (3.95) ranked seventh, etc down to the last or thirty-seventh criteria *relations with subcontractors' and statutory authorities* with mean value (2.25) have the potential to also help the key parties in the construction industry to understand which criteria should be consider first and more important while determining construction project performance which would lead to successful completion of project.

All the standard deviation values calculated for all the set of criteria are low. Except for the following set of criteria; *profitability, client satisfaction on quality, appropriateness of organizational structure in managing project, cost certainty, client satisfaction on outcome, contractors' project management, quality on finished project, contractors, capacity on manpower, creative & innovative ability in executing project, environment protection, level of technology,, labour relations at site, labour dependency, financial stability, contractors'*

flexibility, partnership and ability to formulate and maintain practical programmes. The low standard deviation values obtained which are below 1.00 for those criteria shows that the ranking were also made clustered around the mean values. This signifies that there is a consistency on the respondents ranking on those set of criteria. But the highest standard deviation values which are 1.00 and above obtained for the remaining criteria shows that the respondents have a disagreement. This is because the End-users ranking on the level of importance for the emerging criteria were not made clustered around the mean values.

Table 4.9: Ranking made by End-users in terms of mean, standard deviation and rank values on the level of importance for the criteria in descending order of priority

Criteria	Mean	Standard deviation	Ranking
Client satisfaction on time	4.45	0.686333	1
client satisfaction on cost	4.40	0.994723	2
Environment management	4.15	0.587143	3
Profitability	4.10	1.071153	4
Investment in R & D and training	4.05	0.825578	5
Effectiveness of communication	4.00	0.917663	6
Client satisfaction on quality	4.00	1.376494	6
Appropriate of organisational structure in managing product	3.95	1.099043	7
Construction cost	3.90	0.91191	8
Estimated cost of project	3.85	0.875094	9
Health and safety	3.80	0.695852	10
Cost certainty	3.75	1.069924	11
Client satisfaction on outcome	3.70	1.080935	12
Contractors project management	3.65	1.03999	13
Equipment holding	3.55	0.887041	14
Quality on finished project	3.50	1.147079	15
Contractors capacity on manpower	3.45	1.050063	16
Effective risk management	3.40	0.88258	17
Creative and innovative ability in executing project	3.35	1.460894	18
Environment protection	3.25	1.069924	18
Level of technology	3.25	1.118034	18
Standard workmanship	3.20	0.695852	19
Operational base of contractors	3.20	0.695852	19
Construction time	3.20	0.615587	19
Labour relations at site	3.20	1.005249	19
Labour dependency	3.15	1.03999	20
Financial stability	3.10	1.020836	21
Time certainty	3.00	0.917663	22
Contractors flexibility	2.95	1.099043	23
Partnership	2.90	1.293709	24
Site management practice	2.75	0.850696	25
Prompt correction of defect	2.55	0.887041	26
Ability to formulate and maintain practical programmes	2.50	1.235442	27
Quality of coordination of construction team	2.35	0.933302	28
Liability period	2.35	0.67082	28
Defect	2.35	0.67082	28
Relations with subcontractors and statutory authority	2.25	1.409554	29

Source: Research findings 2015/16

4.2.6 Assessing the ranking made by others category of respondent in terms of mean, standard deviation and rank values on the level of importance of the set of criteria

The ranking by others' in terms of mean, standard deviation and rank values on the thirty-seven (37) criteria are in descending order of priority on the level of importance of the set criteria used for determining performance of construction projects in Northern Nigeria.

Therefore, the others category of respondent considered the following as the important set of criteria which are in descending order of priority; *defect and client satisfaction on time* with mean values (5.00) both ranked first, *environment protection, client satisfaction &* time certainty with mean values (4.75) ranked second, *cost certainty* with mean value (4.5) ranked third, *estimated cost of project, prompt correction of defect & client satisfaction on outcome* with mean values (4.25) ranked fourth, *appropriateness of organisational structure in managing project & equipment holding* with mean values (4.00) ranked fifth, etc down to the last or thirty-seventh criteria *standard workmanship* with mean value (1.15) have the potential to also help the key parties in the construction industry to understand which criteria should be consider first and more important while determining construction project performance which would lead to successful completion of project.

All the standard deviation values calculated for all the set of criteria are low. Except for the following set of criteria; *site management practice, effective risk management, contractors' flexibility, client satisfaction on quality, relations with subcontractors' and statutory authorities, creative and innovative ability to execute project, profitability, labour dependency, partnership and standard workmanship.* The low standard deviation values obtained which are below 1.00 for those criteria shows that the ranking were also made clustered around the mean values. This signifies that there is a consistency on the respondents ranking on those set of criteria. But the

highest standard deviation values which are 1.00 and above obtained for the remaining criteria shows that the respondents have disagreement. This is because the other category of respondents ranking on the level of importance for the emerging criteria were not made clustered around the mean values.

Table 4.9.1: Ranking made by others category of respondents in terms of mean, standard deviation and rank values on the level of importance of the set of criteria in descending order of priority

Criteria	Mean	Standard deviation	Rank
Defect	5.00	0	1
Client satisfaction on time	5.00	0	1
Environment protection	4.75	0.5	2
Time certainty	4.75	0.5	2
client satisfaction on cost	4.75	0.5	2
Cost certainty	4.50	0.57735	3
Estimated cost of project	4.25	0.5	4
Prompt correction of defect	4.25	0.5	4
Client satisfaction on outcome	4.25	0.5	4
Appropriate of organisational structure in managing product	4.00	0.816497	5
Equipment holding	4.00	0.816497	5
Effectiveness of communication	4.00	0	5
Quality of coordination of construction team	4.00	0	5
Construction time	4.00	0	5
Environment management	3.75	0.5	6
Level of technology	3.75	0.957427	6
Health and safety	3.75	0.957427	6
Liability period	3.75	0.5	6
Construction cost	3.75	0.957427	6
Site management practice	3.50	1.290994	7
Effective risk management	3.50	1	7
Contractors capacity on manpower	3.50	0.57735	7
Contractors flexibility	3.50	1.732051	7
Investment in R & D and training	3.50	0.57735	7
Client satisfaction on quality	3.50	1.290994	7
Relations with subcontractors and statutory authority	3.25	1.5	8
Creative and innovative ability in executing project	3.25	1.258306	8
Profitability	3.25	1.5	8
Quality on finished project	3.00	0	9
Labour dependency	2.75	1.258306	10
Financial stability	2.50	0.57735	11
Operational base of contractors	2.50	0.57735	11
Contractors project management	2.50	0.57735	11
Partnership	2.50	1.290994	11
Ability to formulate and maintain practical programmes	2.25	0.957427	12
Labour relations at site	2.25	0.957427	12
Standard workmanship	2.00	1.154701	13

Source: Research findings 2015/16

4.2.7 Assessing the most important set of criteria for determining performance of construction projects by the overall respondents

Table 4.9.2 shows the ten (10) most important set of criteria as ranked by the overall categories of respondents (i.e. contractors', consultants, clients, end-users and other category of respondents). All the respondents consider the following as the most important criteria; *client satisfaction on outcome, effective risk management, client satisfaction on cost, client satisfaction on time, effectiveness of communication, health and safety, environment management, cost certainty, profitability and client satisfaction on quality*. It can be seen that, all the respondents considered "*client satisfaction on outcome"* as the most important criteria. That may be link to the fact that several studies have pointed out the need to consider client satisfaction as the primary objective of the construction industry (Latham, 1994; and Xiao and Proverbs, 2003). So in view of that, "client satisfaction" should be considered as the most important criteria while determining construction project performance. In a nutshell, that has shown the need to develop construction project performance measurement framework using set of criteria which are client-oriented base. That will surely enhance construction project performance which will lead to client satisfaction.

Table 4.9.2: The most important criteria for determining performance of construction projects as ranked by all the respondents (overall)

Criteria	Rank
Client satisfaction on outcome (i.e. in terms of product and service)	1
Client satisfaction on quality (i.e. in terms of standard of project)	2
Construction cost (cost incurred while executing project)	3
Construction time (time use in executing project)	4
Effective risk management	5
Effectiveness of communication	6
Client satisfaction on cost	7
Health and safety	8
Time certainty (probability of completing project within programme)	9
Quality on finished project	10

Source: Research findings 2015/16

4.2.8 Assessing the most important set of criteria for determining performance of construction projects ranked by each or individual respondents

Table 4.9.3 shows that contractors', consultants and end-users considered *"client satisfaction on outcome"* as the most important criteria. The reason of considering "*client satisfaction on outcome*" by these respondents (contractors', consultants and end-users) may be link to the fact that, most researches in the construction industry focus on ways to achieving the client satisfaction by successful completion of projects (Xiao and Proverbs, 2003). While clients considered *effective risk management* and other category of respondent considered *defect* as the most important criteria. Considering the individual respondents ranking, contractors view has a slight difference when compared the other respondents (i.e. clients, consultants, end-users and other category). This is because they considered "profitability" as one of the three most important criteria for determining construction project performance. That can be linked to the fact that contractors are normally out to maximize profit. But other category of respondents (i.e. other campus community) considered "defect" and "environment protection" as one of the most important criteria in project. That can be attributed to the fact hosting communities nowadays are more concern with the protection and preserving of their immediate environment which is in-line with Sustainable Development Goal (SDGs) of the United Nations Development Programme (UNDP) that is 2030 agenda.

In general, the ten (10) most important criteria as ranked by each or individual respondents are client-oriented base.

Table 4.9.3: The most important criteria for determining performance of construction projects by each or individual respondents

Contractors'	Consultants	Clients	End-users	Others	Rank
Client satisfaction on outcome	Client satisfaction on outcome	Effective risk management	Client satisfaction on time	Defect	1
Health and safety	Partnership	Client satisfaction on outcome	Client satisfaction on cost	Client satisfaction on cost	2
Profitability	Effective risk management	partnership	Effective risk management	Environment protection	3
Effective risk management	Environment management	Environment protection	Profitability	Time certainty	4
Ability to formulate programme	Ability to formulate programme	Client satisfaction on cost	Investment in R & D	Client satisfaction cost	5
Standard workmanship	Client satisfaction on quality	Equipment holding	Effectiveness of communication	Cost certainty	6
Quality on finished project	Effectiveness of communication	Contractors' project management	Client satisfaction on quality	Estimated project cost	7
Partnership	Contractors' project management	Client satisfaction on time	Appropriate of organisational structure	Prompt correction of defect	8
Effectiveness of communication	Quality of construction team	Environment friendliness	Construction cost	Client satisfaction on outcome	9
Equipment holding	Cost certainty	Client satisfaction on quality	Estimated cost of project	Appropriateness of organisational structure	10

Source: Research findings 2015/16

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1. SUMMARY OF FINDINGS

(a) The first objective of this study was achieved through the review of literature where by a lists of thirty-seven (37) criteria were generated from different authors. Researchers have suggested that, the level of importance of the set of criteria use for determining performance of construction projects should be found.

(b) Base on the evaluation of findings of this research work, it can be deduced that, the thirty-seven (37) criteria base on level of importance as ranked by respondents' and subsequently evaluated in descending order of priority in terms of mean and standard deviation values helped in achieving the second research objective. The result shows that the important criteria for determining construction project performance as ranked by the overall respondents are; *client satisfaction on outcome (i.e. in terms of product and service), environment management, client satisfaction on cost, client satisfaction on time, effectiveness of communication (i.e. managing information flow between contracting parties), health and safety, effective risk management, cost certainty (i.e. probability of completing project within budget), profitability, client satisfaction on quality, construction cost (i.e. cost incurred while executing project), partnership and investment in research and development and training.*

The respondents have an agreement on their ranking on the following set of criteria with regards to the level of importance of the criteria which involve the following; *client satisfaction on cost, construction time, liability period, client satisfaction on quality, contractor project management,*

environment friendliness, equipment holding, creative and innovative ability in executing project, prompt correction of defect, labour relations at site, standard workmanship, relations with subcontractors and statutory authorities and estimated cost of project. This is because there was no significant difference on their rankings. The respondents have a kind of disagreement on the remaining set of criteria which may be link to their different perception based on their status in the construction industry.

(c) Lastly, the third research objective is to develop a framework for determining performance of construction projects. The framework developed is base on two (2) components namely; emerging construction project performance criteria further broken down into segments and project performance.

The emerging construction project performance measurements criteria arranged in descending order of priority are further grouped into four (4) different segments namely;

i. Cost related criteria
ii. Time related criteria
iii. Quality related criteria
iv. Other related criteria in terms of sustainable development, organisation's management and organisational structure.

The four (4) different grouped criteria are arranged base on the respondents ranking on the level of importance of the 37 set of criteria for determining performance of construction projects in descending order of priority. The emerging project performance criteria workability depends on how well the organisation/firm organisational structure is well designed or formulated to adopt and deliver the criteria in order of priority as ranked by the respondents. That is supported by an

assertion made by Duggan (2014) who stated that organisational structure can inhibit or promote performance, depending how effectively the supervisory relationships and work flow influence productivity. Furthermore, organisational structure affects how performance is measured and managed.

Similarly, Dalton *et al*. (1978) also reported that there is a positive relationship between duos well designed organisation's structure and performance. Following that, it can be seen that efficient delivery of the emerging criteria depends on how well the firm's/organisation's structure is designed to adopt and deliver them in order of priority as ranked by the respondents. Furthermore, the emerging criteria as ranked by respondents in descending order of priority influence construction project performance positively which will further improved construction project performance towards achieving the overall project objectives (i.e. client satisfaction, profits, environment protection and other stakeholders' satisfaction). The construction project organisations of clients or consultants can only adopt the emerging criteria in ascending order of priority as ranked by respondents if their organisational structure was not originally designed to use the criteria. But if constructional professional and clients organisational structure is already designed to use the emerging criteria, then the criteria should be use in descending order of priority as ranked by respondents while delivering projects.

Framework being a system or structure that could be use as the basis for making judgments, decisions toward achieving project objectives. The framework developed in this study will allows monitoring performance and redirect organisational action when necessary. Furthermore, it can also serve as a guide to contractors' in identifying areas they need to overcome their weakness and to improve their performance towards achieving project objectives. It can also serve as a guide to other key stakeholders' of the construction industry particularly the clients and consultants to monitor and

evaluate projects (determine construction project performance) more accurately which will lead to achieving project objectives. Conclusively, the framework can serve as a general theoretical performance measurement system for construction organisations/firms towards achieving overall project objectives which in-line with assertion made by (Bassioni, *et al.*, 2006).

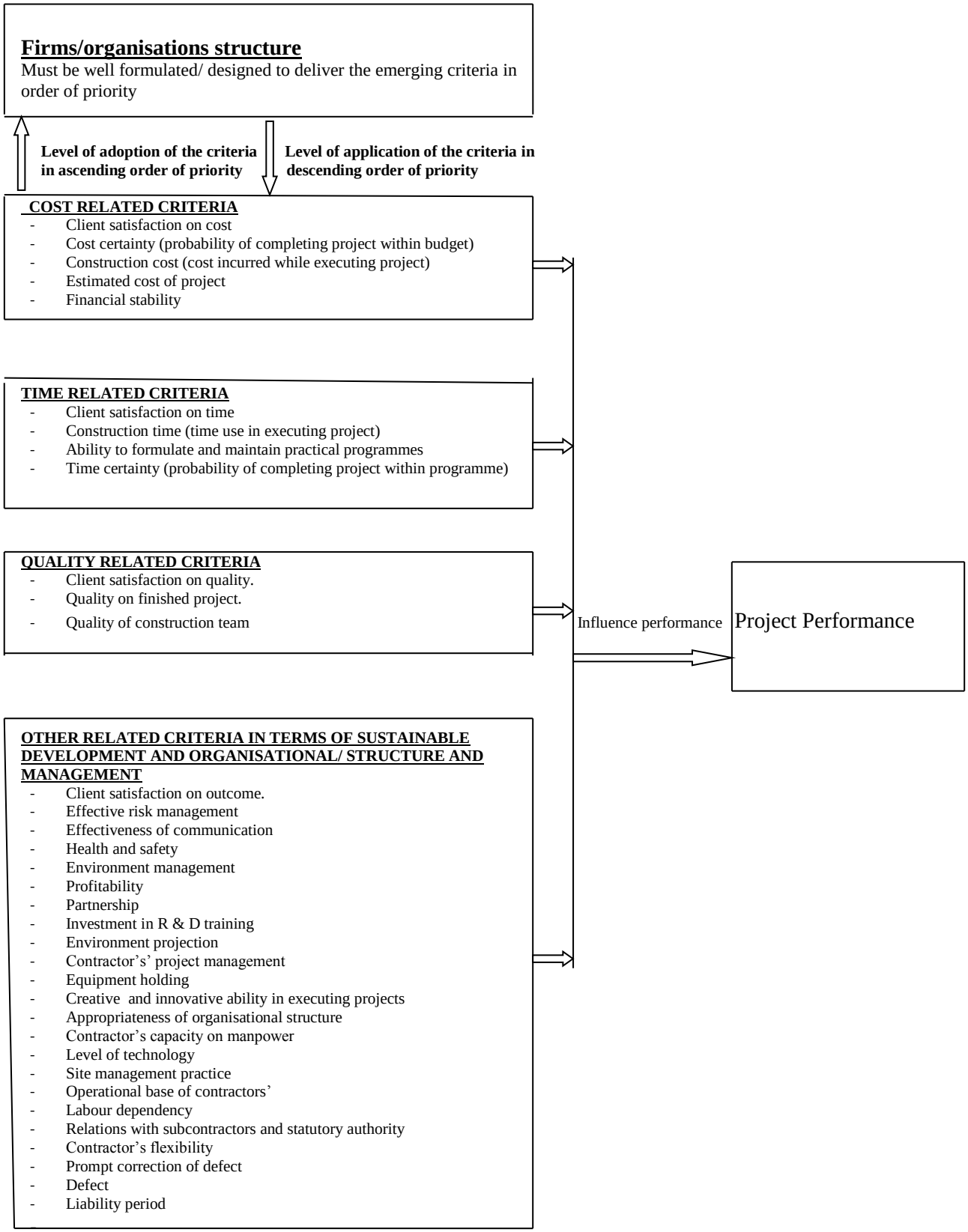

Figure 5.1: Framework developed base on the emerging criteria for determining performance of construction projects.

Source: Research findings 2016

Note: If firm's/organisational structure is not well formulated or designed in such a way to adopt and deliver the emerging criteria as ranked in descending order of priority will hinder the achievement of the project objectives (i.e. client satisfaction, profits, environment protection and other stakeholders' satisfaction)

5.1.1 Results obtained after test-running the framework developed base on the emerging criteria for determining performance of construction projects in terms of its strengths and weakness

5.1.1.1 Strengths

i. It can serve as guideline for monitoring and controlling project deliverables.

ii. It can guide organisations/firms to monitor performance and redirect organisational action when necessary.

iii. It has an ability to measure/determine project performance in relation or against the emerging criteria such as (i.e. environment management, partnership, relations with subcontractors and statutory authority, creative and innovative ability in executing projects, profitability, etc).

iv. It provides a systematic and organised way of using the grouped criteria in descending order of priority.

v. It can guide the consultants and clients to monitor and control project.

vi. The framework considers criteria beyond the normal traditional criteria (i.e. programme, budget and quality) such as sustainable issues.

5.1.1.2 Weakness

i. The framework developed is not base on construction project milestones.

ii. The environment management criteria (sustainable issues) in the framework have not been broken down into segments for easy handling.

iii. Some end-users and other category of respondents view captured while developing the framework may affect its accuracy due to the fact that they are not professionals of the construction industry

iv. The framework have fails to show the implementation stages

v. The framework developed has failed to state the particular type of construction project it can be used or applicable.

Conclusively, it can be seen that, the strengths and weakness identified after test-running the framework for determining performance of construction projects in this study, can be linked to the fact that most of the frameworks developed in previous studies have their benefits and also shortcomings. For example, despite its widespread use, numerous authors have identified shortcomings of the balanced scorecard. This is because it does not consider a number of features of earlier frameworks that could be used to enhance the framework. The absence of a competitiveness dimension, as included in Fitzgerald's et al's (1991) results and determinants framework, is noted by (Neely et al, 1995). Others emphasized the importance of measurement of the human resources perspective/employees satisfaction, supplier performance, product/service quality and environmental/community perspective (Maisel, 1992; Ewing and Lundahl, 1996, Lingle and Schiemann, 1996; Brown, 1996). Since past research have pointed out the need for continuous improvement (Sinclair and Zairi, 1995; Mbagua et al.; Egan, 1998), the framework developed in this study for determining construction project performance is subject to continuous improvement by subsequent research works in this area.

5.2 CONCLUSIONS

The framework developed in this study is based on emerging construction project performance criteria. In developing the framework, the perspective of End-users was also considered which makes the approach used in this study more holistic than the ones developed in previous studies.

The most important project performance criteria ranked by overall respondents are client-oriented base. Using the set criteria for determining performance of construction projects as ranked by the respondents in descending order of priority will help the parties of the construction industry to understand how important those criteria are, and which of the criteria to consider first and more important while determining construction project performance. That will improve construction project performance in the Nigerian construction industry which will lead to achieving project objectives. Additionally, considering the important criteria for determining performance of construction projects as ranked by respondents in descending order of priority will help the key parties of the industry to understand which of the criteria will lead to project failure if not considered while determining performance. Furthermore, the research also found that important criteria are key areas of activity which favorable results are absolutely necessary for a goal to be achieved.

Lastly, using the framework developed in this study for determining performance of construction projects will help the contractors' and other key stakeholders of the construction industry, particularly the clients and consultants to evaluate and monitor their project (determine project performance) more accurately which will lead to achieve the desired project objectives.

5.3 CONTRIBUTION AND APPLICATION OF RESEARCH

(i) The most important criteria ranked in this study are; *client satisfaction on outcome (i.e. in terms of product and service), effective risk management* with mean values 4.22 and 4.03 which represent 84.4% and 80.6% of the total mean ranking respectively *etc.* which differs with the most important criteria (i.e. *duration of construction, quality of final product* with mean values 3.99 and 3.94 which represent 79.8% and 78.8% of the total mean ranking respectively etc.) ranked in previous studies. That shows a difference of 4.6% and 1.8% respectively for the most important criteria ranked in this study with that of previous studies. The reason of the difference in ranking may be link to the fact that end-users view was also considered while assessing the emerging construction projects performance criteria. .

(ii) The study developed a framework for determining performance of construction projects using the emerging criteria (i.e. client satisfaction on outcome, environment management, partnership, relations with subcontractors and statutory authority, creative and innovative ability in executing projects etc).

(iii) The strengths of the framework developed in the study for determining performance of construction projects are; monitoring performance and redirecting organisational action, has a systematic and organized way of using the criteria in descending order of priority, considers criteria beyond the normal criteria (i.e. programme, budget and quality) that is other stakeholders issues (i.e. environment management, partnership, relations with subcontractors and statutory authority, creative and innovative ability in executing projects, profitability, etc). Furthermore, the weakness of the framework developed for determining performance of construction projects are; construction projects milestones not stated, some end-users and other category of respondents (i.e. some end-users view captured while

developing the framework may affect its accuracy and no detail implementation stages stated. Lastly, the weakness pin-pointed with the framework for determining construction projects performance will guide further researches in this area for dire improvements.

5.4 RECOMMENDATIONS

In view of the findings of this research work, the following recommendations shall be considered;

(i) Using the set criteria for determining performance of construction projects as ranked by respondents in descending order of priority will help the parties of the construction industry to understand how important those criteria are, and which of the criteria to consider first and more important while determining performance of construction projects performance. That will help to improve project performance in today's construction industry.

(ii) Considering the most important criteria for determining construction project performance as ranked by respondents in descending order of priority, will help the key parties of the industry to understand which of the criteria will lead to project failure if not considered while determining construction project performance. Lastly, using the framework for determining construction project performance can help the contractors' and other key stakeholders of the construction industry particularly the clients and consultants to achieve the desired project objectives.

(iii) The set of those emerging criteria base on their level of importance shall be considered as the key requirements for the selection of contractors' operating in the Nigerian construction industry with a view to improve their performance. Furthermore, the

construction projects performance measurement framework developed shall also be use in selecting construction organisations/firms that is by evaluating their organisational structure in relation to their capacity and competence in delivering those 37 set of criteria.

(iv) Continuous development shall be encouraged in the built environment on issues to do with competence, professionalism etc. That is by the tertiary institutions (University, polytechnics) and professional bodies such as Nigerian institute of Quantity Surveyor (NIQS), Nigerian Institute of Architect (NIA), Nigerian Institute of builders (NIOB) and Nigerian society of Engineers (NSE).

(v) There is the need to educate contractors' on the need to train their employees to learn new skills and be ready to embrace modern trends and innovations in construction as contain in set of the criteria identified and tested in this research work.

5.5 RECOMMENDED AREA FOR FURTHER STUDIES

Subsequent research work in this area shall determine the Nigerian construction organisations/firms current proficiency in using the framework developed in this research work for determining their performance.

REFERENCES

Adams, C. A., Kennerly, M. and Neely, A. D. (2002) The Performance Prism Perspective, *Journal of Cost management,* 15(1), 7-15

Ahadzie, D.K, Proverbs, D.G and Olomolaiye, P. (2005). Project Managers Performance Measures; *a Fresh Perspective. in 21st Arcom Conference*, Sons London Sept. 3-10.

Alarcon, L.F and Ashley, D.B. (1996). Modeling Project Performance for Decision making. *Journal of Construction, Engineering and Management*. 033-055: 4(3)

Al-Otaibi,S., Osmani, M. and Price, A.D.F. (2013). A Framework for improving project performance of standard design models in Saudi Arabia. *Journal of Engineering, project and production management* 85-98, 3(2)

Al-kharashi, A and Skitmore, M. (2009). Causes of delay in Saudi Arabia public construction project sector. *Construction management and Economics* 27(1) 13-23

Barkley, B. and Saylor, J. (1994). 'Customer Driven Project Management'. New York McGraw-Hill.

Bassioni, H.A, Price A.D.F and Hassan, T.M. (2004). Performance Measurement in Construction *Journal of Management and Engineering* ASCE 10:1061/ASCE 0742-597 20:2 (42).

Belassi, W. and Icmeli, T.O. (1996). A new framework for determining critical success/failure factors in project. *International journal of project management*. 14(3), 141-151. Elsevier science ltd and IPMA

Best, R and LANGSTON, C. (2001). Evaluation of Construction Contractors Performance: A Critical analysis of some recent research. Construction *Management and Economics Journal*, 2(4), 439-445.

Brown, A. and Adams, J. (2000) Measuring the effect of project management on construction outputs: a new approach. Int. Journal of Project Mgmt 18, 327-35.

Bruns, W. (1998), Project as a performance measure: Powerful Concept, insufficient measure. Performance Measurement Theory and Practical: *The first International Conference on Performance Measurement*, 14-17 July, Cambridge.

Chan, P.C and Chan P.L (2004) Key Performance Indicators for Measuring Construction Success J. Benchmark Bradford, 2, 203-221.

Chan, W.M and Kumarawasmy, M. (1996). An Evaluation of Construction Time Performance in the Building Industry. *Building and environment Journal*, 31, 569-578.

Cheung, K.C, Mooi, L.C. (1994). A Comparison between the rating scale model and dual scaling for Likert scales'.

Cheah, Y.J.C and Garrin, J.M (2004). Empirical Study of Strategic Performance of Global Construction firms. *Journal of Construction Engineering and Management*, 3, 808-819

Cocca, P and Alberti, M. (2009). A framework to assess performance measurement systems in SMEs. *IJPPM* 59(2) 186-200.

Costa, B.D, Formoso, T.C, Kagiogiou, M. and Alarcon, F.L. (2005). Performance Measurement for Benchmarking in the Construction industry. *Engineering, Construction & Architectural Management Journal.*

Construction Industry Institute (CII). (2002). Benchmarking Metric Programme'.http://www. Cii-Benchmarking.org/).

Corporate affairs commission (CAC) (2014). List of registered construction firms in Nigeria

Duggan, T. (2014). Organizational structure & control. State university of New york at Albany

Dalton, R.D., Todor, W.D, Spendollin, M.J, Gordon, J.F and Porter, L.W. (1978). Organization structure and performance: A critical review. Indian university.

Eboh, E.C. (2009). Social and Economic Research principles and methods. African institute for applied economics, Enugu, Nigeria

Enshassi .A, Mohammed S. and El-Karriri, A. (2010) Factors Affecting the Bid/ No. Bid Decision in the Palestinian Construction Industry. *Financial, Management Construction Journal* 15 (2).

Egan, J. (1998) Rethinking Construction: Report of the construction Taskforce on the scope of improving the quality and efficiency of UK Construction, Department of the Environment, Transport and the Regions, London.

Epstein, M. J. and Manzori, J.F. (1997) The balance Scorecard and Tableau de Bord: Translating Strategy into action, Management Accounting (US) 79 (2), 28-36.

Ewing, P. and Lundahl, L. (1996), The balanced scorecard at ABB Sweden – The EVITA Project. *The International Workshop on Cost Management*, 27 – 29, June, Venice, Italy.

Fellows, R and Liu, A (1999). Research methods for construction. Blackwell science ltd.

Field, A. (2005). Discovering statistics using SPSS for windows, sage publications, London.

Fitzgrerald, L., Johnston, R. Brignall, T. J., Silvestre, R, and Voss, C. (1991) Performance Measurement in Service Businesses. The Chartered Institute of Management Accountants, London.

Fritz, R. (1996). Corporate Inescapable Law of Organisational Structure. http//www.bestbooks.biz /organization/organizational structure.

Hong, C.W. (2004). 'Contractors Performance Prediction Model for the U.K Construction Contractors'. Study of Logistic Regression Approach'. *Journal of Construction Engineering and Management D. L:* 1061/ (ASCE) 0733-9364. 130: (691).

Hughes, C.L. (2004). Quantitative and qualitative approaches. Department of Sociology University of Warwick, CV4 7AL United Kingdom.

Ibironke, O.T. (2003). 'Construction Finance'. Timlay Quanti cost. Birni Kebbi Nigeria.

Ibrahim, M.L. (2014). Appraisal of stakeholders management practice in TETFUND. An unpublished MSc dissertation department of quantity surveying, Ahmadu Bello University, Zaria, Nigeria.

Idris, A Sodangi, M. and Haq-Hiesm, M. (2011). Prioritizing Project Performance Criteria within Client Perspective. *Research Journal of Applied Sciences, Engineering and Technology.* Peraic Darul Ridzuan Malaysia, 3(10), 1142-1151.

Johnson, H. T. and Kaplan, R.S (1987) Relevance Lost – The Rise and Fall of Management Accounting. Boston, M.A; Harvard Business School Press.

Kagioglou, M., Cooper, R. and Aoud, (2001). Performance Management in Construction: A Conceptual Framework. *Construction Management and Economics Journal*, 19, 85-95.

Kaplan and Norton (1992). Balance scorecard (BSC) framework for the measurement of organisational performance.

Kaplan R. S and Norton, D.P (1996b). Linking the balanced scorecard to strategy. California Management Review, 39(1), 53-79

Komolafe, A. Madaki, R.K and Muhammad, A. (2014). An Assessment of Contractors' Performance in the Public Works Project Delivery in Nigeria'. Presented at as 8^{th} *Annual Conference* Kaduna.

Kingsley, A.N. (2010). Construction Perspective on the Criteria for rating Contractors Performance in Ghanian Construction Industry. Department of Building Technology, University of Kumasi, Ghana.

Krejcie, R.V. and Morgan, W.E (1970). Determining sample size for research activities. Educational and psychological measurement, 30, 607-610.

Landau, S and Everett, B.S (2004). A hand book of statistical analyses using SPSS. Chapman And Hall/CRC Press company, Washington D.C

Longston, C. and Best, R. (2001). An Investigation into Construction Performance of High rise Commercial Office Buildings based on Productivity and Resource Consumption'. *International Journal of Construction Management*, 5, 57-76.

Ling, Y.Y (2002). Model for predicting Performance of Architects and Engineers. *Journal of Construction Engineers and Management* 10.1061 (ASCE) 0733-9364. 128:5 (446).

Lingle, Jitt and Schievann, W.A (1996). From balanced Scorecard to strategy gauge. Is measurement worth it? Management Review, March, 56-

List of Nigerian federal government ministries, agencies and commissions (2015). http//www.wikipedialist of Nigerian federal ministries, agencies and commissions.org

List of Nigerian tertiary institutions (2015).http/www.listofnigeriantertiaryinstitution.com

Maisel, L.S (1992). Performance Measurement: The balanced scorecard approach, *Journal of Construction Management*, summer, 47-52

Mamman, S. J. and Omozokpia, G.R (2014). An Evaluation of factors Affecting the Performance of Construction Projects in Niger State. *Journal of Environmental Sciences and Resources Management.*6 1.

Mbugua, L.M, Harris, P., Holt, G.D and Olomolaiye, P.O. (1999). 'A Framework for Determining Critical Success factors influencing Construction Business Performance'. *in Hughes W. (E.d) Proceedings 15th Annual Arcom Conference.* September 5-7 Reading Arcom 1:255-264.

Mohammed, S. (2003). Performance in International Construction Engineering and Management. Doilo. 1061 (ASCE) 0733-9364.

Muralidharan, R. (2004). A Framework for designing strategy content control. *International Journal of productivity and performance* 53 (7) 741- 840

Naoum S.G (1998). Dissertation Research and Writing for Construction Students. Read Education and Professional. Oxford; 23 (9) 38-48.

Neely, A., Gregory, M. and Platts K. (1994). Performance Measurement System Design. *I Jopan* Manufacturing Group, University of Cambridge U.K.

Neely, A. (1997). The Performance Measurement Revolution: Why now and what next *International. Journal of Project Managers.*

Neely, A.D. (1998). Performance Measurement: Why, What and How. London: Economist Books

Neely, A. D (2002) Business Performance Measurement – Theory and Practical. First Published in 2002.

Neely, A.A and Adams, C.A. (2001). The Performance Prison Perspective. *Journal of Construction Management,* 15(1), 7-15.

News Agency of Nigeria (NAN) (2014) Survey on Tertiary Education Trust Fund (TETFUND) monies budgeted for Nigerian tertiary institutions. http//www.nannews.com/tetfundprojects 2014.

S.M The Quantity Surveyors, 3010-18 Obandan, M.I (2009). A Critical Appraisal of the Nigeria Economy 54 Years After Independence UNDPs. Human Development Report 2008/2009

Smyth, H. (2010). Construction industry performance improvement programmes: the UK case of demonstration projects in the continuous improvement programme. *Construction Management and Economics.* 28(3) 255-270

Ogunlana S.O, Li, H and Sukhera, F.A. (2003). System Dynamic Approach to Exploring Performance Enhancement in Construction Organizations. *Journal of Construction Engineering and Management* 129.5 (528).

Ogunlana, S.O, Promkuntong, K. and Jearkir, M. (1996). Construction delays in fast growing economy: comparing Thailand with other economies. International Journal of Project Management. 14(1) 37-45

Olusola, A.R and Iyagba, R. (2012). Factors Affecting Contractors Performance: A comparative Study of Non-Value Adding Activities in Nigeria and Indonesia. *Journal of Emerging Trends in Economics and Management Sciences (JETEMS,)* 3(5), 467-474 University of Lagos Nigeria.

Olusola, S.B, and Opawole, A (2012). Critical success factors in PPP on infrastructure delivery in Nigeria. *Journal of facilities management,* 10(3), 212-225.

Omole, N. (2000). 'Surveying input to Engineering Projects: The need for Professionalism'. The Quantity Surveyors, 30, 10-18.

Oyewobi, L. O and Ogunsemi, D.R. (2010). Factors Influencing Re-work Occurrence in Construction. A study Selected Building Projects in Nigeria. *Journal of Building Performance*. 1 Issue L.

Parker, S .K and Skitmore, M. (2005). Project Management Turnover: Causes and Effects on Project Performance. *International Journal of Project Management,* (23), 206-214.

Project Management Book of Knowledge Glossary of M & E Concept and Terms Project management theory and practice lecture notes 2007. Herriot-watt university.

Pocock, J.B and T-Hyum, and Kim, M.K. (1996). Relationship between Project Interaction and Performance Indicators. *Journal of Construction Engineering and Management* Omara, C.E.O, Hyland W. and Chapman.

R.L. (1998). Performance Measurement and Strategic Change. *Journal of Construction Engineering and Management.* 8

Robert, F.C, Raja, R.A, E and Dar Ahrens, 2 (2003). Management's Perception of Key Performance Indicators for Construction. Do1:10.1061/ (ASCE) 0733-9364 129:2 (142).

Rockert, J. (1982). The changing roles of information system executive. A critical success factors perspective. Sloan management review, 23(1), 53-66

Robinson, H.S, Camillo, P.M, Anambra, C.J and Al-Ghasani, A.M. (2004). Review and Implementation of performance Management Models in Construction Engineering Organisation. Department of Civil and & Building Engineering Lough Borough University, Leceistershire, U.K.

Rose, K.H (1995). A Performance Measurement Model Quality Progress 28 (2):63-66.

Roberts, F.C, Raga R.A, Issa and Ahrens D. (2003). Management of Key performance Indicators for Construction. *Journal of Construction Engineering and Management* (ASCE).

Russell, B.H. (2006). Research methods in Anthropology; Qualitative and Quantitative methods. Walnut Creek; Altamira press.

Siniscalco, M.T. and Auriat, N. (1998). Quantitative research methods in educational planning. UNESCO international institute for educational planning.

Stanley, U; C and to Tobechukwu, O. (2014). Participation on Indigenous Contractors in Nigerian Public Sector Construction Projects and Their Challenges in Managing working Capital. *International Journal of Civil Engineering, Construction and estate management*, 1(1), 1-21.

Takim, R. and Akintoye, A. (2002). Performance Indicators for successful construction project performance: Greenwood , D (Ed.) 18th Annual ARCOM Conference, 2-4. Association of Researchers in Construction Management Vol. (2) 545-555

Wagelies-Lehtonen, T. (2001). Performance Measurement in Construction Logistics. *International Journal or Production Economic*, 69, 107-116.

Xiao, H, and Proverbs, D. (2003). Factors Influencing Contractors' Performance. An International Investigation. *Engineering, Construction and Architectural Management Journal*, 5, 322-332.

Xiao, H. and Proverbs, S. (2002). The Performance of contractors Japan, the UK and the USA a Comparative Evaluation of Construction Cost. *Construction, Management and Economics Journal*, 6, 423-435

United Nations Development Programme (UNDP) report. Helen Clark UNDP Administrator, 25th September, 2015. World Leaders have unprecedented opportunity this to shift the world onto path of inclusive, sustainable & resilient development

.

Yasamis, F. Arditi D. and Mohammed J. (2002). Assessing Contractor Quality Performance. Construction Management and Economic.2.210.

Wagelieus-leh tomen, T. (2001). Performance measurement in construction logistics. *International journal of production economics*, 69, 107-116.

Zayed, T., Elwakil, E. and Ammar, M. (2012) critical success factors of construction organization. International journal of Architecture, Engineering & construction. 1, 55

APPENDIX A: KREJCIE AND MORGAN'S (1970) TABLE FOR THE DETERMINATION OF SAMPLE SIZE

N	S	N	S	N	S
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370

150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	100000	384

N: Population S: Sample Size

Source: Krejcie and Morgan (1970) table for determination of sample size

APPENDIX B: QUESTIONNAIRE

Muhammad Anas

Department of Quantity Surveying,
Ahmadu Bello University, Zaria, Nigeria.
Tel No: +234(8)034258216
Email mohammedanas2006@gmail.com.

DISSERTATION TOPIC: **Framework for determining performance of construction projects in Northern Nigeria.**

This questionnaire forms part of an MSc in project management dissertation being undertaken by **Muhammad Anas** at Department of Quantity Surveying, Ahmadu Bello University (ABU), Zaria, Nigeria. The essence of this questionnaire is to assess the level of importance of criteria use for determining performance of construction projects in the Nigerian construction industry which were identified and harmonised from literature. The study focuses on Nigerian Tertiary Institutions only.

Your responds to this questionnaire would be appreciated. Please accept my kind assurance that your response will be keep in utmost confidentiality.

A GUIDE TO RESPONDENTS

A maximum of six (6) questions were set. Please respond by ticking in the appropriate column.

Section A: General questions

1. Status in the construction industry

☐ Contractor ☐ Consultant ☐ Client ☐ End-user ☐ Others

2. Educational qualification

☐ ND ☐ HND ☐ BSc ☐ MSc ☐ PhD

3. Years of experience in the Nigerian Construction Industry

☐ Below 5years ☐ 5-10years ☐ 11-15years ☐ 16-20years ☐ above 20years

4. Profession of respondent

☐ Quantity surveyor ☐ Architect ☐ Builder ☐ Structural engineer ☐ M & E Engineer ☐ Others

Section B: Ranking/Assessment

The table below represents the thirty-seven (37) criteria harmonized into thirty-seven (37) construction projects performance criteria as identified in literature which can be used in assessing project performance.

5. Please assess the level of importance of the identified set of criteria used for determining construction projects performance on a scale of 1 to 5, 1 being not important and 5 being the most important.

S/N	Criteria	Level of importance				
		1	2	3	4	5
1.	Construction cost(cost incurred while executing project)					
2.	Cost certainty(probability of completing project within budget)					
3.	Client satisfaction on cost					
4.	Construction time(time use in executing project)					
5.	Time certainty(probability of completing project within programme)					
6.	Client satisfaction on time					
7.	Defect (shortcoming, imperfection noticed on project after completion					
8.	Liability period					
9.	Client satisfaction on cost					
10.	Profitability					
11.	Partnership					
12.	Investment in R&D & Training					
13.	Environment protection					
14.	Health and safety					
15.	Quality on finished project					
16.	Level of technology					
17.	Contractors' flexibility					
18.	Labour dependency					
19.	Quality of coordination of Construction team					
20.	Contractors project management					

21.	Contractors capacity on manpower					
22.	Environment management					
23.	Effective risk management					
24.	Operational base of contractors (i.e well set out office coordination)					
25.	Effectiveness of communication (i.e managing information flow between consultant & contractor.					
26.	Client satisfaction on outcome (i.e in terms of product & services)					
27.	Financial stability (i.e access to credit).					
28.	Equipment holding (il.e equipment use at site as against equipment listed during tendering.					
29.	Appropriateness of organisational structure in managing product (i.e well laid out lines of responsibility, delegation and communication on site.					
30.	Creative and innovative ability in executing project (i.e ability to purpose alternative constructional methods at side.					
31.	Prompt correction of defect.					
32.	Labour relations at site.					
33.	Standard workmanship					
34.	Relations with subcontractors and statutory authorities.					
35.	Site management practice (i.e effective quality control system on) site.					
36.	Ability to formulate and maintain practical programmes.					
37.	Estimated cost of project.					
38	Others, specify					
39						
40						

Section C: Respondents additional comments

- ***Please give additional comments on construction performance criteria in today's project environments, if you have any***

  .....
  .....
  .....
  .....
  .....
  .....

Please give your address, if you would like to receive the summary of this study.

Name: .....
Address: .....
Phone number: .....
Email: .....

APPENDIX C: QUESTIONNAIRE

Muhammad Anas

Department of Quantity Surveying,
Ahmadu Bello University, Zaria, Nigeria.
Tel No: +234(8)034258216
Email mohammedanas2006@gmail.com.

DISSERTATION TOPIC: **Framework for determining performance of construction projects in Northern Nigeria.**

This questionnaire forms part of an MSc in project management dissertation being undertaken by **Muhammad Anas** at Department of Quantity Surveying, Ahmadu Bello University (ABU), Zaria, Nigeria. The essence of this questionnaire is to test-run the Framework developed in this study for determining construction projects performance in the Nigeria with a view to identify its strengths and weakness.

Your responds to this questionnaire would be appreciated. Please accept my kind assurance that your response will be keep in utmost confidentiality.

Section A: Brief explanation of the Framework

The framework developed is base on two (2) components namely; emerging construction project performance criteria further broken down into segments and project performance.The emerging construction projects performance measurements criteria arranged in descending order of priority are further grouped into four (4) different segments namely; cost related criteria, time related criteria, quality related criteria and other related criteria in terms of sustainable development, organisation's management and organisational structure.

The four (4) different grouped criteria are arranged base on the respondents ranking on the level of importance of the 37 set of criteria for determining construction project performance in descending order of priority. The emerging project performance criteria workability depends on how well the organisation/firm organisational structure is well designed or formulated to adopt and deliver the criteria in order of priority as ranked by the respondents. Following that, it can be seen that efficient delivery of the emerging criteria depends on how well the firm's/organisation's structure is designed to adopt and deliver them in order of priority as ranked by the respondents. Furthermore, the emerging criteria as ranked by respondents in descending order of priority influence construction project performance positively which will further improved construction project performance towards achieving the overall project objectives (i.e. client satisfaction, profits, environment protection and other stakeholders' satisfaction). The project clients and consultants can only adopt the emerging criteria in ascending order of priority as ranked by respondents if their organisational structure was not originally designed to use the criteria. But if construction professional and clients organisational structure is already designed to use the emerging criteria, then the criteria should be use in descending order of priority as ranked by respondents while delivering projects.

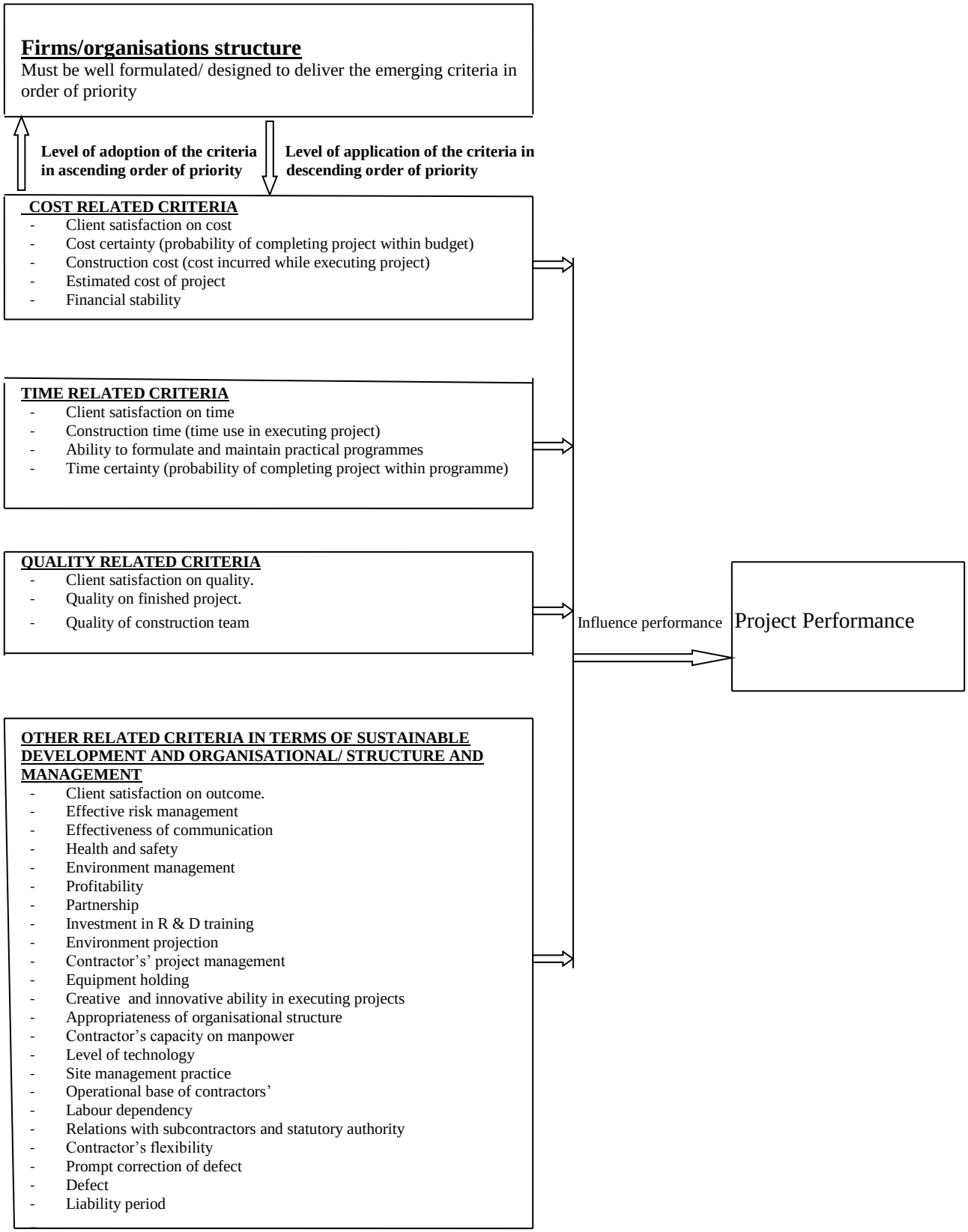

Figure 5.1: Framework developed base on the emerging criteria for determining performance of construction projects.

Source: Research findings 2016

Note: If firm's/organisational structure is not well formulated or designed in such a way to adopt and deliver the emerging criteria as ranked in descending order of priority will hinder the achievement of the project objectives (i.e. client satisfaction, profits, environment protection and other stakeholders' satisfaction)

Section B: Assessment of Framework in terms of strength(s) and weakness

The essence of test-running the construction project performance framework developed in this research by your assessment in terms of strength and weakness, this is because the past studies have pointed out the need for continuous improvement on performance measurement systems.

Please kindly give any ***strength(s)*** of the framework developed in this study for determining construction project performance below

I. ...……

.....

II. ……

.....

III. ……

.....

IV. ……

.....

V. ……

.....

Please kindly give any ***weakness*** of the framework developed in this study for determining construction project performance below

I. ...……

.....

II. ……

.....

III. ……

.....

IV. ……

.....

V. ……

.....

Please give your address, if you would like to receive the summary of this study.

Name: .....

Address: .....

Phone number: .....

Email: .....